



**„VICTOR BABES” UNIVERSITY OF MEDICINE AND PHARMACY FROM  
TIMIȘOARA  
FACULTY OF MEDICINE**

## **Physical Medicine and Rehabilitation**



TIMIȘOARA 2019

## 1. Physical Medicine and Rehabilitation (PMR)

- a. "Branch of medicine emphasizing prevention, diagnosis, and treatment of disorders – particularly related to nerves, muscles, and bones – that may produce temporary or permanent impairment.,,
- b. "Rehabilitation physicians are nerve, muscle, and bone experts who treat injuries or illnesses that affect how you move."
- c. "A branch of medicine which aims to enhance and restore functional ability and quality of life to people with physical impairments or disabilities."

The old term of balneo physiotherapy was been replaced in Romania since 2005 by this internationally acknowledged term. Balneotherapy comes from the latin: balneum "bath" and therapy and represents treatment of disease by bathing, usually practiced at spas. While it is considered distinct from hydrotherapy, there are some overlaps in practice and in underlying principles. Balneotherapy may involve hot or cold water, massage through moving water, relaxation, or stimulation.

Many mineral waters at spas are rich in particular minerals such as silica, sulfur, selenium, and radium. Medicinal clays are also widely used, which practice is known as "fangotherapy".

Diseases addressing PMR are disorders that impair the normal body function:

- Spinal cord injury
- Traumatic Brain
- Stroke
- Polytrauma
- Pediatric disorders
- Chronic Rheumatic conditions
- Burn & scars
- Cancer patients
- Post-Transplant patients
- Orthopedic conditions
- Pulmonary conditions
- Chronic Neurology Disorder (e.g., MS)
- Complex Medical Disorders

Objectives of PMR: To Improve the Quality of Life in patient by maximizing

- Independence
- Dignity
- Optimize Function
- Pain Relief
- Prevent & Manage Complications
- Coordinate Care, and above all,
- Educate Patients

The Rehabilitation Team consist of:

- PMR Physician- coordinator of the PMR team
- Physical Therapist
- Kinesi Therapist

- Rehabilitation Nurse
- Occupational Therapist
- Dietetician
- Recreational Therapist
- Prosthetics & Orthotics
- Psychology
- Respiratory Therapy specialist
- Social Worker
- Speech & Language Therapy specialist
- Vocational Counseling specialist

## 2. IMPAIRMENT; DISABILITY and HANDICAP

The evaluation and assessment represents the first step in medical rehabilitation and it is necessary for the specification of the patient's initial functional deficit, to estimate the applied therapy results, which may require to revalue the therapy, and to assess the final results.

The organism may be affected by the human pathology :

- a) at the organ level, causing an **impairment** = any loss or abnormality of a structure, psychological function, physiological function or anatomical function.
- b) at the individual as a whole, causing a **disability** = limitation or loss the capacity to perform an activity considered as usual for the individual.
- c) at the individual's social integration, causing a **handicap** = difficulty to perform and to maintain normal relations with environment according to individual's age, sex and cultural conditions.

The World Health Organization ( WHO) achieved an international classification for the cronic diseases regarding this three aspects = International Classification of Impairments, Disabilities and Handicaps (IDH Classification) which comprise :

- a) 9 big categorys of impairments,
- b) 9 big categorys of disabilitys,
- c) 7 big categorys of handicaps.

Methodology

### I. Quality of life evaluation and assessment

#### 1. *QALYs scale*

## Quality Adjusted Life Years ( QALYs )



- **Method:** Time tradeoff assessment

- **Calculus:** QALYs= Years to give for a perfect health / Life expectancy (years)

## II. Global evaluation and assessment-ICF checklist ( World Health Organization, September 2003.)

### Version 2.1a, Clinician Form for International Classification of Functioning, Disability and Health

*This is a checklist of major categories of the International Classification of Functioning, Disability and Health (ICF) of the World Health Organization. The ICF Checklist is a practical tool to elicit and record information on the functioning and disability of an individual. This information can be summarized for case records (for example, in clinical practice or social work). The checklist should be used along with the ICF or ICF Pocket version.*

**H 1.** When completing this checklist, use all information available. Please check those used:

**[1] written records [2] primary respondent [3] other informants [4] direct observation**

*If medical and diagnostic information is not available it is suggested to complete appendix 1: Brief Health Information (p 9-10) which can be completed by the respondent.*

**H 2.** Date \_\_\_\_/\_\_\_\_/\_\_\_\_ **H 3.** Case ID \_\_, \_\_, \_\_, \_\_ **H 4.** Participant No. \_\_\_\_, \_\_\_\_, \_\_\_\_  
Day Month Year CE or CS Case No. 1st or 2nd Evaluation FTC Site Participant

### A. DEMOGRAPHIC INFORMATION

**A.1 NAME** (optional) First \_\_\_\_\_ FAMILY \_\_\_\_\_

**A.2 SEX** (1) ☐ Female (2) ☐ Male

**A.3 DATE OF BIRTH** \_\_/\_\_/\_\_ (date/month/year)

**A.4 ADDRESS** (optional)

**A.5 YEARS OF FORMAL EDUCATION** \_\_

**A.6 CURRENT MARITAL STATUS:** (Check only one that is most applicable)

(1) Never married ☐ (2) Currently Married ☐ (3) Separated ☐ (4) Divorced ☐ (5) Widowed ☐ (6) Cohabiting ☐

**A.7 CURRENT OCCUPATION** (Select the single best option)

(1) Paid employment ☐ (2) Self-employed ☐ (3) Non-paid work, such as volunteer/charity ☐ (4) Student ☐ (5) Keeping house/House-maker ☐ (please specify) \_\_\_\_\_ (6) Retired ☐ (7) Unemployed (health reason) ☐ (8) Unemployed (other reason) ☐ (9) Other ☐

**A.8 MEDICAL DIAGNOSIS of existing Main Health Conditions, if possible give ICD Codes.**

1. No Medical Condition exists

2. .... ICD code: \_\_. \_\_. \_\_. \_\_. \_\_

3. .... ICD code: \_\_. \_\_. \_\_. \_\_. \_\_

4. .... ICD code: \_\_. \_\_. \_\_. \_\_. \_\_

5. A Health Condition (disease, disorder, injury) exists, however its nature or diagnosis is not known

### PART 1a: IMPAIRMENTS of BODY FUNCTIONS

• Body functions are the physiological functions of body systems (including psychological functions).

• Impairments are problems in body function as a significant deviation or loss.

**First Qualifier:** Extent of impairments

**0 No impairment** means the person has no problem

**1 Mild impairment** means a problem that is present less than 25% of the time, with an intensity a person can tolerate and which happens rarely over the last 30 days.

**2 Moderate impairment** means that a problem that is present less than 50% of the time, with an intensity, which is interfering in the person's day to day life and which happens occasionally over the last 30 days.

**3 Severe impairment** means that a problem that is present more than 50% of the time, with an intensity, which is partially disrupting the person's day to day life and which happens frequently over the last 30 days.

**4 Complete impairment** means that a problem that is present more than 95% of the time, with an intensity, which is totally disrupting the person's day to day life and which happens every day over the last 30 days.

**8 Not specified** means there is insufficient information to specify the severity of the impairment.

**9 Not applicable** means it is inappropriate to apply a particular code (e.g. b650 Menstruation functions for woman in pre-menarche or post-menopause age).

### **Short List of Body Functions Qualifier**

#### **b1. MENTAL FUNCTIONS**

**b110** Consciousness

**b114** Orientation (*time, place, person*)

**b117** Intellectual (*incl. Retardation, dementia*)

**b130** Energy and drive functions

**b134** Sleep

**b140** Attention

**b144** Memory

**b152** Emotional functions

**b156** Perceptual functions

**b164** Higher level cognitive functions

**b167** Language

#### **b2. SENSORY FUNCTIONS AND PAIN**

**b210** Seeing

**b230** Hearing

**b235** Vestibular (*incl. Balance functions*)

**b280** Pain

#### **b3. VOICE AND SPEECH FUNCTIONS**

**b310** Voice

#### **b4. FUNCTIONS OF THE CARDIOVASCULAR, HAEMATOLOGICAL, IMMUNOLOGICAL AND RESPIRATORY SYSTEMS**

**b410** Heart

**b420** Blood pressure

**b430** Hematological (*blood*)

**b435** Immunological (*allergies, hypersensitivity*)

**b440** Respiration (*breathing*)

#### **b5. FUNCTIONS OF THE DIGESTIVE, METABOLIC AND ENDOCRINE SYSTEMS**

**b515** Digestive

**b525** Defecation

**b530** Weight maintenance

**b555** Endocrine glands (*hormonal changes*)

#### **b6. GENITOURINARY AND REPRODUCTIVE FUNCTIONS**

**b620** Urination functions

**b640** Sexual functions

#### **b7. NEUROMUSCULOSKELETAL AND MOVEMENT RELATED FUNCTIONS**

**b710** Mobility of joint

**b730** Muscle power

**b735** Muscle tone

**b765** Involuntary movements

#### **b8. FUNCTIONS OF THE SKIN AND RELATED STRUCTURES**

#### **ANY OTHER BODY FUNCTIONS**

#### **Part 1 b: IMPAIRMENTS of BODY STRUCTURES**

- Body structures are anatomical parts of the body such as organs, limbs and their components.

- Impairments are problems in structure as a significant deviation or loss.

**First Qualifier: *Extent of impairment* Second Qualifier: *Nature of the change***

**0 No impairment** means the person has no problem

**1 Mild impairment** means a problem that is present less than 25% of the time, with an intensity a person can tolerate and which happens rarely over the last 30 days.

**2 Moderate impairment** means that a problem that is present less than 50% of the time, with an intensity, which is interfering in the persons day to day life and which happens occasionally over the last 30 days.

**3 Severe impairment** means that a problem that is present more than 50% of the time, with intensity, which is partially disrupting the person's day to day life and which happens frequently over the last 30 days.

**4 Complete impairment** means that a problem that is present more than 95% of the time, with an intensity, which is totally disrupting the persons day to day life and which happens every day over the last 30 days.

**8 Not specified** means there is insufficient information to specify the severity of the impairment.

**9 Not applicable** means it is inappropriate to apply a particular code (e.g. b650 Menstruation functions for woman in pre-menarche or post-menopause age).

**0** No change in structure

**1** Total absence

**2** Partial absence

**3** Additional part

**4** Aberrant dimensions

**5** Discontinuities

**6** Deviating position

**7** Qualitative changes in structure, including accumulation of fluid

**8** Not specified

**9** Not applicable

**Short List of Body Structures**

**First Qualifier:**

***Extent of impairment***

**Second Qualifier:**

***Nature of the change***

## **s1. STRUCTURE OF THE NERVOUS SYSTEM**

**s110** Brain

**s120** Spinal cord and peripheral nerves

## **s2. THE EYE, EAR AND RELATED STRUCTURES**

## **s3. STRUCTURES INVOLVED IN VOICE AND SPEECH**

## **s4. STRUCTURE OF THE CARDIOVASCULAR, IMMUNOLOGICAL AND RESPIRATORY SYSTEMS**

**s410** Cardiovascular system

**s430** Respiratory system

## **s5. STRUCTURES RELATED TO THE DIGESTIVE, METABOLISM AND ENDOCRINE SYSTEMS**

## **s6. STRUCTURE RELATED TO GENITOURINARY AND REPRODUCTIVE SYSTEM**

**s610** Urinary system

**s630** Reproductive system

## **s7. STRUCTURE RELATED TO MOVEMENT**

**s710** Head and neck region

**s720** Shoulder region

**s730** Upper extremity (*arm, hand*)

**s740** Pelvis

**s750** Lower extremity (*leg, foot*)

**s760** Trunk

## **s8. SKIN AND RELATED STRUCTURES**

## **ANY OTHER BODY STRUCTURES**

## **PART 2: ACTIVITY LIMITATIONS & PARTICIPATION RESTRICTION**

- Activity is the execution of a task or action by an individual. Participation is involvement in a life situation.

- Activity limitations are difficulties an individual may have in executing activities. Participation restrictions are problems an individual may have in involvement in life situations.

The **Performance qualifier** indicates the **extent of Participation restriction** by describing the persons **actual performance** of a task or action in **his or her current environment**. Because the current environment brings in the societal context, performance can also be understood as "involvement in a life situation" or "the lived experience" of people in the actual context in which they live. This context includes the environmental factors – all aspects of the physical, social and attitudinal world that can be coded using the Environmental. The Performance qualifier measures the difficulty the respondent experiences in **doing things, assuming that they want to do them**.

The **Capacity qualifier** indicates the **extent of Activity limitation** by describing the **person ability** to execute a task or an action. The Capacity qualifier focuses on limitations that are inherent or intrinsic features of the person themselves. These limitations should be direct manifestations of the respondent's health state, **without the assistance**. By assistance we mean the help of another person, or assistance provided by an adapted or specially designed tool or vehicle, or any form of environmental modification to a room, home, workplace etc. The level of capacity should be judged relative to that normally expected of the person, or the person's capacity before they acquire their health condition.

**Note:** Use Appendix 2 if needed to elicit information on the Activities and Participation of the individual

**First Qualifier:** Performance. Extent of Participation Restriction

**Second Qualifier:** Capacity (without assistance). Extent of Activity limitation

**0 No difficulty** means the person has no problem

**1 Mild difficulty** means a problem that is present less than 25% of the time, with an intensity a person can tolerate and which happens rarely over the last 30 days.

**2 Moderate difficulty** means that a problem that is present less than 50% of the time, with an intensity, which is interfering in the person's day to day life and which happens occasionally over the last 30 days.

**3 Severe difficulty** means that a problem that is present more than 50% of the time, with an intensity, which is partially disrupting the person's day to day life and which happens frequently over the last 30 days.

**4 Complete difficulty** means that a problem that is present more than 95% of the time, with an intensity, which is totally disrupting the person's day to day life and which happens every day over the last 30 days.

**8 Not specified** means there is insufficient information to specify the severity of the difficulty.

**9 Not applicable** means it is inappropriate to apply a particular code (e.g. b650 Menstruation functions for woman in pre-menarche or post-menopause age).

**Short List of A&P domains Performance Qualifier /Capacity Qualifier**

#### **d1. LEARNING AND APPLYING KNOWLEDGE**

**d110** Watching

**d115** Listening

**d140** Learning to read

**d145** Learning to write

**d150** Learning to calculate (*arithmetic*)

**d175** Solving problems

#### **d2. GENERAL TASKS AND DEMANDS**

**d210** Undertaking a single task

**d220** Undertaking multiple tasks

#### **d3. COMMUNICATION**

**d310** Communicating with -- receiving -- spoken messages

**d315** Communicating with -- receiving -- non-verbal messages

**d330** Speaking

**d335** Producing non-verbal messages

**d350** Conversation

#### **d4. MOBILITY**

**d430** Lifting and carrying objects

**d440** Fine hand use (*picking up, grasping*)

**d450** Walking

**d465** Moving around using equipment (*wheelchair, skates, etc.*)

**d470** Using transportation (*car, bus, train, plane, etc.*)

**d475** Driving (riding bicycle and *motorbike, driving car, etc.*)

**d5. SELF CARE**

**d510** Washing oneself (*bathing, drying, washing hands, etc.*)

**d520** Caring for body parts (*brushing teeth, shaving, grooming, etc.*)

**d530** Toileting

**d540** Dressing

**d550** Eating

**d560** Drinking

**d570** Looking after one's health

**d6. DOMESTIC LIFE**

**d620** Acquisition of goods and services (*shopping, etc.*)

**d630** Preparation of meals (*cooking etc.*)

**d640** Doing housework (*cleaning house, washing dishes laundry, ironing, etc.*)

**d660** Assisting others

**d7. INTERPERSONAL INTERACTIONS AND RELATIONSHIPS**

**d710** Basic interpersonal interactions

**d720** Complex interpersonal interactions

**d730** Relating with strangers

**d740** Formal relationships

**d750** Informal social relationships

**d760** Family relationships

**d770** Intimate relationships

**d8. MAJOR LIFE AREAS**

**d810** Informal education

**d820** School education

**d830** Higher education

**d850** Remunerative employment

**d860** Basic economic transactions

**d870** Economic self-sufficiency

**d9. COMMUNITY, SOCIAL AND CIVIC LIFE**

**d910** Community Life

**d920** Recreation and leisure

**d930** Religion and spirituality

**d940** Human rights

**d950** Political life and citizenship

**ANY OTHER ACTIVITY AND PARTICIPATION**

**PART 3: ENVIRONMENTAL FACTORS**

• *Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives.*

**Qualifier in environment:** **0** No barriers **0** No facilitator

**Barriers or facilitator**

**1** Mild barriers **+1** Mild facilitator

**2** Moderate barriers **+2** Moderate facilitator

**3** Severe barriers **+3** Substantial facilitator

**4** Complete barriers **+4** Complete facilitator

**Short List of Environment Qualifier barrier or facilitator**

**e1. PRODUCTS AND TECHNOLOGY**

**e110** For personal consumption (*food, medicines*)

**e115** For personal use in daily living

**e120** For personal indoor and outdoor mobility and transportation

**e125** Products for communication

**e150** Design, construction and building products and technology of buildings for public use

**e155** Design, construction and building products and technology of buildings for private use

## **e2. NATURAL ENVIRONMENT AND HUMAN MADE CHANGES TO ENVIRONMENT**

**e225** Climate

**e240** Light

**e250** Sound

## **e3. SUPPORT AND RELATIONSHIPS**

**e310** Immediate family

**e320** Friends

**e325** Acquaintances, peers, colleagues, neighbors and community members

**e330** People in position of authority

**e340** Personal care providers and personal assistants

**e355** Health professionals

**e360** Health related professionals

## **e4. ATTITUDES**

**e410** Individual attitudes of immediate family members

**e420** Individual attitudes of friends

**e440** Individual attitudes of personal care providers and personal assistants

**e450** Individual attitudes of health professionals

**e455** Individual attitudes of health related professionals

**e460** Societal attitudes

**e465** Social norms, practices and ideologies

## **E5. SERVICES, SYSTEMS AND POLICIES**

**e525** Housing services, systems and policies

**e535** Communication services, systems and policies

**e540** Transportation services, systems and policies

**e550** Legal services, systems and policies

**e570** Social security, services, systems and policies

**e575** General social support services, systems and policies

**e580** Health services, systems and policies

**e585** Education and training services, systems and policies

**e590** Labor and employment services, systems and policies

## **ANY OTHER ENVIRONMENTAL FACTORS**

### **Part 4: OTHER CONTEXTUAL INFORMATION**

**4.1** Give a thumbnail sketch of the individual and any other relevant information.

**4.2** Include any **Personal Factors** as they impact on functioning (e.g. lifestyle, habits, social background, education, life events, race/ethnicity, sexual orientation and assets of the individual).

### **Appendix I:**

#### **BRIEF HEALTH INFORMATION**

**[ ] Self Report [ ] Clinician Administered**

**X.1** Height : \_\_\_/\_\_\_/\_\_\_ cm (or inches)

**X.2** Weight: \_\_\_/\_\_\_/\_\_\_ kg (or pounds)

**X.3** Dominant Hand (prior to health condition): Left [ ] Right [ ] Both hands equally [ ]

**X.4** How do you rate your physical health in the past month?

Very good [ ] Good [ ] Moderate [ ] Bad [ ] Very bad [ ]

**X.5** How do you rate your mental and emotional health in the past month?

Very good [ ] Good [ ] Moderate [ ] Bad [ ] Very bad [ ]

**X.6** Do you currently have any disease(s) or disorder(s)? [ ] NO [ ] YES

If YES, please specify: \_\_\_\_\_

**X.7** Did you ever have any significant injuries that had an impact on your level of functioning? [ ] NO [ ] YES

If YES, please specify \_\_\_\_\_

**X.8** Have you been hospitalized in the last year? [ ] NO [ ] YES

If YES, please specify reason(s) and for how long?

1. \_\_\_\_\_; \_\_\_\_\_. \_\_\_\_\_. \_\_\_\_ days

2. \_\_\_\_\_; \_\_\_\_\_. \_\_\_\_\_. \_\_\_\_ days

3. \_\_\_\_\_; \_\_\_\_\_. \_\_\_\_\_. \_\_\_\_ days

**X.9** Are you taking any medication (either prescribed or over the counter)? [ ] NO [ ] YES

If YES, please specify major medications

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

**X.10** Do you smoke? [ ] NO [ ] YES

**X.11** Do you consume alcohol or drugs? [ ] NO [ ] YES

If YES, please specify average daily quantity

Tobacco: \_\_\_\_\_

Alcohol: \_\_\_\_\_

Drugs: \_\_\_\_\_

**X.12** Do you use any assistive device such as glasses, hearing aid, wheelchair, etc.? [ ] NO [ ] YES

If YES, please specify \_\_\_\_\_

**X.13** Do you have any person assisting you with your self care, shopping or other daily activities? [ ] NO [ ] YES

If YES, please specify person and assistance they provide \_\_\_\_\_

**X.14** Are you receiving any kind of treatment for your health? [ ] NO [ ] YES

If YES, please specify: \_\_\_\_\_

**X.15** Additional significant information on your past and present health:

**X.16** IN THE PAST MONTH, have you cut back (i.e. reduced) your usual activities or work because of your *health condition*? (a disease, injury, emotional reasons or alcohol or drug use) [ ] NO [ ] YES

If yes, how many days? \_\_\_\_\_

**X.17** IN THE PAST MONTH, have you been totally unable to carry out your usual activities or work because of your *health condition*? (a disease, injury, emotional reasons or alcohol or drug use) [ ] NO [ ] YES

If yes, how many days? \_\_\_\_\_

## **Appendix 2:**

### **GENERAL QUESTIONS FOR PARTICIPATION & ACTIVITIES**

The following probes are proposed as a guide to help the examiner when interviewing the respondent about problems in functioning and life activities, in terms of the distinction between capacity and performance. Take into account all personal information known about the respondent and ask any additional probes as necessary. Probes should be rephrased as openended questions if necessary to elicit greater information.

Under each domain there are two kinds of probes:

- The first probe tries to get the respondent to focus on his or her **capacity** to do a task or action, and in particular to focus on limitations in capacity that are **inherent or intrinsic features of the person** themselves. These limitations should be direct manifestations of the respondent's health state, without the assistance. By **assistance** we mean the help of another person, or assistance provided by an adapted or specially designed tool or vehicle, or any form of environmental modification to a room, home, workplace and so on. The level of capacity should be judged relative to that normally expected of the person, or the person's capacity before they acquired their health condition.
- The second probe focuses on the respondent's **actual performance** of a task or action in the person's actual situation or surroundings, and elicits information about the effects of environmental barriers or facilitators. It is important to emphasize that you are only interested in the extent of difficulty the respondent has in doing things, **assuming that they want to do them**. Not doing something is irrelevant if the person chooses not to do it.

### **I. Mobility**

#### **(Capacity)**

(1) In your present state of health, how much difficulty do you have walking long distances (such as a kilometer or more) without assistance?

(2) How does this compare with someone, just like you only without your health condition?

(Or: "...than you had before you developed your health problem or had the accident?)

#### **(Performance)**

(1) In your present surroundings, how much of a problem do you actually have in walking long distances (such as a kilometer or more)?

(2) Is this problem walking made worse, or better, by your actual surroundings?

(3) Is your capacity to walk long distances without assistance more or less than what you actually do in your present surroundings?

## **II. Self Care**

### **(Capacity)**

(1) In your present state of health, how much difficulty do you have washing yourself, without assistance?

(2) How does this compare with someone, just like you only without your health condition?

(Or: "...than you had before you developed your health problem or had the accident?)

(Performance)

(1) In your own home, how much of a problem do you actually have washing yourself?

(2) Is this problem made worse, or better, by the way your home is set up or the specially adapted tools you use?

(3) Is your capacity to wash yourself without assistance more or less than what you actually do in your present surroundings?

## **III. Domestic Life**

### **(Capacity)**

(1) In your present state of health, how much difficulty do you have cleaning the floor of your where you live, without assistance?

(2) How does this compare with someone, just like you only without your health condition?

(Or: "...than you had before you developed your health problem or had the accident?)

(Performance)

(1) In your own home, how much of a problem do you actually have cleaning the floor?

(2) Is this problem made worse, or better, by the way your home is set up or the specially adapted tools you use?

(3) Is your capacity to clean your floor without assistance more or less than what you actually do in your present surroundings?

## **IV. Interpersonal Interactions**

### **(Capacity)**

(1) In your present state of health, how much difficulty do you have making new friends, without assistance?

(2) How does this compare with someone, just like you only without your health condition?

(Or: "...than you had before you developed your health problem or had the accident?)

(Performance)

(1) In your present situation, how much of a problem do you actually have making friends?

(2) Is this problem making friends made worse, or better, by anything (or anyone) in your surroundings?

(3) Is your capacity to make friends, without assistance, more or less than what you actually do in your present surroundings?

## **V. Major Life Areas**

### **(Capacity)**

(1) In your present state of health, how much difficulty do you have getting done all the work you need to do for your job, without assistance?

(2) How does this compare with someone, just like you only without your health condition?

(Or: "...than you had before you developed your health problem or had the accident?)

(Performance)

(1) In your present surroundings, how much of a problem do you actually have getting done all the work you need to do for your job?

(2) Is this problem fulfilling your job requirements made worse, or better, by the way the work environment is set up or the specially adapted tools you use?

(3) Is your capacity to do your job, without assistance, more or less than what you actually do in your present surroundings?

## **VI. Community, Social and Civic Life**

### **(Capacity)**

(1) In your present state of health, how much difficulty do you have participating in community gatherings, festivals or other local events, without assistance?

(2) How does this compare with someone, just like you only without your health condition?

(Or: "...than you had before you developed your health problem or had the accident?)

(Performance)

(1) In your community, how much of a problem do you actually have participating in community gatherings, festivals or other local events?

(2) Is this problem made worse, or better, by the way your community is arranged or the specially adapted tools, vehicles or whatever you use?

(3) Is your capacity to participate in community events, without assistance, more or less than what you actually do in your present surroundings?

### **Appendix 3:**

#### **GUIDELINES FOR THE USE OF ICF CHECKLIST VERSION 2.1A**

This is a checklist of major categories of International Classification of Functioning, Disability and Health (ICF) of the World Health Organization. The ICF Checklist is a practical tool to elicit and record information on the functioning and disability of an individual. This information can be summarized for case records (for example, in clinical practice or social work).

This version (2.1a) is for use by a clinician, health or social care professional. The checklist should be used along with the ICF full or short version which is scheduled for publication in September 2001. Until then the ICIDH-2 Final Draft, full version, WHO, 2001 will serve as reference document for the ICF checklist. The raters should familiarize themselves with the ICIDH-2 Final Draft by attending a brief educational programme or self-taught curriculum. All information from written records, primary respondent, other informants and direct observation can be used to fill in the checklist. Please record all sources of information used on the first page. Parts 1 to 3 should be filled in by writing the qualifier code against each of the function, structure, activity and participation term that shows some problem for the case being evaluated. Appropriate codes for the qualifiers are given on the relevant pages. Comments can be made regarding any information that can serve as the additional qualifier or that is thought to be significant for the case being evaluated. Part 4 (Environment) has both negative (barrier) and positive (facilitator) qualifier codes. For all positive qualifier codes, please use a plus (+) sign before the code. The categories given in the checklist have been selected from the ICF and are not exhaustive. If you need to use a category that you do not find listed here, use the space at the end of each dimension to record these.

### **3. EVALUATION AND ASSESSMENT IN PMR**

#### **Specific evaluation and assessment**

The evaluation and assessment represents the first step in medical rehabilitation and it is necessary for the specification of the patient's initial functional deficit, to estimate the applied therapy results, which may require to revalue the therapy, and to assess the final results.

The organism may be affected by the human pathology :

- At the organ level- causing an impairment = any loss or abnormality of a structure, psychological function, physiological function or anatomical function.
- At the individual as a whole, causing a disability = limitation or loss the capacity to perform an activity considered as usual for the individual.
- At the individual's social integration, causing a handicap = difficulty to perform and to maintain normal relations with environment according to individual's age, sex and cultural conditions.

World Health Organization ( WHO) achieved an international classification for the cronic diseases regarding this three aspects = **International Classification of Impairments, Disabilities and Handicaps** (IDH Classification) which comprise :

- 9 big categories of impairments,
- 9 big categorys of disabilitys,
- 7 big categories of handicaps.

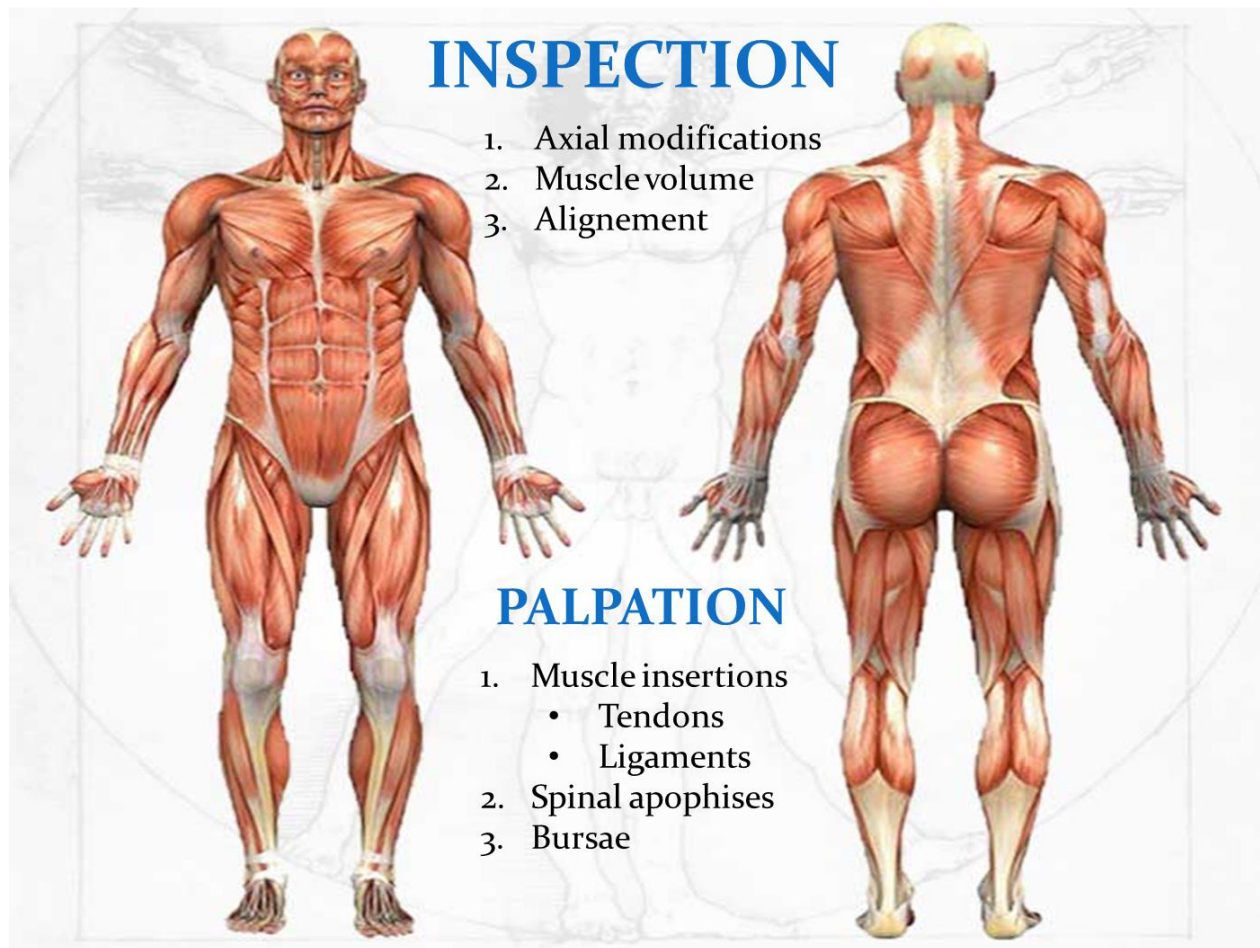
## Health Indicators

Health Status			
Well-Being	Health Conditions	Human Function	Deaths
<ul style="list-style-type: none"> <li>Self-rated health</li> <li>Changes over time in self-rated health</li> <li>Self-esteem</li> </ul>	<ul style="list-style-type: none"> <li>Body mass index (BMI)</li> <li>Arthritis/rheumatism</li> <li>Diabetes</li> <li>Asthma</li> <li>High blood pressure</li> <li>Chronic pain - affects activities</li> <li>Chronic pain - severity</li> <li>Depression</li> <li>Low birth weight</li> <li>Cancer incidence, age-standardized rates:                             <ul style="list-style-type: none"> <li>All cancer incidence</li> <li>Lung cancer incidence</li> <li>Colorectal cancer incidence</li> <li>Breast-female cancer incidence</li> <li>Prostate cancer incidence</li> </ul> </li> <li>Injury hospitalizations</li> <li>Food and waterborne diseases*</li> <li>Injuries</li> </ul>	<ul style="list-style-type: none"> <li>Functional health</li> <li>Two-week disability days</li> <li>Activity limitation</li> <li>Conditions causing activity limitation</li> <li>Disability-free life expectancy</li> <li>Disability-adjusted life expectancy</li> <li>Disability-adjusted life years</li> <li>Health expectancy *</li> </ul>	<ul style="list-style-type: none"> <li>Infant mortality</li> <li>Perinatal mortality</li> <li>Life expectancy</li> <li>Mortality crude counts/rates, age-standardized rates:                             <ul style="list-style-type: none"> <li>Total mortality</li> <li>Circulatory disease deaths</li> <li>Cancer deaths</li> <li>Respiratory disease deaths</li> <li>Suicide</li> <li>Unintentional injury deaths</li> <li>AIDS deaths</li> </ul> </li> <li>Potential years of life lost (PYLL)                             <ul style="list-style-type: none"> <li>Total PYLL</li> <li>Cancer PYLL</li> <li>Circulatory PYLL</li> <li>Respiratory PYLL</li> <li>Unintentional injuries PYLL</li> <li>Suicide PYLL</li> <li>AIDS PYLL</li> </ul> </li> </ul>
Non-Medical Determinants of Health			
Health Behaviours	Living and Working Conditions	Personal Resources	Environmental Factors
<ul style="list-style-type: none"> <li>Smoking status</li> <li>Smoking initiation</li> <li>Changes over time in smoking behaviour</li> <li>Frequency of heavy drinking</li> <li>Leisure-time physical activity</li> <li>Breastfeeding practices</li> <li>Dietary practices</li> </ul>	<ul style="list-style-type: none"> <li>High school graduates</li> <li>Post-secondary graduates</li> <li>Average number of years of schooling</li> <li>Unemployment rate</li> <li>Long-term unemployment rate</li> <li>Low income rate</li> <li>Children in low income families</li> <li>Average personal income</li> <li>Housing affordability</li> <li>Decision latitude at work</li> <li>Median share of income</li> <li>Government transfer income</li> <li>Crime rate and youth crime rate**</li> </ul>	<ul style="list-style-type: none"> <li>School readiness*</li> <li>Social support</li> <li>Life stress</li> </ul>	<ul style="list-style-type: none"> <li>Exposure to second-hand smoke</li> </ul>

38-38

## Components of the General Physical Examination (cont.)

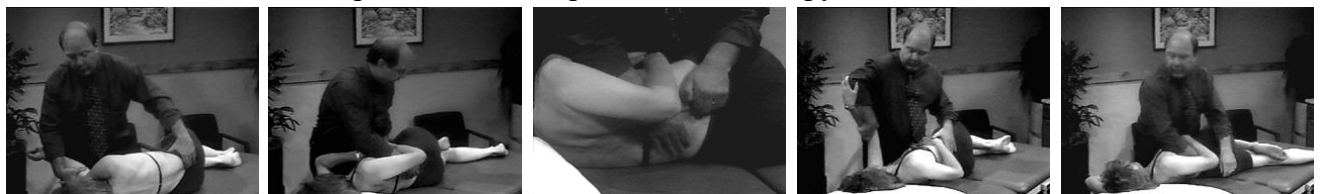
- |  |   |
|--|---|
| <p>❑ Musculoskeletal system</p> <ul style="list-style-type: none"> <li>■ Posture</li> <li>■ Gait</li> <li>■ Range of motion</li> <li>■ Muscle strength</li> <li>■ Body measurements</li> <li>■ Development and coordination in children</li> </ul> | <p>❑ Neurological system</p> <ul style="list-style-type: none"> <li>■ Reflexes</li> <li>■ Mental and emotional status</li> <li>■ Sensory and motor functions</li> <li>■ Intellectual assessment in children</li> <li>■ Mental status and memory in elderly</li> </ul> |
|--|---|



#### Examples of Specific tests

- a) **Lasègue test:** The straight leg raise, also called Lasègue's sign, Lasègue test or Lazarević's sign, is a test done during a physical examination to determine whether a patient with low back pain has an underlying herniated disc, often located at L5 (fifth lumbar spinal nerve).  
 Technique: With the patient lying down on his or her back on an examination table or exam floor, the examiner lifts the patient's leg while the knee is straight. If the patient experiences sciatic pain when the straight leg is at an angle of between 30 and 70 degrees, then the test is positive and a herniated disk is a possible cause of the pain. A negative test suggests a likely different cause for back pain.
- b) **Bonnet test:** uses hip adduction and internal rotation during SLR to help identify nerve root/sciatic irritation

Test exercises for low back pain- that can be performed as therapy method



- c) **Reflexes** (deep tendon reflexes): The reflex exam is fundamental to the neurological exam and important to locating upper versus lower motor neuron lesions. There are 4 deep tendon reflexes that can predict paresis and therefore inability to move properly. The superficial reflexes depending on the root level are:
- Biceps and Brachioradialis C5/C6
  - Triceps C7 (Note: Some references include C6 OR C8, however C7 is predominantly involved.)
  - Patellar L2-L4
  - Ankle S1,
- d) **Movements**- The Articular Range of Motion means the distance and direction to which a bone joint can be extended. Range of motion is a function of the condition of the joints, muscles, and connective tissues involved. Joint flexibility can be improved through appropriate MUSCLE STRETCHING EXERCISES. The term was introduced in 1991. It is measured by goniometry. The technique may be used as a diagnostic or therapeutic measure to determine the functional status of a patient with a musculoskeletal or neurological disability. There are a variety of tools and techniques by which joint motion can be measured, but for most clinical purposes the simple universal goniometer is an adequate instrument. The system for recording measurements of range of motion may be somewhat complex or it may be based upon the simple technique of relating the degree of joint motion to a full circle (360 degrees).

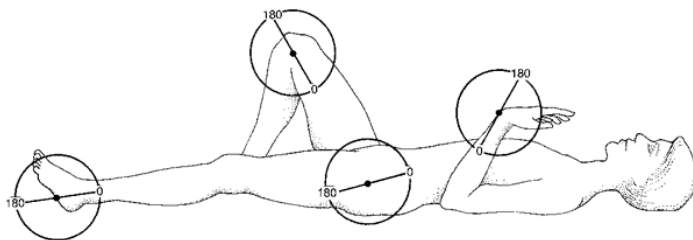


Fig. 1. The full-circle or 360° system of goniometry applied to several joints of the body, illustrating the locations of the zero degree (0°) position. From Kottke and Lehmann, 1990.

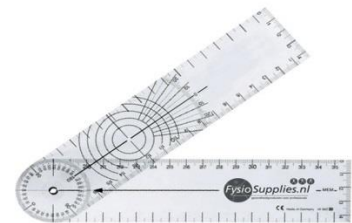
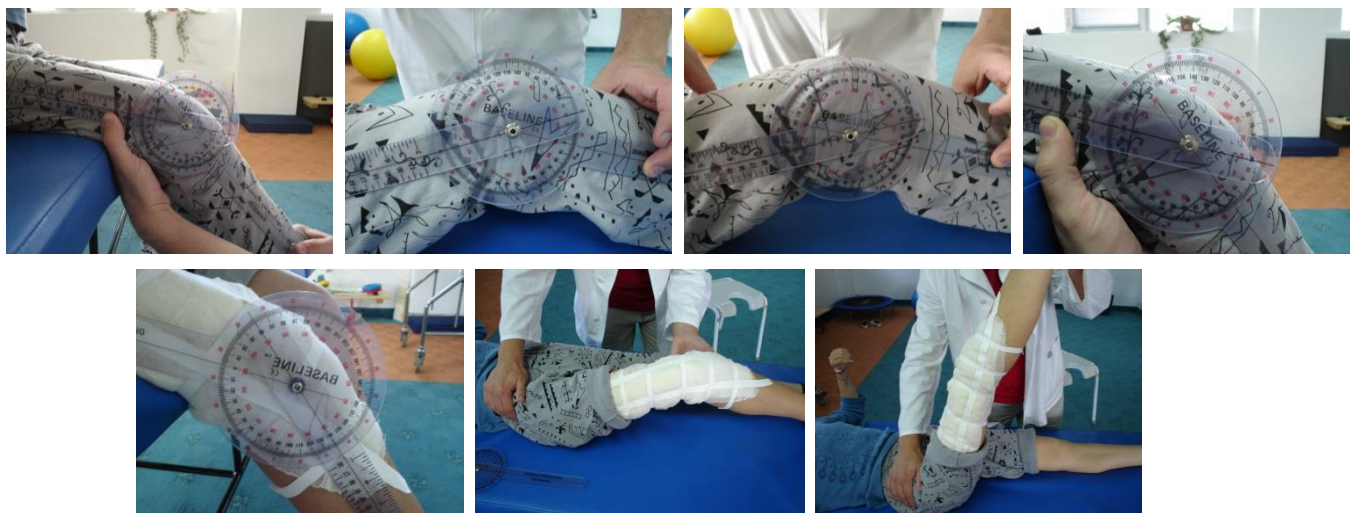


Fig.2. Goniometer



- e) **Functionality**- can be assessed by evaluating muscle straight, articular Range of motion, reflexes and by knowing normal functionality. Gait, balance and walking are important when assessing functionality in one person.

<b>MANUAL MUSCLE TESTING PROCEDURES</b>				
<b>Key to Muscle Grading</b>				
	Function of the Muscle	Grade		
<b>No Movement</b>	No contractions felt in the muscle	0	0	Zero
	Tendon becomes prominent or feeble contraction felt in the muscle, but no visible movement of the part	T	1	Trace
<b>Test Movement</b>	<b>MOVEMENT IN HORIZONTAL PLANE</b>			
	Moves through partial range of motion	1	2-	Poor-
	Moves through complete range of motion	2	2	Poor
	<b>ANTIGRAVITY POSITION</b>			
	Moves through partial range of motion	3	2+	
<b>Test Position</b>	Gradual release from test position	4	3-	Fair-
	Holds test position (no added pressure)	5	3	Fair
	Holds test position against slight pressure	6	3+	Fair+
	Holds test position against slight to moderate pressure	7	4-	Good-
	Holds test position against moderate pressure	8	4	Good
	Holds test position against moderate to strong pressure	9	4+	Good+
	Holds test position against strong pressure	10	5	Normal

Modified from 1993 Florence P. Kendall. Author grants permission to reproduce this chart

### \*The Up&Go test

The timed “Up & Go” is a simple measure of physical mobility, which can be used either as a screening tool or as a descriptive tool. To test the subject, give the subject the following instructions:

“Rise from the chair, walk to the line on the floor, turn, return to the chair and sit down again”.

Use a standard armchair. Place the line three (3) meters from the chair. The score given is the time taken, in seconds, to complete the list. The subject is encouraged to wear regular footwear and to use his customary walking aid. No physical assistance is given. Have the subject walk through the test once before being timed, to become familiar with the test.

Interpretation of the score: The timed “Up & Go” score is correlated with the patient’s balance, gait speed and functional capacity. The score, in seconds, can be interpreted as follows:

< 10 sec.:	Freely independent individual
< 20 sec.:	Independent with basic transfers, usually independent with tub and shower transfers, usually able to climb stairs or go outside alone.
20-29 sec.:	“Grey zone” great variance in balance
30 sec. or more:	Usually need help with chair and toilet transfers, help in and out of tub or shower, assistance with climbing stairs. Unable to go out alone.

### **1. Pain assessment.**

The easiest way to assess pain is using a likert scale ( range 0 to 10) such as the Visual Analogue Scale for Pain Assessment (the VAS)



### **2.Overall health assessment:**

\* **THE HEALTH ASSESSMENT QUESTIONNAIRE (HAQ)** DISABILITY INDEX (DI) OF THE CLINICAL HEALTH ASSESSMENT QUESTIONNAIRE

Compries of 8 sections: dressing, arising, eating, walking, hygiene, reach, grip, and activities. There are 2 or 3 questions for each section. Scoring within each section is from 0 (without any difficulty) to 3 (unable to do).

For each section the score given to that section is the worst score within the section, i.e. if one question is scored 1 and another 2, then the score for the section is 2. In addition, if an aide or device is used or if help is required from another individual, then the minimum score for that section is 2. If the section score is already 2 or more then no modification is made.

The Aides and Devices are assigned to the specific HAQ sections as follows:

- Dressing and Grooming: Devices used for dressing (button hook, zipper pull, shoe horn, etc.)
- Arising: Special or built up chair
- Eating: Built up or special utensils
- Walking: Cane, Walker, Crutches, Wheelchair
- Hygiene: Bathtub bar, Long-handled appliances in bathroom, Raised toilet seat
- Reach: Long-handled appliances for reach
- Grip: Jar opener for jars previously opened

The 8 scores of the 8 sections are summed and divided by 8. The result is the DI or FDI, the disability index or functional disability index.

### **\*\* The Short Form (36) Health Survey:**

Is a 36-item, patient-reported survey of patient health. Is a measure of health status consists of eight scaled scores, which are the weighted sums of the questions in their section. Each scale is directly transformed into a 0-100 scale on the assumption that each question carries equal weight.

The lower the score the more disability. The higher the score the less disability .

The eight sections are:

- vitality
- physical functioning
- bodily pain
- general health perceptions
- physical role functioning
- emotional role functioning

- social role functioning
- mental health

\*\*\* **The McMaster Health Index Questionnaire** (Ref: Chambers LW, Sackett DL, Goldsmith CH, Macpherson AS, McAuley RG. Development and application of an index of social function. Health Serv Res. 1976 Winter;11(4):430-41. )

Description of Instrument to supplement clinical ratings of health status, with quality of life measures based on physical, social and emotional functions. Administration time is 45-50 minutes for interview administered and 20 minutes for self-administered. The Scale Format varies between, yes/no, 3-point Likert or 5-point Likert scale.

Administration Technique – Interview, telephone or self-administration versions.

Scoring and Interpretation – Yes/no, scores by dimension, higher score means better quality of life.

Scoring guide available, contact author.

Factors and Norms – Social function 64 items (general well-being, work/social role performance, social support and participation), emotional function 41 items (self-esteem, findings about personal relationships and the future, critical life events, and global emotional functioning) and physical function 35 items (mobility, self-care, communication, and global physical functioning). Also includes additional questions about respiratory and joint symptoms, cigarette use, and a series of sociodemographic variables.

Test-retest Reliability – Intraclass correlation coefficient used: physical function 0.53, emotional function 0.70, social function 0.48. Completed on 30 physiotherapy outpatients with an interval of 1 week between administrations. 0.50 level indicates “good” reliability (Chambers et al, 1982).

### 3. Functional tests:

#### \* The Functional Independence Measure (FIM)

Tasks that are evaluated using the FIM include bowel and bladder control, transfers, locomotion, communication, social cognition as well as the following six self-care activities:

- Feeding
- Grooming
- Bathing
- Upper Body Dressing
- Lower Body Dressing
- Toileting

#### \*\*\* THE KARNOFSKY PERFORMANCE STATUS SCALE

Able to carry on normal activity and to work; no special care needed.	100	Normal no complaints; no evidence of disease.
	90	Able to carry on normal activity; minor signs or symptoms of disease.
	80	Normal activity with effort; some signs or symptoms of disease.
Unable to work; able to live at home and care for most personal needs; varying amount of assistance needed.	70	Cares for self; unable to carry on normal activity or to do active work.
	60	Requires occasional assistance, but is able to care for most of his personal needs.
	50	Requires considerable assistance and frequent medical care.
Unable to care for self; requires equivalent of institutional or hospital care; disease may be progressing rapidly.	40	Disabled; requires special care and assistance.
	30	Severely disabled; hospital admission is indicated although death not imminent.
	20	Very sick; hospital admission necessary; active supportive treatment necessary.
	10	Moribund; fatal processes progressing rapidly.
	0	Dead

\*\*\**Hand functional assessment- Dreiser functional index for hand osteoarthritis*

Criteria	Yes, without problem	Yes, with some difficulty	Yes, but very difficult	No
Degree	0	1	2	3
1. Can you twist a key in the door lock?				
2. Can you cut, with the knife, a piece of meat?				
3. Can you cut, with the scissors, a sheet of paper or a textile?				
4. Can you lift, with a single hand, a bootle?				
5. Can you grip the fist?				
6. Can you knot?				
7. Can you sew (for women)? Can you use a screwdriver (for men)?				
8. Can you write a long period?				
9. Can you accept a handshake without taking back your hand?				
10. Can you button up?				

\*\*\*\*\**Pediatric disability inventory*

Content of the Pediatric Evaluation of Disability Inventory			
	Self-care domain	Mobility domain	Social function domain
Function skills scales	Types of food textures	Toilet transfers	Comprehension of word meanings
	Use of utensils	Chair/wheelchair transfers	Comprehension of sentence complexity
	Use of drinking containers	Car transfers	Functional use of expressive communication
	Toothbrushing	Bed mobility/transfers	Complexity of expressive communication
	Hairbrushing	Tub transfers	Problem resolution
	Nose care	Method of indoor locomotion	Social interactive play
	Handwashing	Distance/speed indoors	Peer interactions
	Washing body and face	Pulls/carries objects	Self-information
	Pullover/front-opening garments	Method of outdoor locomotion	Time orientation
	Fasteners	Distance/speed outdoors	Household chores
	Pants	Outdoor surfaces	Self-protection
	Shoes/socks	Upstairs	Community function
	Toileting tasks	Downstairs	
	Management of bladder		
	Management of bowel		
Complex activities assessed with caregiver assistance and modifications scales	Eating	Chair/toilet transfers	Functional comprehension
	Grooming	Car transfers	Functional expression
	Bathing	Bed mobility/transfers	Joint problem solving
	Dressing upper body	Tub transfers	Peer play
	Dressing lower body	Indoor locomotion	Safety
	Toileting	Outdoor locomotion	
	Bladder management	Stairs	
	Bowel management		

#### 4. Sensibility's assessment

Sensitive syndrom's assessment

- gentle touch of the skin with cotton-wool, with the finger-tip, and with hair;
- pressure with a blunt (stumpy) object/ the 256Hz tuning fork's vibrations;

- temperature : warm→cold;
- pain : pricking with a sharp object/ the 30Hz tuning fork vibrations;
- the posture sense (proprioception);
- the movement sense ( kinestezia);
- identification of an object through palpation (stereognozia): shape, size, weight, firmness, texture, material;
- tactile discrimination of two points ( normaly = 2-3mm on the finger tip and 6-8mm at the thigh);

Sensibility's reeducation steps ( only when the patient feels the 30Hz or 256Hz tuning fork's vibrations), are first performed with opened eyes and then with closed eyes:

- pressure- pain;
- proprioception;
- kinestezia
- thermic sensibility: warm→cold;
- stereognozia;
- incorporation of the motor function in sensitive training's context.

#### **4. MANAGEMENT METHODS AND TECHNIQUES**

##### **Massage**

##### **Definition of basic massage concepts**

Massage is a therapeutic manipulation of the soft tissues of the body with the goal of achieving normalization of those tissues. Massage can have mechanical, neurological, psychological, and reflexive effects. Massage can be used to reduce pain or adhesions, promote sedation, mobilize fluids, increase muscular relaxation, and facilitate vasodilatation. Massage easily can be a preliminary treatment to manipulation; however, it clearly targets the health of soft tissues, while manipulation targets joint segments.

##### **Types of massage**

##### **A. Western**

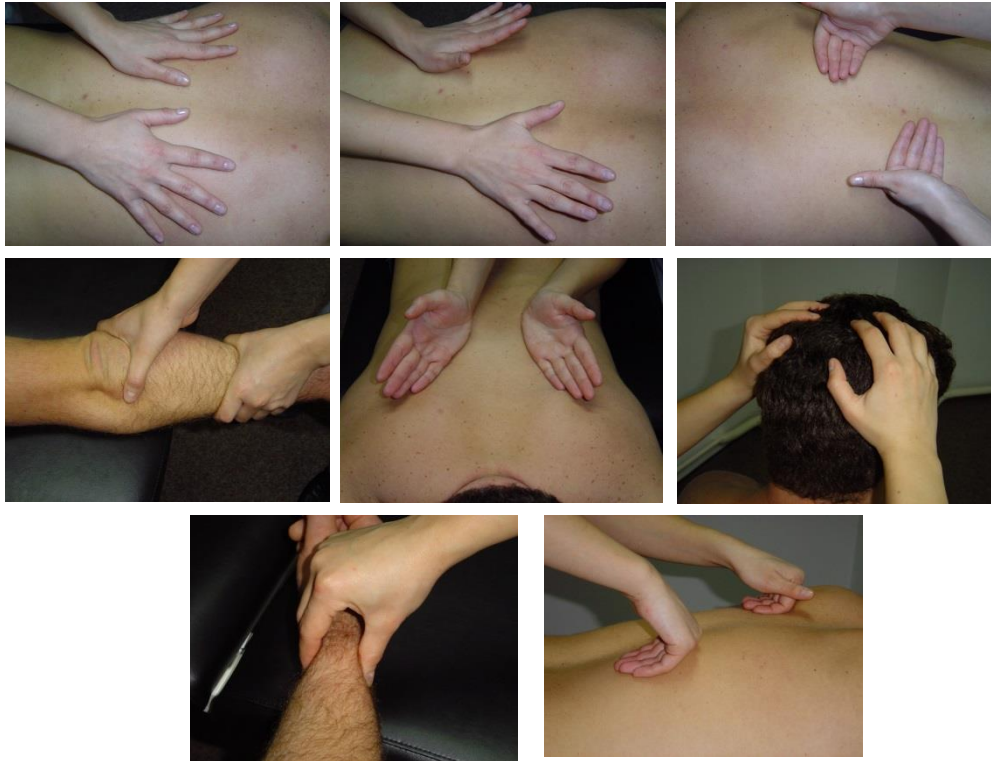
Western massage is the most common type of massage practiced. Western massage organizes variations of soft tissue manual therapy into several categories. The essence of Western massage is use of the hands to apply mechanical forces to the skeletal muscles and skin, although the intent may be to affect either more superficial or deeper tissues. Types of basic Western massage are characterized by whether:

- a. the focus of pressure is moved by the hands gliding over the skin (i.e., effleurage),
- b. soft tissue is compressed between the hands or fingers and thumb (i.e., petrissage),
- c. the skin or muscle is impacted with repetitive compressive blows (i.e., tapotement),
- d. shearing stresses are created at tissue interfaces below the skin (i.e., deep friction massage).

##### **1. Effleurage**

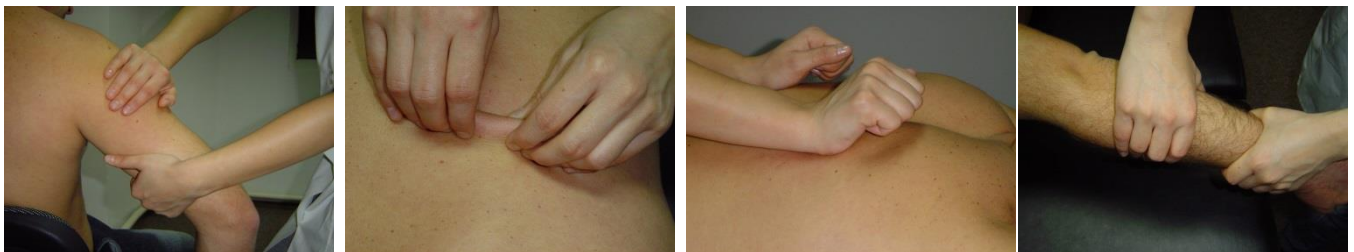
- In this approach, the practitioner's hands glide across the skin overlying the skeletal muscle being treated.
- Oil or powder is incorporated to reduce friction; hand-to-skin contact is maintained throughout the massage strokes.
- Effleurage can be superficial or deep.

- Light strokes energize cutaneous receptors and act by neuroreflexive or vascular reflexive mechanisms, whereas deep stroke techniques mechanically mobilize fluids in the deeper soft tissue structures.
- Deep stroking massage is performed in the direction of venous or lymphatic flow, whereas light stroking can be in any direction desired.
- The main mechanical effect of effleurage is to apply sequential pressure over contiguous soft tissues so that fluid is displaced ahead of the hands as tissue compression is accomplished.



## 2. *Petrissage*

- Petrissage involves compression of underlying skin and muscle between the fingers and thumb of one hand or between the two hands.
- Tissue is squeezed gently as the hands move in a circular motion perpendicular to the direction of compression.
- The main mechanical effects are compression and subsequent release of soft tissues, reactive blood flow, and neuroreflexive response to flow.



## 3. *Tapotement (percussion)*

- This percussion-oriented massage involves striking soft tissue with repetitive blows, using both hands in a rhythmic, gentle, and rapid fashion.
- Numerous variations can be defined by the part of the hands making an impact with the body.
- The therapeutic effect of tapotement may result from compression of trapped air that occurs on impact.
- The overall effect of tapotement may be stimulatory; therefore, healthy persons with increased tolerance for this approach are more likely to find this type of massage useful.



#### 4. *Deep friction*

- Pressure is applied with the ball of the practitioner's thumb or fingers to the patient's skin and muscle.
- The main effect of deep friction massage is to apply shear forces to underlying tissues, particularly at the interface between two tissue types (e.g., dermis-fascia, fascia-muscle, muscle-bone).
- Deep friction massage frequently is used to prevent or slow adhesions of scar tissue.



#### **B. Eastern massage**

Over the centuries, Eastern massage systems have been an integral part of the cultures where they are practiced. Systems for evaluation, diagnosis, and treatment generally are not grounded in conventional Western neurophysiology. Eastern massage includes, among other approaches,

- Shiatsu (i.e., a Japanese system based on traditional Chinese Meridian theory with principles of Western science). The theory of Shiatsu is based upon the system of the 12 traditional

Chinese meridians (i.e., major channels) of the body in which the energy or life force, or Chi, circulates.



- Acupressure pressure points, situated along the course of channels, allow access to these channels. Acupressure applies massage forces, largely through digital pressure, to the same points treated with acupuncture needles. Imbalances of energy along the meridians are believed to cause disease and can be rectified by localized finger pressure.

### **Massage technique**

The practitioner controls several variables of massage. Actual application of treatment includes rhythm, rate, pressure, direction, and duration.

Most massage approaches involve a friction-reducing medium, so that the hands of the practitioner move along the patient's skin with minimal friction. Powders or oils often are used. Massage strokes also should be regular and cyclic. The rate of application for massage varies with the type of technique.

The amount of pressure depends upon technique and desired results. Light pressure may produce relaxation and relative sedation and may decrease spasm; breakdown of adhesions and intervention at a deeper tissue level may require heavier pressure. Treatment of edema and stretching of connective tissue generally requires intermediate amounts of pressure. Direction of massage often is centripetal to provide better mobilization of fluids toward the central circulation.

When muscles are treated, motions generally are kept parallel to muscle fibers. If the treatment goal is to reduce adhesions, shearing forces are circular or at least include cross-fiber components. The area to be treated with massage depends upon the condition being treated and may vary from a well-circumscribed area to treatment of contiguous areas. Duration of treatment depends upon the area being treated, desired therapeutic goals, and patient tolerance.

If massage is performed before other treatments, duration may be determined by the result needed in order to optimize the next treatment step. Duration of a massage therapy program can range from one week to months and depends upon verifiable therapeutic goals. Patients must be re-examined from time to time, depending upon diagnosis and therapeutic goals, to insure satisfactory progress.

### **Physiologic effects of massage**

Massage produces some mechanical effects. Mechanical pressure on soft tissue displaces fluids. Fluid moves in the direction of lower resistance under the static forces of the practitioner's hands. Once mobilized fluid leaves the soft tissues, it enters the venous or lymphatic low-pressure systems. When treating lymph edema, massage is performed more proximally and then moves distally, based upon the belief that proximal blockage in the lymph channels must be opened first to allow for subsequent distal mobilization of fluid and protein.

Kneading and stroking massage decreases edema; compression converts nonprinting to pitting edema. In addition to strictly mechanical effects, these massage approaches release histamine, causing superficial vasodilatation to assist in washing out metabolic waste products. Venous return increases, which subsequently increases stroke volume.

Studies suggest that massage may decrease blood viscosity and hematocrit and increase circulating fibrinolytic compounds. Preliminary data suggest an explanation for the success of massage in decreasing deep vein thrombosis (DVT). Massage may be contraindicated in the presence of existing thrombosis.

Other blood compounds that show increases through massage include myoglobin, creatine kinase, lactate dehydrogenase, and glutamic oxaloacetic transaminase. Massage may decrease muscle spasm and increase force of contraction of skeletal muscle. Decreased spasm and increased endurance may result from wash out of metabolic waste products by fluid mobilization and increased blood flow. Decreased muscle soreness probably results from metabolic wash out.

### **Reflexive changes**

Massage can stimulate cutaneous receptors, spindle receptors, and superficial skeletal muscle as well. These structures produce impulses that reach the spinal cord, producing various effects, including moderation of the facilitated segment. Somatovisceral reflex changes to the viscera are possible in this model.

### **Psychological effects of massage**

Massage generally increases feelings of relaxation and well-being in patients. Whether this is from placebo effect or the result of some previously undiscovered reflex is not fully understood. Practitioners often incorporate a variety of psychophysical techniques, such as guided imagery, into massage treatment.

### **Therapeutic goals and indications for massage therapy**

Massage may be used as primary therapeutic intervention or as an adjunct to other therapeutic techniques. Uses can include, but are not limited to, (1) mobilization of intertissue fluids, (2) reduction or modification of edema, (3) increase of local blood flow, (4) decrease of muscle soreness and stiffness, (5) moderation of pain, (6) facilitation of relaxation, and (7) prevention or elimination of adhesions. Massage may be used to alter pathophysiology of a primary condition (e.g., contracture) or to prevent or modify deleterious effects of a previously used treatment modality.

Another therapeutic effect derived from massage is muscle relaxation. Massage appears to reduce tone and enhance circulation to the area. Muscle relaxation also may result from increased sensory stimulation caused directly by massage. This increased sensory input to the spinal cord may result in changes in reflex pathways, leading to central modulatory decreases of muscle tone.

Other effects of massage are enkephalin release, endorphin production, promotion or absorption of fibrous tissue, restoration of connective tissue pliability, improvement of lymphatic flow (in some studies up to 7-9 times), and increased levels of natural killer (NK) cells.

### **Contraindications for massage**

Massage is contraindicated when it could cause worsening of a particular condition, unwanted tissue destruction, or spread of disease. Malignancy, thrombi, atherosclerotic plaques, and infected tissue could be spread by massage.

Absolute contraindications to massage include:

- ventricular dysfunction because of the fact that increased blood flow in a limb could cause thrombus to detach from the vessel wall creating an embolism,

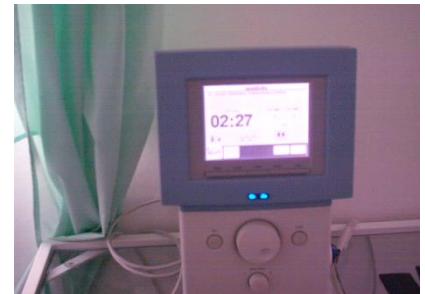
- acute infection,
- bleeding,
- new open wound.

Relative contraindications include:

- incompletely healed scar tissue,
- fragile skin,
- skin grafts,
- atrophic skin,
- inflamed tissue,
- malignancy,
- inflammatory muscle disease,
- pregnancy.

The physiatrist should be aware that massage must be used very carefully in chronic pain patients. The direct hands-on nature of massage may potentiate strong psychophysical effects and may unintentional reliance of passive treatment modalities. In all patients, it is necessary to establish treatment endpoints at the beginning of the treatment period and to terminate treatment when those end points have been achieved.

## 2.2. Electrotherapy



### A. The concept of electrophysiology and electrotherapy techniques

The electric excitability of the nerves and muscles is characterized by two parameters:

- 1) REOBASIS (limit current), it is defined as being the fundamental limit, as in, the minimum intensity

of a continuous current which produces a muscular contraction when a sudden and prolonged electric current shut-down interferes.

2) CRONAXIA represents the minimum amount of time needed for a current, having a value which equals the double of “robes”, to produce a lamina muscular contraction.

The excitability of the muscular and nervous tissue, in diverse pathologies of the human organism, is realized through the medium of the so called “electric stimulators”.

1) Stimulators of constant current-where the exciter current is constant, being independent of the resistance variation of the excited tissue.

2) Stimulators of constant tension-where the tension of the signal given at the exit is constant, independent of the resistance variation of the excited tissue.

#### Types of electric current used in therapy

##### I. Low frequency (0-100 Hz)

###### *a. The galvanic current (low frequency and continuously current)*

Biophysiological effects due to galvanic current are manifested with maximum intensity in the vicinity of the axle which unites the two electrodes, being specific to each pole.

-analgesic

-stimulative

- hiperemiant-vaso-biotrophic

- unspecific neuro-vegetative adjustment

Indications for galvanotherapy

1. Osteoarthritis

2. The rheumatoid inflammatory diseases in the sub acute period or between inflammatory

3. The rheumatism of the soft tissue

4. The posttraumatic pathology containing local oedema, haematoma, algoneurodistrophy,

5. The pathology of the nervous system:

- peripheral motor neuron syndrome with paresis of the members, facial or of the sphincters

belonging to internal organs

- central neuron syndrome with different aetiologies (hemiparesis, tetra paresis, para paresis)

-disorders of sense organs

-functional crioparestesis of the peripheral system

-stressful situations, nervous asthenia and oversteering, somatic cortical pain,

6. Dermatological disorders: acnes

*b. The impulse currents:* These currents have specified physiological effects, other then the continuous currents. Through various typology of signals that get in the composition of this therapeutic category effects can be obtained that continuous currents can't achieve.

1. Biodynamic currents (Pierre Bernard): represents a part of the category of therapy using low frequency alternative currents (50-100 Hz).

2. Impulse currents other then biodynamic currents

■ Faradic current

■ Various types of currents shapes: exponential, trapezoidal, rectangular and triangular.

■ **Träbert current** (ultrastimulation current) and **Trans cutaneous nerve stimulation (TENS, SNET)**

-This currents are used as an unitary impulse, continuous sequences, consecutive impulses (modulated in frequency or/and amplitude or unpopulated),

-They have applicability in: selective excitation of nervous and muscular fibres after poliomyelitis and

nervous lesion; smooth muscle treatments in case of chronic constipation, in post surgery atonal of urinary bladder and uterine inaction; selective treatment of totally nonintegrated muscles (less serious paralysis and prophetic neuron lesion); blocking and treating atrophies, muscular weakness; for respiratory gymnastics and intentional exercises ( volatile ); spastic paralysis treatment in postnatal cerebral paresis; traumatic lesions of cerebral and medullar system; spastic paresis in multiple sclerosis; less serious spastic paresis after apoplexy and especially in painful states at hemiplegics.

☒ The therapy using excitation currents in spastic paralysis

- For the spastic muscular treatment it is applied the method elaborated by Hufschmidt in 1968, consisting in the utilization of two independent excitation circuits (two separated circuits), but electronically synchronized, each of these circuits contains two excitation electrodes. In this way more antagonist muscular group are excited, with presetted intensity until the appearance of strong muscular reflexes.
- The simulation of normally innervated muscles has the following therapeutic indications:
- -Inactivity hypnotherapy and atrophy, produced by prolong immobilization (gypsum device, external fixatives, prolong immobilization in bed) or articulatory pathology with pain, marked limitation of movement amplitude on different plans, that forces the effectors muscle to inactivity.

☒ For muscle hip atrophy or muscular contractures in spin static disorders as we encounter in cyphoscoliosis.

☒ Electro gymnastic of respiratory muscles (in ventilation disorders)

☒ Stimulation of abdominal muscles (in constipation, after birth)

☒ In disorders accompanied with lost of kinesthetic sensibility (in prolonged bed repose, in coma or at those that depend on certain life sustaining devices).

☒ As a special propose of utilization we mention the voluntary movement stimulation, through (sensitive-motor) feed-back from tendon and muscular receptors (in poliomyelitis after effects).

☒ The stimulation of partial or total enervated muscles. The motor path command lesions or cut-off's (peripheral nerves) goes to neuron-muscular suffering with rapid installation of muscular hip trophy and atrophy, which starts to appear in the first 72 hours. In these situation muscular fibres does not respond to any electric impulse with sudden trigger as rectangular impulse and it will only respond to slow increased slope as exponential impulse or triangular impulse with exponential increased slope.

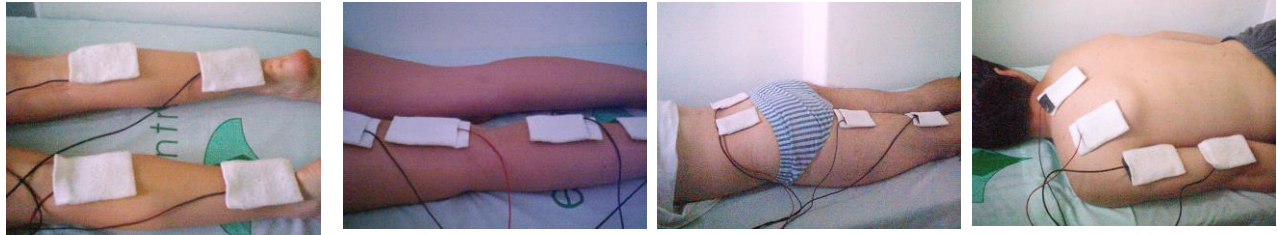
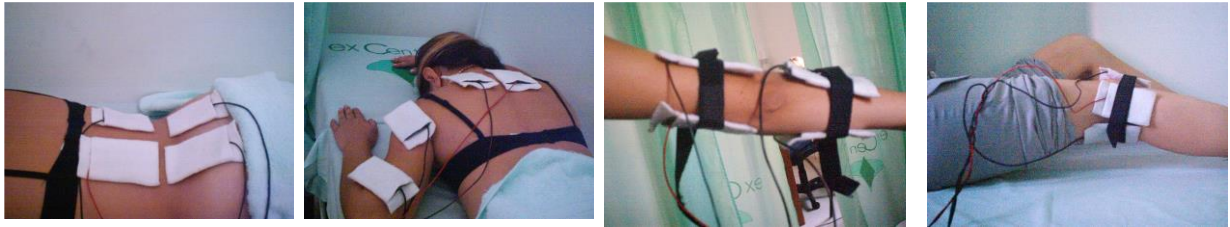
☒ Smooth muscle electro stimulation.

☒ Smooth muscle's response at stimulation is made by taking in concern his long coaxial and is due to a reflex action and not to a muscular fibres respond at direct stimulation.

☒ Scars, Dupuytren's disease, Ledderhose's disease

☒ Algoneurodystrophy stage III, applied on stellate ganglion

☒ Radicular or applications in neuralgia and neuritis

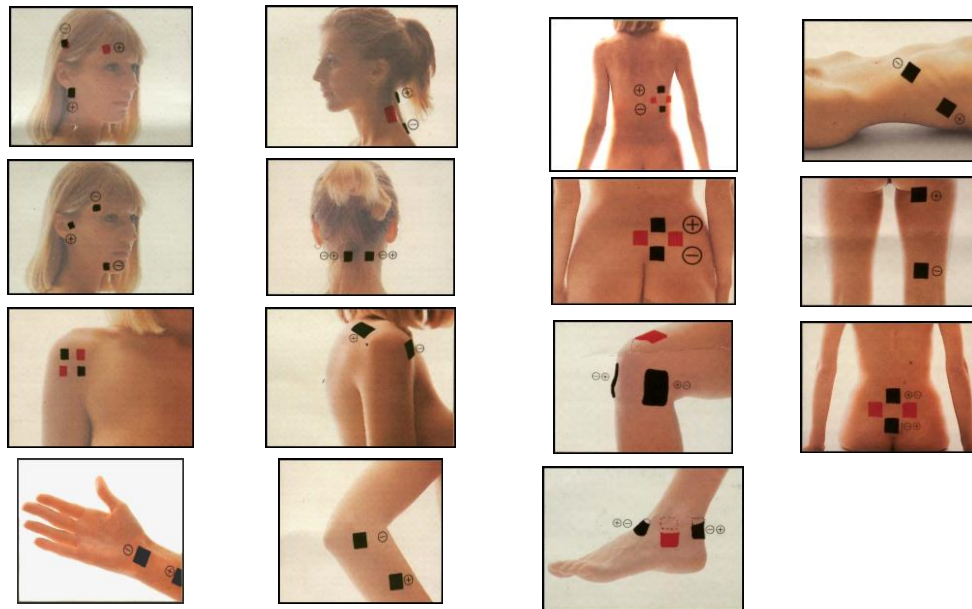


## 2. Medium frequency (1 100 KHz.)

Using the crossing of 2 sinusoidal and disparity medium frequency currents (3, 9 and 4, 0 kHz). We obtain various effects depending on crossing frequency

- ⇒ < 10 Hz – stimulation of normal scheletic fibres
- ⇒ = 12 - 35 Hz – muscle relaxation
- ⇒ = 1 - 4 Hz – stimulation of internal organs muscle;
- ⇒ = 4 - 10 Hz – stimulation of sympatic system
- ⇒ = 20 - 40 Hz - stimulation of parasympatic system
- ⇒ = 90 - 100 Hz - analgesia.

This is why we can use the medium frequency therapy in the same pathology as the low frequency, with fewer side effects



## 3. High frequency (100 KHz – 50000 MHz)

- Electromagnetic fields : ” Short” waves and radar waves due to their profound heating of the tissues



► Ultrasounds stimulates the bioelectrically potential of the human cell., so they have complex therapeutically actions.



### ***B Magnetic fields therapy***

Represent a artificially developed magnetic field (continuously or various waves forms) , pointed to specific areas or to entire human body in order to use the well known human adaptation to terrestrial magnetic field for neurovegetative regulation or for speeding the healing process

Indications:

- Rheumatic disease: osteoarthritis, inflammatory, periarticular rheumatism
- Post-traumatic sequels: fractures, plagues, contusions, muscular haematomas, sprains, musculotendinous tears, algoneurodystrophy
- Neuropsychical diseases: functional disease of the central nervous system (neurosis, neurovegetative dystonia), organic diseases of the central nervous system.
- Cardiovascular diseases: functional peripheral vascular diseases (Reynaldo syndrome and disease, acrocyanosis) organic peripheral vascular diseases (thromboangeitis obliterans, atherosclerosis obliterans of the limbs, diabetic arteriopathy), cerebral atherosclerosis, arterial hypertension
- Respiratory affections: bronchial asthma, chronic asthmatical bronchitis, spastic tracheobronchitis, pseudo asthma
- Digestive disease: gastro duodenal ulcer, chronic gastritis, chronic enterocolopathy, functional disorders of the colon, hypotonic and hyperkinetic biliar dyskinesia, vesicle hypotonic biliar dyskinesia
- Metabolic and endocrine disease: diabetes, gout, hyperthyroidism
- Female genital disorders : dysmenorrhoea , functional menstrual disorders , hyperplastic uterus , chronic metroanexitis, climax and preclimax disorders, premenstrual and intermenstrual syndrome ,dyspareunia, vulvar pruritus and other pelvic pains witch don't have as a cause any organic lesions, frigidity under different aspects(with libido disorders , with or without orgasm)

### ***C. Phototherapy***

The use of biological and physiological properties of light is called phototherapy

### I. Actinotherapy (ultraviolet radiation - UV)

Effects:

#### a) Photochemical

1) Actinic erythema with 4 grades (stages) of intensity (1st grade = pink, 2nd grade = red, 3rd grade = purple red -> violet + oedema, 4<sup>th</sup> grade – bluish + placenta)

2) Melanic pigmentation

3) Metabolic effects

- produces vitamin D2 from provitamin D2
- increases the protein metabolism by increasing the oxide-reduction reaction

#### b) Biological

1) Vegetative regulation effect

2) Analgesic and vascular dilatation effect

3) Reflex action on endocrine glands

4) Insulin- actions: ↓ glycerine – glycosuria – ketone bodies, ↑glycogen deposits in muscles and liver

5) Bactericidal effect: by coagulating the bacterial cell and acting on chromosomal RNA

Indications:

1. exonerative spondyloarthropathy, rheumatic polyarthritis
2. infectious rheumatism
3. osteoarthritis
4. cervical–brachial neuralgia
5. radiculopathy : on Valleix`s points
6. Post traumatic states, osteoporosis

### II. Infrared radiations (IR)

Effects:

a) caloric erythema = arterial and capillary dilatation + oedema of the mucus layer and dermic papilla + perivascular leukocyte infiltration

b) the thermoregulation mechanism influences the local and general blood circulation

c) analgesic, resorbative, conjunctive tissue relaxing effects

d) Activates the blood circulation and nervous system, modifies gland secretion and general metabolism

e) In small doses increases the synthesis of melanin pigment

Indications:

1. skin diseases
2. ORL affections
3. sub acute and chronic inflammatory process
4. particular and periarticular degenerative rheumatism in chronic stage
5. peripheral circulation disorders
6. vicious scars
7. atonic ulcer
8. visceral spastic state
9. synovitis and tenosynovitis

### III. Lasertherapy

Is an therapeutic method of direct (skin, mucous membrane) or indirect (optical fibres, radiation guide, micromanipulators, endoscopes) application of coherent electromagnetic no ionized radiation, with variable wave length (200 – 15.000 nm)

## 2.3. Kinetotherapy

Kinethology investigates the articular and neuromuscular mechanisms, which make possible the normal motor activities, detecting and correcting the deficient neuromuscular mechanisms. Include:

1. Prophylactic kinethology = all kinethological possibilities and methods to maintain and invigorate health, therefore disease prevention. This represents primary prophylaxis (stage I prophylaxis). Secondary prophylaxis (stage II prophylaxis) includes all necessary possibilities to prevent the aggravation, complication and recurrence's occurrence of some chronic diseases.

2. Rehabilitation kinethology = represents all kinethological possibilities used in order to recover functional deficit in chronic diseases.

3. Medical kinethology

### ▪Kinetotherapy's objectives

**1. Relaxation** (intrinsic-Jacobson method, extrinsic methods such as yoga and Schultz method)

**2. Body's posture and alignment correction:**

- corrected or hypercorrected posture, maintained through various fixed methods
- passive, helped active and active mobilizations
- isometric contractions
- proprioceptive facilitation techniques

This step must be preceded by relaxation techniques in any body segment

**3. Articular mobility increase**

- for articular mobility, in soft tissue affectations are used : stretching, active inhibition.
- for articular mobility, in articular affectations are used : mobilisations, manipulations.

**4. Muscular strength increase**

Muscular strength reeducation represents a very important objective of kinetotherapy.

Muscular contractions types:

1. Isometric contraction: the muscle works against a resistance equal with his maximum strength and the muscle length remain constant. The isometric contraction is performed without moving the segments and in particular articular angles, depending on static or dynamic role of that muscle in professional activity or in daily living .

2. Isotonic contraction may be:

- Concentric = the muscle overcomes continuously a little lower resistance than the maximal muscular strength. Muscular length diminish gradual.
- Excentric = the muscle counteract continuously an external resistance which has the centrifugal vector tending, with all tension developed in muscle , to lengthen the muscle.

Regarding the capacity to generate and develop muscular strength these three types of contractions are ordered:

Excentric contraction > Isometric contraction > Concentric contraction.

Isometric efficiency > Excentric efficiency > Concentric efficiency.

**5. Muscle resistance increase**

Resistance represents the organism's necessary physiological capacity to perform repetitive motor activities during the day.

Muscular resistance represents muscle's capacity to maintain muscular tension and to perform an effort long time.

In rehabilitation kinetotherapy about bequeathing the muscular strength, is necessary to bequeath

muscular resistance. The bequeath is usually made with weights amounting 15-40% from maximal strength, measuring contraction's maintaining time or performing a simple activity, calculate the repetition's number at the mentioned weight at a mentioned rate. The methodology of this objective is to increase exercise's duration at low effort. Are used dynamic exercises with resistance, obtaining tiredness through exercise's duration increase. A similar efficiency is offered through therapeutical sports and occupational therapy.

## **6. Coordination, control and equilibrium.**

Coordination, control and equilibrium belong to neurokinetic process, called „motor control” which can be definite as the „ability to perform dynamic posture's fitters and to regulate body and limbs's movements.

### *a) The control*

Motor control develops in 4 steps, during the nervous system's development, beginning at birth:

1. mobility = the ability to initiate and to perform a movement with all his physiological amplitude.
2. stability = the capacity to maintain gravity postures and antigravity postures as well as median positions of the body.
3. controlled mobility = capacity to perform movements in every weight posture through body's weight with distal segments fixed.
4. ability = capacity to manipulate and to explore the environment, distal segment of limbs be in free.

Practical possibilities for motor control training:

1. stretch-reflex achieve contraction of the muscle of whom tendon was fast stretched. Is used in periferic motor neuron lesions.
2. electrovibration with 200HZ has the same effect.
  - proprioceptive facility tehcnics (PFT)
  - Margaret Rood method which use skin stimulations above the muscle which must be trained (exteroceptive facility)
  - contraction's perception training refer to muscle's contraction awareness. This awareness is performed trough a very little resistance opposite to movement, which means a small effort which will quicken the training and will spread the stimulation to other muscular groups.

### *b) The coordination*

Coordination's pathology occurs in cerebel lesions which make possible coordination's control as well as extrapyramidal system's lesions which influence coordination.

Practical possibilities for coordination's training:

1. PFT technics and methods
2. Articular and poliarticular mobilizations, train many joints and musculare gruops as treble flexions and treble extensions. Poliarticular mobilization comprise muscles which release the activity or muscles which strengths other musculare groups. The first group is called „trigger-muscles” and the second group is called „target-muscles”
3. Occupational therapy
4. Palleative coordinations represens the practise of some unphysiological coordinations, necessary in certain moments.

### *C) Body's equilibrium*

Defined as a complex process regardind the senzorial input organization and movements's program, which award right posture, which means permanent maintaining of the gravity center in ground support.

Permanent posture control is a characteristic of a health nervous system. Any equilibrium perturbation in the postural control, disturb the movement's efficiency. That is why equilibrium's correction is the first aim in rehabilitation of the patients with such perturbations.

Rehabilitation principles of the equilibrium perturbations:

1. in order to train an equilibrium maintaining system, another is suspended in order to make the first one to work as much as possible. Thus for peripheral feedback's perturbations are indicated orthostatic exercises and walk trough dark or with closed eyes.

2. if one inferior limb is more affected than the other (for example hemiparesis) the equilibrium of the affected limb can be trained in two manners:

- offering weighs to the affected limb,
- deprive the health limb, regarding equilibrium, in order to force the affected limb to maintain equilibrium,
- training will be perform on stable as well as on unstable surface,
- the exercises will be performed, varying the weigh center height,
- superior limbs and the body will be used as stabilizer or as unstabilizer for equilibrium,
- the aim is to obtain a functional motor ability (adaptable reflexes through training and experience).

## **7. Effort training**

Patients with cardiorespiratory diseases or thus which were long time immobilized as well as many healthy persons with sedentary life, find great difficulties to perform a usual effort. Effort tolerance represents the principal measure to appreciate the patient's work capacity. Absence of physic effort determine some functional disturbs, some cardiorespiratory, metabolic and muscular perturbations. Such a patient must have in his rehabilitation program the effort "retraining".

In kinesiology, effort training represents a very important objective comprised in kinetoprofilaxias as well as in rehabilitation kinetotherapy. Muscular resistance and muscular strength training doesn't increase automatic effort capacity, because this is a specific adaptation's result of the whole organism to physic effort.

Effort training effects:

- Psychic condition improvement trough dependence sensation decrease, trough self confidence increase and trough disappearance of the effort fear.
- Decrease of the tension-time index of the cardiac frequency and systolic pressure product, left ventricle's contractility improvement and increase of the ejection fraction.
- Increase the alveolo-capilar change surface with V/Q rapport improvement
- Improvement of the O<sub>2</sub> diffusion.
- Peripheral vascular resistance decrease.
- Tissues O<sub>2</sub> extraction increase (improvement of the O<sub>2</sub> use in tissue's respiration)
- ST segment's delineation decrease trough effort.
- Decrease of the blood cathecolamines and blood lipids levels and increase of the rapport between cholesterol from high density lipoproteins and total cholesterol.
- Fat tissue decrease and muscular tissue increase.
- Sexual capacity increase
- Favourable modifications in coagulation and fibrinolysis.

As a kinesiology objective, effort training must be applied more intensive by physicians and

kinetotherapists. Cardiac patient training to effort must be observed by the cardiologist at list in the first stages.

### **8. Respiratory deficit correction**

Respirator's function influence through various kinetological techniques, represents not only a kinesiology's objective but also an independent chapter with principles, techniques and particular methods.

The most physic exercises are performed during respiration times (inspiration-expiration) in order to maintain a good ventilation during the muscular O<sub>2</sub> increased consumption. Rhythmic respiration becomes a relaxation during the breaks and at the end of the effort. Respiratory kinesiology represents a principal therapeutic means and a functional respiratory rehabilitation possibility of the bronhopulmonary and extrapulmonary diseases with impact on respiration. In cardiovascular diseases is also important to pay attention to the respiration during kinetotherapy or kinetoprofilaxy in order to improve the gaseous changes and to improve the circulation. Respiratory training is performed to any immobilized patient during the kinetic rehabilitation program.

Respiratory kinetotherapy comprise:

1. corrective gymnastic
2. respiration re-education
3. relaxation
4. posturation
5. measured effort training
6. couch education
7. talk education
8. occupational therapy.

### **9. Sensibility re-education**

Sensitive syndrom's assessment

- gentle touch of the skin with cotton-wool, with the finger-tip, and with hair;
- pressure with a blunt (stumpy) object/ the 256Hz tuning fork's vibrations;
- temperature : warm→cold;
- pain : pricking with a sharp object/ the 30Hz tuning fork vibrations;
- the posture sense (proprioception);
- the movement sense ( kinestezia);
- identification of an object through palpation (stereognosia): shape, size, weight, firmness, texture, material;
- tactile discrimination of two points ( normally = 2-3mm on the finger tip and 6-8mm at the thigh);

Sensibility's reeducation steps ( only when the patient feels the 30Hz or 256Hz tuning fork's vibrations), are first performed with opened eyes and then with closed eyes:

- pressure- pain;
- proprioception;
- kinestesia
- thermic sensibility: warm→cold;
- stereognosia;
- incorporation of the motor function in sensitive training's context.

## Reeducation techniques

PFT is based on normal movement and motor development. In normal motor activity the brain registers total movement and not individual muscle action. Encompassed in the PFT approach are mass movement patterns that are spiral and diagonal in nature and that resemble movement seen in functional activities. In this multisensory approach, facilitation techniques are superimposed on movement patterns and postures through the therapist's manual contacts, verbal commands and visual cues. PFT is effective in the treatment of numerous conditions, including Parkinson's disease, spinal cord injuries, arthritis, stroke, head injuries and hand injuries.

*The principles underlying the PFT are developed from concepts in the fields of neurophysiology, motor learning and motor behaviour.*

1. All human beings have the potentials that have not been fully developed. That is why in the assessment and intervention we have to take in account patient's abilities and potential.
2. Normal motor development proceeds in a cervicocaudal and proximodistal direction. This direction is also followed in the assessment and therapy. When the disability is severe, the attention must focus on the head and neck region with its visual, auditory and vestibular receptors and to the upper trunk and extremities. The proximodistal direction is followed by developing adequate function in the head, neck and trunk before developing function in the extremities. This approach is of particular importance in treatment that often facilitates fine motor coordination in the upper extremities.
3. Early motor behaviour is dominated by reflex activity. Mature motor behaviour is supported or reinforced by postural reflexes. As the human beings matures, primitive reflexes are integrated and available for reinforcement to allow for progressive development such as that of rolling, crawling and sitting. Reflexes have also been noted to have an effect on tone changes in the extremities. Hellebrandt and associates studied the effect of the tonic neck reflex (TNR) and the asymmetrical tonic neck reflex (ATNR) on changes in tone and movement in the extremities of normal adults. In applying this finding to treatment, weak elbow extensors can be reinforced with the ATNR by having the patient look toward the side of weakness.
4. Early motor behaviour is characterised by spontaneous movement, which oscillates between extremes of flexion and extension. These movements are rhythmic and reverse in character. When it is working with a patient on getting up from the chair for example, attention also must be given to sitting back down. Often with an injury the eccentric contraction (sitting down) is readily lost and becomes very difficult for the patient to regain. If not properly treated, the patient may be left with inadequate motor control to sit down smoothly and thus may "drop" into the chair. Similarly, in training for ADL the patient must learn how to get dressed as well as how to undress.
5. Developing motor behaviour is expressed in an orderly sequence of total patterns of movement and posture. In the normal infant the sequence of total patterns is demonstrated through the progression of locomotion. The infant learns to roll, to crawl, to creep and finally to stand and walk. Throughout these stages of locomotion the infant also learns to use the extremities in different patterns and within different postures. Initially the hands are used for reaching and grasping within the most supported postures, such as supine and prone. As postural control develops, the infant begins to use the hands in side-lying, sitting and standing.
6. The growth of motor behaviour has cyclic trends, as evidenced by shifts between flexors and extensors dominance. The shifts between antagonists help to develop muscle balance and control. One of the main goals of the PFT treatment approach is to establish a balance between antagonists. Developmentally the infant establishes this balance before creeping (for example when rocking forward-

extensor dominant and backward –flexor dominant on hands and knees)) Postural control and balance must be achieved before movement can begin in this position. In treatment it is important to establish a balance between antagonistic muscles by first observing where imbalance exists and then facilitating the weaker component. For example, if the stroke patient demonstrates a flexor synergy (flexor dominant), extension should be facilitated.

7. Normal motor development has an orderly sequence but lacks a step-by-step quality. If one technique or developmental posture is not effective in obtaining the desired result, it may be necessary to try the activity in another posture. For example if an ataxic patient is unable to write in sitting position it may be necessary to practice writing in a more supported position for example supported on his elbows in a prone position. Just as an infant reverts to a more secure posture when attempting a complex fine motor task, so the patient does.

8. Locomotion depends on reciprocal contraction of flexors and extensors, and the maintenance of posture requires continual adjustment for nuances of imbalance. An example of imbalances is a head-injured patient who can not maintain adequate sitting position because of dominance of trunk extensor tone. Another example is the hemiplegic patient with tight finger flexors secondary to flexor-dominant tone in hand. In treatment emphasis is placed on correcting the imbalance. In the presence of the spasticity, first the spasticity is inhibited and then the antagonistic muscles, reflexes and postures are facilitated.

9. Improvement in motor ability is dependent upon motor learning. Multisensory input from the therapist facilitates the patient's motor learning and is an integral part of the PFT approach. For example the therapist may work with a patient on a shoulder flexion activity such as reaching into the cabinet for a cup. The therapist says, "Reach for the cup!" to add verbal input. Thus tactile, auditory and visual input is used. Motor learning has occurred when these external cues are no longer needed for adequate performance.

10. Frequency of stimulation and repetitive activity are used to promote and retain motor learning and to develop strength and endurance. Just as the therapist who is learning PFT needs the opportunity to practice the techniques, the patient needs the opportunity to practice new motor skills. In the process of developing the child constantly repeats a motor skill in many settings and developmental postures until it is mastered, as becomes apparent to anyone who watches a child learning to walk. Numerous attempts fail, but efforts are repeated until the skill is mastered. After the activity is learned, it becomes part of the child. He or she is able to use the activity automatically and deliberately as the occasion demands. The same is true for a person learning to play piano or to play tennis.

11. Goal- directed activities coupled with techniques of facilitation are used to learn total patterns of walking and self-care activities. When facilitation techniques are applied to self-care activities, the objective is improved functional ability. The correction of deficiencies is accomplished by directly applying manual contacts and techniques to facilitate desired response. In treatment this approach may mean applying stretch to finger extensors to facilitate release of the object or providing joint approximation through the shoulders and pelvis of an ataxic patient to provide stability while patient is standing to wash dishes.

#### ***A. Facilitation methods***

*They have the following elements:*

1. Use of the elementary reflex mechanisms
2. Use of the synergies (Brunnstrom)
3. Modifying the head position in the space influences tonic muscles in the rest of the body

1. Elementary (basic) reflexes can be used because the mechanisms underlying these reflexes don't depend of the cortical motor area.

For example: - the plantar flexion of the foot can be obtained only if the inferior limb is in the triple flexion, not when it is in extension.

-For a hemiplegic patient we can facilitate the apprehension by doing a sudden extension of the affected fingers.

-Tactile stimulation is the first that recover after coma. So, tactile stimulations have a great importance as a facilitation mechanism even the active mobility had recovered. Tactile stimulations have a great impact on walking recovery.

-Use of the sensitive-motor paths (nociceptive reflexes) : tactile stimulation of the foot with a needle determines dorsal flexion of the foot.

-The local reflexes: the extension of the first finger after a great pressing or the extension of the dorsal face of the first phalange of the first finger with the other finger flexion after a profound pressure on the anterior face of the fingers.

2. Sincineses are used to put under a volitional control some segmentary movements, which initially have a global character. The extension of the movement in such conditions can be obtained by the irradiation phenomenon of the cortical excitatory centre. The use of the sincineses is only the first step of the therapy and is a limited step. The use of these for a longer time is a great error because it can lead to stereotypes and automatisms, which can not be corrected afterwards.

The sincineses can be on the vertical and horizontal. The vertical ones can be used for the proximal-distal progression of the active mobility for the limbs. (For example: flexion of a plegic arm can lead to the extension of the forearm, wrist and fingers with the opening of the fist because of the irradiation phenomenon of the motor cortical excitation). The horizontal ones can facilitate increased mobility in the spastic limbs by acting on the healthy limbs. If we apply a resistance on the healthy limb, the response of the affected limb will increase. The upper limbs react different from the lower limbs when we use horizontal sincineses. The active movement of the upper healthy limb determine the same movement in the affected upper limb. For the lower limb the response is inverse.

3. Changes of the head position modify the muscle tone in the rest of the body. For example in a hemiplegic patient turning the head towards the hemiplegic side facilitates the extension of the upper limb on this side and rotation of the head towards the healthy side facilitates the flexion of the affected side.

*Basic principles of the proprioceptive facilitation:*

-We are working at first on the healthy side

-We are starting first with the head and neck, after that the knee doesn't matter the goal we are working on.

-We have to respect the diagonal and spiral movements.

-Human brain differentiates the movement notion not that of muscle.

*The facilitation tools a therapist has are:*

-Manual pressure and contacts

-Verbal commands

-Visual cues

-Stretch reflex

-Isotonic and isometric contractions

*Methods*

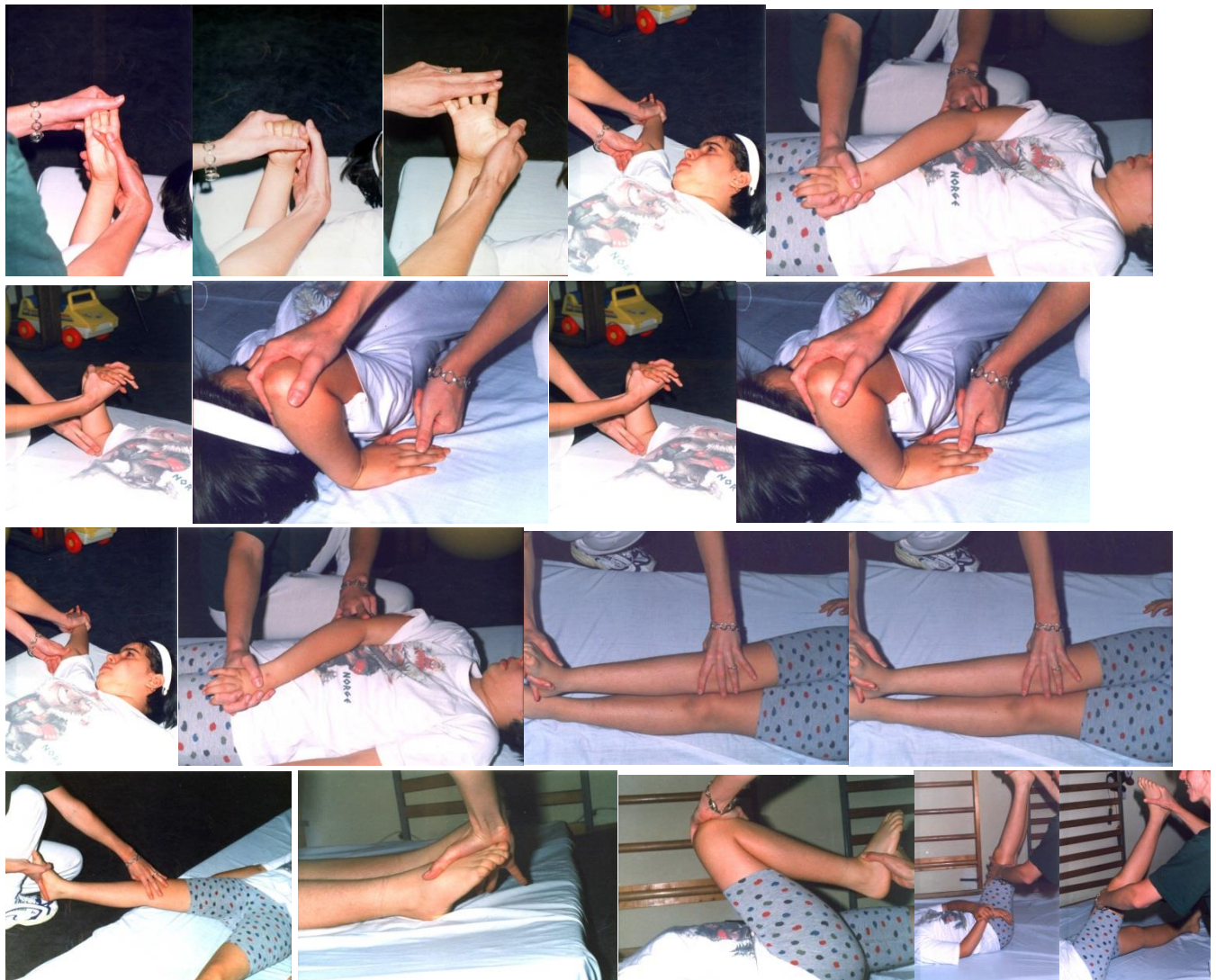
### 1. Kabat method:

-Uses other motor centres than cortical centres for the therapy (it uses the proprioceptive system for the onset and improvement of the movement. This is a very important mechanism taking in account the great distribution of this system in the muscles, tendons, ligaments and capsules). It is a muscular function's facilitation method and obtaining a muscular contraction stronger than that obtained through a simple voluntary effort, using various proprioceptive stimulus and voluntary contraction with maximum effort with maximal resistance;

-The method uses 4 ways to facilitate:

1. A maximum resistance to the patient movement
2. Straithening the muscle to increase the force (we use a resistance to the active movement)
3. Use the global movement schemes (irradiation phenomenon which activates our nervous cortical processes from the motor cortical areas)
4. Antagonists alternation for the active movement re-education by using the successive induction mechanism providing to the cortical level (successive irradiation and concentration phenomenon) and medullar level to facilitate cyclic movement.

-The limits of the methods: doesn't delimitate exactly the areas where it can be used (spastic or flaccid palsy); it refers more to the anatomical affected segments and less to the disease and stages of progression.



## 2. Frenkel method:

- Coordination imbalances of the movement can be facilitated using the sight.
- It is needed that the patient doesn't have severe psychiatric problems and to have a good level of understanding and collaboration.
- Frenkel focused on sensorial ataxia (diseases that affect the proprioceptive sensibility which enable the body to get information about the position of body parts in relation to the position of the whole body.)
- The method has as a goal the quality of the movement, not the intensity of this.
- The methods have 2 parts: the introductive one (physical exercises in an alert rhythm and great intensity) and the basic part (permits the precision of the execution using the spinal primitive reflexes.
- It can be used for the walking re-education. (the locomotorium's ataxis therapy which use the „after disease remained proprioception” through some exercises performed under visual control)

## 3. Phelps method:

- The method addresses to the re-education of each muscle, starting with the passive movement, after that the active movement, associating orthopaedic surgery and the plastic-reparatory surgery.
- It is used the “reciprocal-voluntary” technique: the healthy hand assists the passive movements of the affected hand to recover the proprioceptive sensibility (biofeedback). So, we can obtain active movements in segments with 0 quotation at muscle testing using the resistance applied to neighbouring segments. For example: we can obtain the dorsal flexion of the foot by applying a resistance to lower limb flexion.
  - The method uses music associated with the kinetotherapy programs.

4. Brunnstrom method: using spinal reflex activity (functional rehabilitation without active patient's participation) and sensorial stimulation (it is necessary the integrity of the afferent sensorial paths) this method focuses on voluntary movements re-education at hemiplegic patients. Sensorial stimulation depends on the motor rehabilitation stage of each patient. It is used primitive reflexes to initiate the movement. This method doesn't use tone muscle normalisation or primitive movements' inhibition.

## 5. Bobath inhibition techniques:

- Inhibition techniques consider motor deficit present in the hemiplegic patient due to pathological postural reflexes, which are no longer under the control of superior nervous centres. This method takes in account along with abnormal postural reflexes also the automatic movements which overlap and support the selective movements specially those with postural ending through inferior nervous centres. (cerebellum and pons and medulla). Inferior coordination of voluntary movements gives these movements a stereotypical character (that's why a typical hemiplegic attitude and movement appear).

## 6. Bobath method:

- The basis for this method is normal human movement and its pathology. Direct body manipulation and the key-points will control afferent input and will facilitate normal postural reactions. The goal of this control is to permit the patient to experience a normal afferent input and normal movement patterns while the abnormal afferent input is inhibited and also the pathologic movements.
- The goal of this method is decreasing tonic reflex activity in excess which affects the normal scheme of the active movement.
- Doesn't take in account force (strength) rehabilitation because it will increase the spasticity.
- It uses inhibitory-reflex schemes, which means posturing the patient in positions opposite to those that will be inhibited.
- It respects some sequences of reflex-inhibitory postures, starting always with the head and neck and continuing with the trunk, pelvis and finally the limbs.

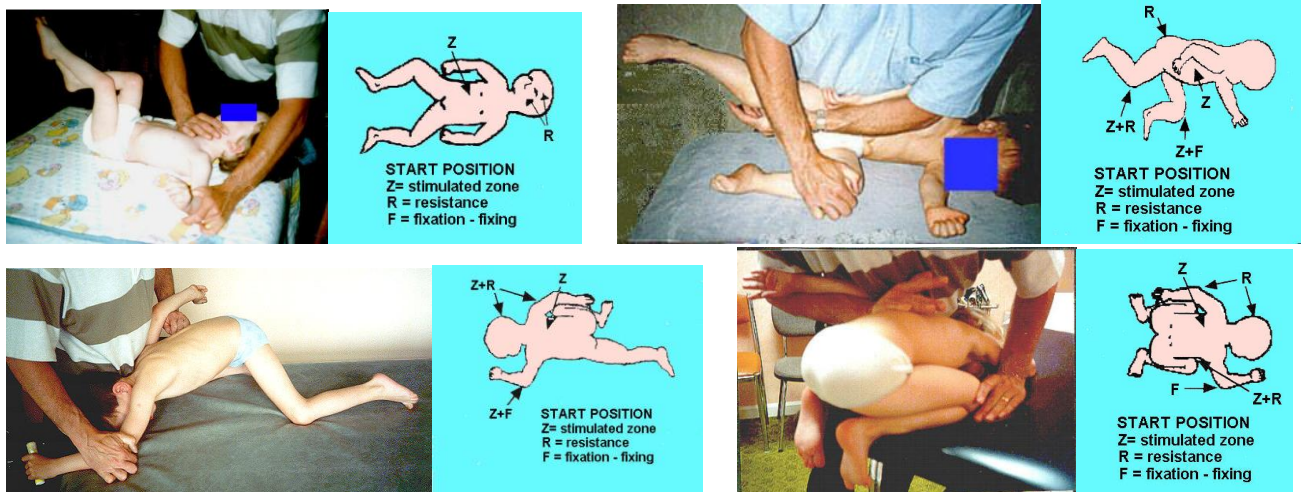
-Exercise programmes have to respect 4 basic principles:

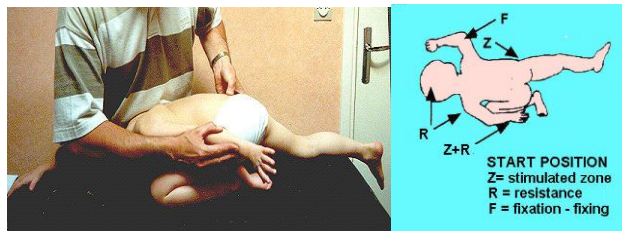
1. not to overlap the normal and pathologic schemes.
2. decreasing the spasticity exclusively using reflex-inhibitory positions.
3. postural combinations precede the movements; the effect will be decreased pathologic muscle tone and superior movement coordination.
4. Keeping under control the key-points. Key-points are joints not muscles. The location of key-points is axial (spinal cord with shoulder and pelvic girdles) and distal (fingers-wrist; toes- tibiotarsian joint)



## 7. Vojta method

- Due to congenital scheme of reflex locomotion the method uses global motor scheme at spastic children
- Performing the movement with resistance in the axial part of the body (head, trunk, pelvis), synergies are triggered and they generalise





## ***B. Neurophysiologic approach***

### **1. Knott and Voss method:**

-Using a maximum peripheral input it promotes the movement and movement functional synergies. PFT techniques permit motor learning by different sensorial stimulus and performance of the activities in a certain sequence of development. As a peripheral input you can use stretching and resistance movements to increase the existent motor response. Pathological movements are not permitted, abnormal activities are inhibited and it doesn't addresses to abnormal tone.

**2. Margaret Rood method:** focuses on obtaining a motor response as normal as possible and where it is possible. Sensorial stimuli are used to activate or inhibit postural reactions or movements, which follow a certain developmental sequence.

**3. Johnstore method:** refers to spasticity control and movement facilitation while the tonus has been controlled. The treatment focuses on the trunk with total body movement as rolling and crawling. It is encouraged the family participation. There aren't used abnormal movements.

## ***C. Learning theories***

**1. Peto method** (conductive education): teaches the patient strategies to solve the physical disabilities, encouraging the patient or the adult to learn to live with the disability. There are used education and repetitive principles to facilitate everyday independence of the patient. The programs are structured and controlled by an educator (conductor), the patients are encouraged to learn active and not to be treated by others. The group work is used. Also the repetition and analysis of the activities. It is not used the manual facilitation and the patients guide themselves the movements using bilateral activities. Individual treatment is not used, also the manipulation for movement correction or somatic-sensorial stimuli.

**2. Carr and Sheppherd method:** uses learning theories and in particular practice and biomechanical knowledge to analyse movements and activities, to encourage the patient to learn and supervise himself. Manual guiding techniques to manipulate movement or to realise a normal afferent input are not used.

## **2.4. Occupational therapy**

***Occupation*** refers to a group of activities and tasks of everyday life, ***named, organised and given value and meaning*** by individuals and a culture. Occupation is everything people do to occupy him or herself, including looking after himself or herself (***self-care***), enjoying life (***leisure***) and contributing to the social and economic fabric of their communities (***productivity***).

Each individual has the potential to function as an integrate whole, interacting with other persons and with many environments. Individual has creative and adaptive capacities that flourish best in occupational environments that offer optimal levels of opportunity, challenge and support.

***Environment*** means in occupational therapy: ***physical*** environment (buildings, landscape, furniture), ***human*** (parents, teachers, people in the community, at work, at home) and ***cultural***, which may facilitate or puts barriers in people participating in everyday life's occupations.

The goal of the occupational performance is full social ***participation***. Occupational performance and roles we have in everyday life (parent, student, child, teacher, worker, etc.) may be disrupted by:

developmental delays, disease, and emotional and physical trauma as well as by environmental factors. Occupational therapy, as a dynamic process, uses occupation to enable clients to prevent and remediate the dysfunction.

An occupation can be *in 3 areas*:

- Self-care
- Leisure
- Productivity (work)

Every occupation consists of many *activities*.

*For example* a leisure occupation is playing Monopoly. It is a game that a family plays together one evening. It is an occupation. But this occupation consists of many activities like:

- Knowing the rules of the game
- Winning and losing
- Moving pieces
- Bonuses and penalties etc.

It is an occupation that requires a lot of *skills*: communication, sensory-motor, cognitive, social etc.

Every person experience differently playing Monopoly. So, it has different *meaning* for each individual.

Occupational therapy highlights *meaningful and purposeful occupations* for each individual.

Occupational therapy *has two main approaches*:

## 1. PATIENT-CENTRED APPROACH

Puts the client in the centre of the therapy. He is not a passive person and others decide on his wishes. Is an *active person*, and the therapist asks him what he wants, if he is satisfied with the therapy. That is why we find CLIENT in the occupational therapy as a name for medical PATIENT.

Occupational therapy works with three factors and the interaction between them:

- *Person* with his values, wishes, abilities.
- *Occupations* he engages in during his life.
- *Environment*: physical, human, cultural specific for each client.

## 2. TOP-DOWN APPROACH

- Occupational therapy looks upon a client from the top to bottom:

-First of all is participation

-Second occupations

-Activities

-Skills (physical, cognitive, social)

For example a person cannot make shopping. After assessing him we can find that one of his activities can be disrupted:

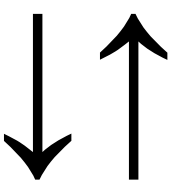
- He doesn't know the way to the shop (cognitive skills)
- He can not reach the shop (motor or sensorial skills)
- He doesn't know the products in the shop (mentally dysfunction or is autistic)
- He doesn't know the value of the money (cognitive skills) etc.

*Occupational therapy works only on individual's activity level where there is a dysfunction.*

- Medicine looks from bottom to top:

-What is not working well? For example you have decreased range of motion in the left knee, so we will improve this through mobility exercises until the normal value of the ROM is established. But, sometimes during our everyday life we do not need a full range of motion for our occupations, or

maybe that the client doesn't need it because of his static activities. Another aspect is that the client can move his affected knee through the entire range of motion after therapy but even so he cannot perform his usual activities.

ICF FUNCTIONING		ICF DISABILITY	
<b>PARTICIPATION</b>	Expected, required or desired <b>SOCIAL PARTICIPATION</b>	<b>PARTICIPATION RESTRICTION</b>	
<b>ACTIVITIES</b>	Performance Skills: <b>ADL, IADL, WORK /SCHOOL, PLAY, LEISURE</b>	<b>ACTIVITY LIMITATIONS</b>	
<b>BODY FUNCTIONS</b>  <b>BODY STRUCTURES</b>	Capacities: <b>mental, sensory, neuromuscular, psychological etc.</b>	<b>IMPAIREMENTS</b>	
<b>HEALTH</b>	Wellness Condition/Disorder/Disease Trauma Developmental delay	<b>CONDITION</b>  <b>DISORDER</b>  <b>DISEASE</b>	

Disease and disorder represent two opposite explanations of disability: the medical and social model. The medical model views disability as a consequence of factors within the person, whereas the social model views disability as a consequence of factors extrinsic to the person. ICF (International Classification of Functioning) captures the perspective of both models into a bio psychological one. When disease and disorder negatively affect a person, change or loss of body functions and structures can occur leading to impairments. In turn, impairment can negatively influence activity capacity and performance determining activity limitations. When one or more activities are limited this can lead to reduced involvement in everyday life situations, or participation restriction. Both functioning and disability are influenced by contextual factors. ICF distinguishes between environmental factors (physical, social, attitudinal) and personal factors (attributes of a person that have an impact on functioning or disability).

Occupational therapy addresses to a variety of clients in different medical and social areas:

- Children and adults with:
  - Autism
  - Cerebral Palsy.
  - Neurological impairments: Parkinson, Stroke, and Multiple Sclerosis etc.
  - Orthopaedic and rheumatologic conditions.

- Abandoned children, AIDS.
- Psychiatric conditions.
- Learning disabilities.
- Elderly. etc.

Occupational therapy *intervention* is a term used for the processes and methods that occupational therapists use to help their clients achieve desired occupational performance in their valued activities. These include personal and *instrumental activities of daily living (ADL)*, *education, work, play and leisure, and social participation*.

Occupational therapists base their intervention on an understanding of the client as a person with a *unique history* of life activities, patterns of daily living, values and interests. *Client goals* are elicited by systematically *interviewing* the client about how his occupations have been disrupted, or threatened.

## **2.5. Adapted physical activity (APA)**

➤ ***Adapted physical activity (APA)*** is an umbrella term for all sport activities for persons with diverse needs, especially for individuals with disabilities and including areas of:

- rehabilitative sport
- physical education and sport at school
- sport for all, sport in leisure time, in community
- elite performance sport

Adapted physical activity has many meanings, but its central focus is individual differences in physical activity that require special attention.

Adaptation means to modify, adjust, or accommodate in accordance with assessment data. Individual differences include impairments, disabilities, handicaps and other special needs as delineated by various governing bodies.

APA is not only a term used to describe a cross disciplinary body of knowledge but also a theoretical framework for research and strategies for providing physical activity programmes (De Pauw, 2000).

The practical applications in the area of APA are directed towards improvements in the quality of life of persons across disability groupings, age, and throughout one's life-span. For example it deals with issues such as:

- equal access to physical activity opportunities;
- right of all individuals to participate in physical activity for its own sake if they so choose (participation not determined solely by therapeutic benefits);
- individualisation/inclusion of students with disabilities in physical education;
- improved teachers' training/coaches' and recreation leaders' training in physical education and sport;
- development of various recreational programs;
- assistance/resources to include individuals with disabilities in existing programmes;
- the development of new strategies and approaches in physical activity and sport in rehabilitative/therapeutic settings;
- in elite sport it deals with Paralympics sport issues such as: classification, integration/inclusion, sport performance, attitudes, empowerment, retirement from sport, spectatorship, media, equity issues, sport injuries, to name but a few
- APA also deals with reducing barriers to sport participation, re-education in physical activity after acquiring disability and exercise effects in conjunction with specific disabilities and conditions.

In 1989, when preparing the International Symposium on APA, were defining APA as follows:

*“Adapted physical activity refers to movement, physical activity and sport in which special emphasis is placed on the interests and capabilities of individuals with limited conditions.”*

In 1994 it changed the definition: *APA is cross-disciplinary theory and practice related to life-span activity of individual whose function, structure, or appearance requires expertise in:*

- *assessing and adapting ecosystems*
- *facilitating societal changes necessary for:*
  - *equal access*
  - *integration/inclusion*
  - *life-span wellness*
  - *movement success*
  - *empowerment/self – actualisation*

How we understand the concept APA, because it should be broad than the concept sport for the disabled is. In every national sports culture there are at least three population groups, which need adaptations in sports and physical activity and to who sports has a specific value or role from the viewpoint of health or activities of daily living. These groups are:

- *persons with disability*
- *the chronically ill*
- *part of the elderly (Koivumäki, 1995).*

### **►Adapted physical education**

-Is defined as a „diversified programme of developmental activities, games, sports and rhythms suited to the interests capacities and limitations of students with disabilities who may not safely or successfully engage in unrestricted participation in the rigorous activities of the general physical educational programme.” (Winnick, 1990).

-Adapted physical education is the art and science of developing and implementing a carefully designed physical education instructional program for an individual with a disability, based on a comprehensive assessment, to give the individual the skills necessary for a lifetime of rich leisure, recreation, and sport experiences to enhance physical fitness and wellness. (Auxter, Pyfer, & Huettig, 2001).

\_The aims and goals of an adapted physical education programme are:

#### **1. Influence of health status:**

- *To remove health impairment*
- *To stabilise health impairment and prevent of additional development of it*
- *The lower impairment symptoms*
- *To build conditions for individual loading and adaptation*
- *The health fitness*
- *To regulated way of living*

#### **2. Educate:**

- *acquire motor skills, locomotors habit*
- *motor development*
- *specific sport skills*
- *posture and body mechanics*
- *physical fitness*
- *sport activities*
- *theoretical knowledge*

- *motor experiences*
- *development of motor ability*

### 3. Social:

- *self evaluation, evaluation of others*
- *self know, know of others*
- *acceptance of collective, in collective*
- *own identity*
- *living and sport environment*

### 4. Psychological:

- *improve physic functions and conditions*
- *change of behaviour, activities*
- *develop feeling, precepts, and needs*
- *motivation*

### 5. Aims of sport representation:

- *represent of self person*
- *represent collective*
- *to be a member of sport collective*
- *represent nation, club*

### ➤ **Concept of impairment/disability/handicap**

The conception of World Health Organisation (WHO) presented from the year 1980 a new model of diseases in the form of the following diagram (ICIDH, 1980): Disease impairment disability handicap. These terminology bases are intended to give shape to the classification of persons after acute illness. Illness involves several separate events:

- Something abnormal occurs within the individual – may be present at birth or acquired later. A chain of causal circumstances (the aetiology) gives rise to changes in the structure or functioning of the body (pathology). Pathological changes may or may not make them evident, in medical terminology are usually distinguished as symptoms and signs. These features are the components of the medical model of disease.
- Someone becomes aware of such an occurrence – appearance of an anomaly within the individual, realisation of the existence of the anomaly. This realisation may be that of the person concerned or of those around him or health professionals. The pathological state is said to be exteriorised. Spontaneously or through the intervention of a third party the person concerned becomes aware of his ill health when abnormalities of body structure and appearance or of organ or system function are identified. The abnormalities are described as impairments and represent disturbances within organs.
- The performance or behaviour of the individual may be altered – awareness leads to these changes either directly or as a result of a cognitive process. Behaviour during ordinary activities should be understood in the broad sense and includes psychological responses by the individual to the presence of disease particularly in response to the expectations of others. All of these responses reflect the consequences of the consequences of impairments (of organ or function) in terms of functional performance and activity – are described as disabilities.
- Either the awareness itself, or the altered behaviour or performance to which this gives rise, may place the individual at a disadvantage relative to others. This plane reflects the response of society to the individual's experience, whether in the form of attitudes, stigmatisation or behaviour, including legislation. What is the value attached to an individual's functional performance or status. The emphasis

on value certainly makes this last plane of experience the most problematical of all – are described as handicaps. (Chapireau, 1994).

Planes of experience	Level	Vector	Type
Pathological change	Pathological process	Within the individual	Symptoms and signs
Exteriorisation	Organ or function	Awareness	Impairment
Objectification	Person	Ordinary activities	Disability
Socialization	Society	Social value	Handicap

In the context of health experience:

- Impairment is any loss or abnormality of psychological, physiological or anatomical structure or function. The term includes the existence or occurrence of an anomaly, defect, and loss in a limb, organ, tissue or other structure of the body, including the system of mental function. There may be an impairment even when the individual is not or is no longer ill, exists when someone becomes aware of it. Nobody can become aware of what exists only potentially. It represents exteriorisation of a pathological state and in principle it reflects disturbances at the level of the organ.

Losses and abnormalities may be: Temporary - Permanent

#### *Classification*

- intellectual impairments
- other psychological impairments
- language impairments
- hearing impairments
- ocular impairments
- visceral impairments
- skeletal impairments
- disfiguring impairments
- generalised, sensory and other impairments.

Disability is any restriction or lack (resulting from impairment) of ability to perform an activity in the manner or within the range considered normal for a human being.

It is concerned with compound or integrated activities, it relates to the person or body as a whole when engaged in a task, a skill or a particular form of behaviour.

There may be excesses or deficiencies of customarily expected behaviour or activity, may be: temporary or permanent, reversible or irreversible, progressive or regressive.

Objectification plays a key role in this plane of experiences. Disabilities may arise as a direct consequence of impairment or as a response by the individual, particularly psychologically to a physical, sensory or other impairment. It represents objectification of impairment and as such it reflects disturbances at the level of the person.

#### *Classification*

- behaviour disabilities
- communication disabilities
- personal care disabilities
- locomotor disabilities
- body disposition disabilities
- dexterity disabilities

- situational disabilities
- particular skill disabilities
- other activity restrictions.

Handicap is a disadvantage for a given individual, resulting from impairment or a disability, which limits or prevents the fulfilment of a role that is normal (depending on age, sex and social and cultural factors), for that individual.

The same handicap can arise in different situations and therefore as a result of different disabilities. Handicap is a social phenomenon, which represents the social and environmental consequences of impairments and disabilities, is characterised by discordance between the individual's performance or status and the expectations of the particular group of which he is member.

Disadvantage may be perceived:

- subjectively, by the individual himself
- by others who are significant to the individual
- by the community as a whole.

Handicap represents socialisation of an impairment or disability and reflects the consequences for the individual in sphere – cultural, social, economic, and environmental.

*Classification* (list of dimensions)

- orientation handicap
- physical independence handicap
- mobility handicap
- occupation handicap
- social integration handicap
- economic self-sufficiency handicap
- other handicap.

-The term „impaired“ expresses: having identifiable organic or functional disorder that may restrict performance.

-Then term „disability“ expresses impairment of physical, mental, or emotional functioning that may or may not limit the persons ability to perform certain tasks and term „handicap” expresses: a problem a person encounters because of a hindrance or difficulty imposed by physical, health, learning, or behavioural characteristics that interfere with achievement or acceptance by society (Anshel, et al., 1991).

-Some persons take offence to both the term disability and impairment and prefer use of the term different ability to describe themselves (Egbert, 2000).

### ➤ **Disability sport or sport for differently abled**

Participation in sports and recreational activities can be an excellent part of maintaining a healthy and fulfilling lifestyle for persons of all abilities and inclinations. Although there is much progress to be made, ongoing movements in making all aspects of balanced living, including sports and recreation available to all persons, have resulted in a growing array of options and viable opportunities for maintaining a fit and healthy lifestyle.” *Sports do not build character, they reveal it.” (John Wooden)*

Disability sport or sport for differently abled originally referred to as Sport Conducted by Disability Sport Organizations. Today the term encompasses broader definitions to include mainstream and reverse mainstream in which athletes both with and without disabilities may participate (Sherrill, 1998, p 32).

### Barriers to sport participation

Sport and athletes with a disability are confronted with many barriers. These barriers result from persistent social myths and alarming stereotypes held by the society, from current economics situation or from state of society development. We can characterise and to divide the barriers as follows:

- ***Social:***

- position of persons with disability in society
- social myths
- lack of sport clubs
- lack of organised sport programmes
- law
- social conditions

Although increasing sport opportunities for individuals with disabilities within school physical education or after-school sport programmes are inadequate.

Community – based recreation and sport programmes have increased dramatically over the years, but they remain inadequate to fulfil the needs of the existing, let alone the potential population (De Pauw – Gavron, 1995).

- ***Personal:***

Qualified physical education teachers, coaches, instructors, volunteers, referees, officials, experts, and specialists.

The sport of persons with disability needs greater number of trained sport and recreation professionals and physical educators athletes with disabilities have suffered from the each of coaches available to help them train. Most of these athletes have been self-coached. There is a lack of expert for management of integration sport's process.

- ***Architectural:***

Facilities that are accessible to all disability groups are in short supply, even though laws have been passed that require accessibility. Emphasis must be placed on the local level as well as the state and federal levels to provide the physical accommodation and accessibility to those individuals with disabilities who wish to participate in sport.

All new facilities should be constructed to ensure accessibility and usability. Attention must be given to indoor and outdoor facilities.

- ***Material needs:***

Many individuals with disabilities do require some additional apparatus or assistive device: wheelchair, especially designed prosthesis, visual and hearing aids, special exercise aids, mono-ski, etc. The cost of necessary equipment can be especially prohibitive, some of equipment are non produce or can not buy its.

- ***Medical:***

- kind of impairment
- health status, fitness
- classification of athletes
- medical recommendation for participation in physical education and sport

- ***Economic:***

- a lack of sponsorship
- foundations

- governmental budget
- private sector budget
- payment for participation in sport
- cost of facilities, sport camps, etc.

- **Educational:**

- lack of organised sport programmes
- lack of access to coaches and training programmes
- long – term sport preparation
- conception of physical education teaching
- sport care of sport talented people

- **Psychological:**

- the attitude of health person to disabled
- mutual acceptance
- personal segregation
- behaviour forms

Paralympics: "a world-wide sport movement for elite athletes with disabilities, which parallels the Olympics in that international Summer and Winter games are held alternately every 2 years. Current Paralympics Sports include: Summer sports of archery, athletics (track and field), bocce, cycling, equestrian, fencing, goal ball, judo, lawn bowling, power lifting, sailing, shooting, soccer (football), swimming, table tennis, volleyball (sitting and standing), wheelchair basketball, wheelchair rugby and wheelchair tennis as well as Winter sports of alpine skiing, cross-country skiing, ice sledge hockey, ice sledge racing and wheelchair dance sport

## **Robotic Rehabilitation**

Is a field of research dedicated to understanding and augmenting rehabilitation through the application of robotic devices. Robotic rehabilitation includes development of robotic devices tailored for assisting different sensorimotor functions(e.g. arm, hand, leg, ankle), development of different schemes of assisting therapeutic training, and assessment of sensorimotor performance (ability to move) of patient; here, robots are used mainly as therapy aids instead of assistive devices. Rehabilitation using robotics is generally well tolerated by patients, and has been found to be an effective adjunct to therapy in individuals suffering from motor impairments, especially due to stroke.

Robotic rehabilitation can be considered a specific focus of biomedical engineering, and a part of human-robot interaction. In this field, clinicians, therapists, and engineers collaborate to help rehabilitate patients.

Rehabilitation robots are used in the recuperation process of disabled patients in *standing up, balancing and gait*. These robots must keep up with a human and their movement, therefore in the making of the machine the makers need to be sure that it will be consistent with the progress of the patient. Much rigorous work is put into the design because the robot will work with people who have disabilities and will not be able to react quickly in case something goes wrong

Prominent goals in the field include:

- developing implementable technologies that can be easily used by patients, therapists, and clinicians;
- enhancing the efficacy of clinician's therapies;

- increasing the ease of activities in the daily lives of patients

Rehabilitation robots are designed with applications of techniques that determine the adaptability level of the patient. Techniques include but are not limited to active assisted exercise, active constrained exercise, active resistive exercise, passive exercise, and adaptive exercise. In active assisted exercise, the patient moves his or her hand in a predetermined pathway without any force pushing against it. Active constrained exercise is the movement of the patient's arm with an opposing force; if it tries to move outside of what it is supposed to. Active resistive exercise is the movement with opposing forces. These machines MIT-Manus, Bi-Manu-Track and MIME make the active resistive exercise possible. Passive exercise needs to be pushed from the patient. Finally, an adaptive exercise is an excessive workout that the robot has never done and is adapting to the new unknown pathway. These devices Bi-ManuTrack and MIME support the adaptive exercise possible. The active constrained exercise is supported by all the machines that are mentioned.

Over the years the number of rehabilitation robotics has grown but they are very limited due to the clinical trials. Many clinics have trials but do not accept the robots because they wish they were remotely controlled. Having Robots involved in the rehabilitation of a patient has a few positive aspects. One of the positive aspects is the fact that you can repeat the process or exercise as many times as you wish. Another positive aspect is the fact that you can get exact measurements of their improvement or decline. You can get the exact measurements through the sensors on the device. While the device is taking a measurement you need to be careful because the device can be disrupted once it is done because of the different movements the patient does to get out. The rehabilitation robot can apply constant therapy for long periods. The rehabilitation robot is a wonderful device to use according to many therapists, scientists, and patients that have gone through the therapy. In the process of a recovery the rehabilitation robot is unable to understand the patient's needs like a well experienced therapist would. The robot is unable to understand now but in the future the device will be able to understand. Another plus of having a rehabilitation robot is that there is no physical effort put into work by the therapist.

Lately, rehabilitation robotics have been used in training medicine, surgery, remote surgery and other things, but there have been too many complaints about the robot not being controlled by a remote. Many people would think that using an industrial robot as a rehabilitation robot would be the same thing, but this is not true. Rehabilitation robots need to be adjustable and programmable, because the robot can be used for multiple reasons. Meanwhile, an industrial robot is always the same; there is no need to change the robot unless the product it is working with is bigger or smaller. In order for an industrial robot to work it would have to be more adjustable to its new task.

#### *Current products:*

Hand of Hope is an intention-driven exoskeleton hand that focuses on improving motion of the hand and fingers in stroke victims, developed by Rehab-Robotics. The robotic hand is controlled by EMG signals in the forearm muscles, meaning that patients can move their hand using only their brain. The device also has a continuous passive motion mode, where the actions of hand opening and closing are done involuntarily.

Ekso Bionics is currently developing and manufacturing intelligently powered exoskeleton bionic devices that can be strapped on as wearable robots to enhance the strength, mobility, and endurance of

soldiers and paraplegics. Tyromotion is currently developing and manufacturing a set of intelligent rehabilitation devices for the upper extremity. The hand rehabilitation robot called AMADEO offers a range of rehabilitation strategies including passive, assistive, ROM, force and haptic training. The arm rehabilitation robot called DIEGO offers bilateral arm therapy including assistive force for weight reduction and full 3D tracking of the arm movement for augmented feedback training in a virtual reality environment.

Current robotic devices include exoskeletons for aiding limb or hand movement such as the Tibion Bionic Leg, the Myomo Neuro-robotic System, MRISAR's STRAC (Symbiotic Terrain Robotic Assist Chair) and the Berkeley Bionics eLegs; enhanced treadmills such as Hocoma's Lokomat; robotic arms to retrain motor movement of the limb such as the MIT-MANUS, and finger rehabilitation devices such as tyromotion's AMADEO. Some devices are meant to aid strength development of specific motor movements, while others seek to aid these movements directly. Often robotic technologies attempt to leverage the principles of neuroplasticity by improving quality of movement, and increasing the intensity and repetition of the task. Over the last two decades, research into robot mediated therapy for the rehabilitation of stroke patients has grown significantly as the potential for cheaper and more effective therapy has been identified.

## 5.REHABILITATION OF SPECIFIC DISORDERS

- **Autoimmune Diseases**

**General data** (*American Autoimmune Related Diseases Association, 22100 Gratiot Ave E.Detroit, 2005*)

It is the preferred the use of the term 'autoimmune rheumatic disease' to replace 'collagen vascular disease. The term "autoimmune disease" refers to a varied group of more than 80 serious, chronic illnesses that involve almost every human organ system. It includes diseases of the nervous, gastrointestinal, and endocrine systems as well as skin and other connective tissues, eyes blood, and blood vessel. In all of these diseases, the underlying problem is similar -the body's immune system becomes misdirected, attacking the very organs it was designed to protect.

Female: Male Ratios in Autoimmune Diseases	
Hashimoto's disease/hypothyroidisms	50:1
Systemic lupus erythematosus	9:1
Sjogren's syndrome	9:1
Antiphospholipid syndrome	9:1
Primary biliary cirrhosis	9:1
Mixed connective tissue disease	8:1
Chronic active hepatitis	8:1
Graves' disease/hyperthyroidisms	7:1

Rheumatoid arthritis	4:1
Scleroderma	3:1
Myasthenia gravis	2:1
Multiple sclerosis	2:1
Chronic idiopathic thrombocytopenic purpura	2:1

## ***1. Rheumatic Diseases***

1. Systemic connective tissue diseases: rheumatoid arthritis, lupus erythematosus (systemic, discoid, and drug-related), scleroderma (localized syndromes, systemic sclerosis, CREST variant, chemical/drug-related), eosinophilic fasciitis, eosinophilic myalgic syndrome, Sjögren's syndrome, polymyositis and dermatomyositis, overlap syndromes including mixed connective tissue disease, polymyalgia rheumatica, relapsing polychondritis, relapsing panniculitis, erythema nodosum, adult-onset Still's disease, primary antiphospholipid antibody syndrome, undifferentiated connective tissue disease

2. Seronegative spondyloarthropathies: ankylosing spondylitis, Reiter's syndrome, psoriatic arthritis, inflammatory bowel disease-associated arthritis, arthritis associated with acne and other skin diseases, SAPHO syndrome, and undifferentiated spondyloarthropathies

3. Vasculitis: temporal arteritis, Takayasu's arteritis, polyarteritis nodosa and systemic necrotizing vasculitis overlaps, allergic granulomatosis of Churg- Strauss, Wegener's granulomatosis and other ANCA-associated diseases, Behcet's disease, hypersensitivity and small vessel angiitis, cryoglobulinemia, Cogan's syndrome

4. Paediatric rheumatic diseases: diseases occurring primarily in childhood (e.g., juvenile rheumatoid arthritis, Kawasaki's disease and infantile PAN, neonatal lupus syndrome, juvenile dermatomyositis, acute rheumatic fever, bone and joint dysplasias, other) and diseases which occur primarily in adults but can occur in childhood (e.g., SLE, systemic sclerosis, others)

### 5. Infectious and reactive arthritis

- Infectious arthritis: bacterial (nongonococcal and gonococcal), mycobacterial, spirochetal (syphilis, Lyme), viral (HIV, hepatitis B, parvovirus, other), fungal, parasitic
- Whipple's disease
- Reactive arthritis: acute rheumatic fever, arthritis associated with subacute bacterial endocarditis, intestinal bypass arthritis, postdysenteric arthritis, postimmunization arthritis, other colitic-associated arthropathies

### 6. Metabolic, endocrine, and haematological disease associated rheumatic disorders

- Crystal - associated diseases: monosodium urate monohydrate (gout), calcium pyrophosphate dihydrate deposition disease, basic calcium phosphate (hydroxyapatite), calcium oxalate
- Endocrine - associated diseases: rheumatic syndromes associated with diabetes mellitus, acromegaly, hyperparathyroidism, hypoparathyroidism, hyperthyroidism, hypothyroidism, Cushing's disease
- Haematological - associated diseases: rheumatic syndromes associated with haemophilia, hemoglobinopathies, and angioimmunoblastic lymphadenopathy

### 7. Bone and cartilage disorders

- Osteoarthritis - primary and secondary osteoarthritis, chondromalacia patellae
- Metabolic bone disease: osteoporosis, osteomalacia, bone disease related to renal disease
- Paget's disease of bone
- Avascular necrosis of bone: idiopathic, secondary causes, osteochondritis dissecans
- Others: transient osteoporosis, hypertrophic osteoarthropathy, diffuse idiopathic skeletal hyperostosis, insufficiency fractures

#### 8. Hereditary, congenital, and inborn errors of metabolism associated with rheumatic syndromes

- Disorders of connective tissue: Marfan's syndrome, osteogenesis imperfecta, Ehlers- Danlos syndromes, pseudoxanthoma elasticum, hypermobility syndrome, others
- Mucopolysaccharidoses
- Osteochondrodysplasias: multiple epiphyseal dysplasias, spondylepiphyseal dysplasia
- Inborn errors of metabolism affecting connective tissue: homocystinuria, ochronosis
- Storage disorders: Gaucher's disease, Fabry's disease, Farber's lipogranulomatosis
- Immunodeficiency: IgA deficiency, complement component deficiency, SCID and ADA deficiency, PNP deficiency, others
- Others: hemochromatosis, familial Mediterranean fever, hyperlipidemic arthropathy, myositis ossificans progressiva, Wilson's disease, others

#### 9. Nonarticular and regional musculoskeletal disorders

- Fibromyalgia
- Psychogenic rheumatism
- Axial syndromes: low back pain, spinal stenosis, intervertebral disc disease and radiculopathies, cervical pain syndromes, coccydynia, osteitis condensans ilii, osteitis pubis, spondylolisthesis/spondylolysis, and discitis
- Regional musculoskeletal illnesses: in addition to bursitis, tendinitis, or enthesitis occurring around each joint, the fellow should be familiar with other disorders occurring at each specific joint site (e.g., shoulder-rotator cuff tear, adhesive capsulitis, impingement syndrome; wrist ganglions; trigger fingers and Dupuytren's contractures; knee synovial plicae, internal derangements, cysts; hallux rigidus, heel pain, and metatarsalgia; TMJ syndromes; costochondritis
- Biomechanical/anatomic abnormalities associated with regional pain syndromes: scoliosis and kyphosis, leg length discrepancy, foot deformities
- Overuse rheumatic syndromes: occupational, sports, recreational, performing artists
- Sports medicine: injuries, strains, sprains, nutrition, female athlete, medication issues
- Entrapment neuropathies: thoracic outlet syndrome, upper extremity entrapments, lower extremity entrapments
- Other: reflex sympathetic dystrophy, erythromelalgia

#### 10. Neoplasms and tumour-like lesions

- Benign
  - Joints: loose bodies, fatty and vascular lesions, synovialosteochondromatosis, pigmented villonodular synovitis, ganglions
  - Tendon sheaths: fibroma, giant cell tumour, nodular tenosynovitis
  - Bone: osteoid osteoma, others
- Malignant

- Primary: synovial sarcoma, others
- Secondary: leukaemia, myeloma, metastatic malignant tumours
- Malignancy-associated rheumatic syndromes: carcinomatous polyarthritis, palm plantar fasciitis, Sweet's syndrome

### 11. Muscle diseases

- Inflammatory: polymyositis, dermatomyositis, inclusion body myositis
- Metabolic
  - Primary: glycogen storage diseases, lipid metabolic disorders, myoadenylate deaminase deficiency, mitochondrial myopathies
  - Secondary: nutritional, toxic, endocrine disorders, electrolyte disorders, drug-induced
- Muscular dystrophies
- Myasthenia gravis

### 12. Miscellaneous rheumatic disorders

- Amyloidosis: primary, secondary, hereditary
- Raynaud's disease
- Charcot joint
- Remitting seronegative symmetrical synovitis with pitting oedema
- Multicentric reticulohistiocytosis
- Plant thorn synovitis
- Intermittent arthritis: palindromic rheumatism, intermittent hydrarthrosis
- Arthritic and rheumatic syndromes associated with: sarcoidosis, scurvy, pancreatic disease, chronic active hepatitis, primary biliary cirrhosis, drugs, and environmental agents
- Rheumatic disease in the geriatric population
- Rheumatic disease in the pregnant patient
- Rheumatic syndromes in dialysis patients

## ***II. Clinical and technical skills***

- Rheumatologic history: understand principles and demonstrate competency in obtaining a clinical history, relevant review of systems, and functional status of patients with rheumatic disease symptoms.
- Physical examination: understand principles and demonstrate competency in performing and interpreting the examination of the structure and function of all axial and peripheral joints, periarticular structures, peripheral nerves, and muscles. Additionally, the fellow should be able to identify extraarticular findings that are associated with specific rheumatic diseases.
- Diagnostic testing and procedures
- *Arthrocentesis*: understand the anatomy, precautions including OSHA requirements, and potential sequelae of arthrocentesis and demonstrate competency in obtaining synovial fluid from diarthroidal joints, bursae, and tenosynovial structures.
- *Synovial fluid analysis*: understand the principles and interpretation of results of synovial fluid analyses and demonstrate competency in the analysis of synovial fluid by light and polarized microscopy from patients with a variety of rheumatic disorders.
- *Interpretation of results of specific laboratory tests* (including but not limited to): sedimentation rate, C-reactive protein and other acute phase reactants, iron studies including ferritin, rheumatoid factor, antinuclear antibodies, anti ds DNA, anti SS-A/Ro, anti SS-B/La, anti U1

RNP, anti Sm, antiribosomal P, anticentromere, antitopoisomerase 1, anti-Jo-1, anti PM-Scl, antineutrophil cytoplasm antibodies, cryoglobulins, complement component levels, CH50, serum protein electrophoresis, serum immunoglobulin levels, LE cell preparation, RPR, lupus anticoagulant, anticardiolipin antibodies, HLA typing (e.g., HLA B27), antihistone antibodies, ASO and other streptococcal antibody tests, Lyme serology, serum and urine uric acid levels, circulating immune complexes, lymphocyte subset and function data, anticellular antibodies (e.g., Coombs, neutrophils, platelets).

- *Plain radiographs*: demonstrate understanding and competency in the assessment of radiographs of normal and diseased joints, bones, periarticular structures, and prosthetic joints.
- *Demonstrate competency in the interpretation of results* from the following tests in patients with rheumatic diseases (fellows may develop skill in the performance of some of these tests):
  - (1) Diagnostic imaging techniques: arthrography, ultrasonography, computered tomography, magnetic resonance imaging of joints, bones, and periarticular structures
  - (2) Radionuclide scanning techniques: joint and bone scans, parotid scans and salivary flow studies, bone densitometry
  - (3) Arteriograms in the vasculities
  - (4) Electromyograms and nerve conduction studies
  - (5) Biopsy specimens including histochemistry and immunofluorescence of tissues relevant to the diagnosis of rheumatic diseases: skin, synovium, muscle, nerve, bone (e.g., metabolic bone disease), minor salivary gland, artery, kidney, and lung
  - (6) Others: nailfold capillary examination, ischemic forearm muscle test, Schirmer's and rose Bengal tests, closed needle synovial biopsy, and arthroscopy.
- Demonstrate the ability to construct a differential diagnosis in patients presenting with signs and symptoms related to rheumatologic diseases and to outline further testing necessary to establish the correct diagnosis.
- Using the basic principles of decision analysis, understand the indications for and costs of ordering laboratory tests and procedures to establish a diagnosis of a rheumatologic disease.

### ***III. Therapeutic modalities and strategies***

1. Therapeutic aspiration and injection: understand the anatomy, precautions, and potential sequel's and demonstrate competency in therapeutic aspiration and/or injection of diarthroidal joints, bursae, tenosynovial structures, and entheses.

2. Pharmacology: for each medication, understand the dosing, pharmacokinetics, and metabolism, mechanisms of action, side effects, drug interactions, compliance issues, costs, and use in patients including fertile, lactating, and pregnant women.

A. Nonsteroidal anti-inflammatory drugs

B. Glucocorticoids: topical, intraarticular, systemic

C. Systemic antirheumatic drugs: antimalarials, sulfasalazine, gold compounds, methotrexate, D-penicillamine

D. Cytotoxic drugs: azathioprine, cyclophosphamide, chlorambucil

E. Immunomodulators: cyclosporine, biologic response modifiers

F. Hypouricemic drugs: allopurinol, sulfinpyrazone, probenecid

G. Antibiotic therapy for septic joints

H. Narcotic and non-narcotic analgesics

I. Others: apheresis, ionizing radiation

### 3. Rehabilitation, disability, and pain management issues

A. Multidisciplinary team concept: Understand the rheumatologist's role as well as when to consult other health professionals (physiatrist, nurse practitioner, visiting nurse, physical therapist, occupational therapist, podiatrist, social worker, vocational rehabilitation counsellor, psychologist, others) in the outpatient and inpatient rehabilitation of patients with rheumatic diseases.

B. Demonstrate the ability to identify physical impairment; relate the impairment to the observed functional deficits; prescribe appropriate rehabilitation to achieve goals to improve the defined impairment.

C. Methods of rehabilitation: for each method, understand principles, mechanism of action, indications, precautions and contraindications, potential side effects, and costs.

- Exercise: range of motion, strengthening, conditioning, and stretching
- Rest and splinting
- Modalities and hydrotherapy: ultrasound, iontophoresis, spa therapy
- Joint protection and energy conservation techniques
- Adaptive equipment and assistive devices
- Job site/home evaluation and adaptation
- Footwear and orthotics
- Others: acupuncture, TENS unit, pain clinics, traction
- Nutritional issues

D. Demonstrate understanding of specific rehabilitative techniques/modalities and what modification of these techniques are needed depending on the patient's disease (e.g. osteoarthritis, myositis, etc.), location of symptoms (e.g. back, shoulder, etc) and other related issues.

E. Psychosocial aspects: understand the impact that the following factors have on the overall therapy of a patient with rheumatic disease and demonstrate knowledge of what can be done to assist a patient in these areas.

#### **3.1.2. Systemic Lupus Erythematosus (SLE) (Bertram Greenspun, eMedicine.com, Inc., 2005)**

**Background:** Systemic lupus erythematosus (SLE) is an inflammatory connective tissue disease with variable manifestations. SLE may affect many organ systems with immune complexes and a large array of autoantibodies, particularly antinuclear antibodies (ANAs).

**Pathophysiology:** The damage that results with SLE is from the excessive deposition of immune complexes and the resultant organ-specific inflammatory response found in the blood vessels, kidneys, connective tissue, and skin.

**The American College of Rheumatology Classification system for SLE** suggests that a person may be classified as having lupus if he or she has 4 or more of the following 11 criteria:

- Malar rash
- Discoid lupus
- Photosensitivity
- Oral or nasal ulcers
- Arthritis
- Serositis
- Renal with blood or protein in urine
- Seizures or mental illness
- Hematological disorders

- Immunologic disorders
  - Positive LE test
  - Anti-DNA antibody
  - Anti-Smith antibody
  - False positive test for syphilis
- A positive antinuclear antibody

### ***Rehabilitation Program:***

- Physical Therapy: Physical therapy (PT) often is beneficial for patients with SLE. The role of the physical therapist is to assess each patient and determine an effective plan of care to help reduce pain, stiffness, and inflammation, as well as to improve joint range of motion (ROM) and functional mobility. Key points to keep in mind when developing a PT program for a patient with SLE include the following:
  - Aerobic exercise might improve aerobic capacity in patients with mild SLE.
  - Incorporate isometric exercises for patients with joint inflammation, especially for the hip and the quadriceps to help maintain biomechanical stability.
  - Isotonic exercises can be used when there is reduced or absent joint inflammation.
  - Transfers and ambulation activities are important for maintaining mobility.
  - Strengthening exercises are initiated when appropriate. Fatigue may hinder progress in some patients.
  - If pain lasts more than 1-1.5 hours following activity, the exercise regimen should be reduced in intensity and/or duration.
  - ROM exercises in the presence of inflammation may induce more pain. Isometric exercises may be tolerated better. Hydrocollator packs can be helpful prior to completing ROM to help reduce pain and stiffness.
  - Proper positioning may prevent joint contractures in patients with SLE. Do not use a pillow under a painful knee.
  - Ultrasound (US) is a modality commonly used to provide deep heat to the affected joint, but it should not be used in the presence of inflammation. When US are used to improve ROM, the joint should be moved simultaneously with application of the US.
  - Heat and US are indicated for chronic joint pain, while ice is the preferred modality for inflamed joints.
  - A pool, when available, is an excellent setting for exercising inflamed joints, both because of the buoyancy of the water (providing unloading of the joint) and because the warm water is soothing.
- Occupational Therapy: The role of the occupational therapist (OT) is to help the patient restore their functional independence to the extent possible in spite of the problems caused by the disease. Principles of occupational therapy for patients with SLE include the following:
  - Activities of daily living (ADL) are encouraged and may require training with special equipment, techniques, and procedures. ADL activities include feeding, dressing, bathing, toileting, grooming, and homemaking.
  - Adaptive equipment may be necessary for patients to complete ADL tasks; some of the more common adaptive equipment includes a raised toilet seat, splints, and reachers.
  - Educating the patient in joint conservation techniques to protect the joints from damage is important.

- Fatigue is one of the most frequent symptoms that need to be dealt with in patients with SLE. The OT can be helpful in teaching the patient energy conservation techniques, frequently using adaptive equipment.
- A home safety evaluation may need to be completed, and the OT can provide recommendations for equipment (e.g., bathtub bench, raised toilet seat, grab bar) to increase the patient's independence and safety with mobility at home.
- **Speech Therapy:** The speech pathologist can be helpful when a patient has slurred speech, difficulty understanding speech, or the patient has difficulty speaking appropriately. These individuals with swallowing problems also can be evaluated and treated by the speech pathologist.
- **Recreational Therapy:** The role of the recreational therapist is to involve the patient in enjoyable activities that have therapeutic value. A patient who has painful or weak hands, for example, may benefit from putting a jigsaw puzzle together. Doing a jigsaw puzzle is a light activity that enhances the patient's eye-hand coordination and ability to match pieces by color. Patients can do this while standing or sitting (whichever is most appropriate) and at the same time can be socializing with other patients.

***Fatigue in systemic lupus erythematosus: (C. M. Tench, J. McCarthy, I. McCurdie, P. D. White and D. P. D'Cruz, *Rheumatology* 2003; 42: 1050-1054)***

Patients with systemic lupus erythematosus (SLE) report greater fatigue than healthy sedentary controls, and this may be related to physical deconditioning, depression, poor sleep quality, disease activity, associated fibromyalgia or a combination of all five. Physical deconditioning may be caused by reduced physical activity, and indeed some patient information leaflets recommend frequent periods of rest to cope with the fatigue of SLE.

### Treatments

#### *Exercise*

Exercise at home at least three times a week for between 30 and 50 min for a period of 12 weeks at a heart rate corresponding to 60% of peak oxygen consumption. The main exercise was walking but patients were encouraged to take other forms of exercise, such as cycling and swimming, and were seen every 2 weeks for a supervised exercise session.

#### *Relaxation*

To listen to a 30-min relaxation audiotape a minimum of three times a week in a darkened, warm and quiet room and were seen every 2 weeks for a supervised relaxation session.

The use of appropriately prescribed graded aerobic exercise in the management of fatigue in patients with SLE. Exercise can be safely prescribed without exacerbating disease activity and leads to overall improvement when compared with relaxation therapy or no intervention. Greater improvement probably requires more intensive and/or frequent exercise, and sustained improvement probably requires continued exercise after the formal supervised programme is over.

***Dermatomyositis and polymyositis (E. H. S. Cho, D. A. Isenberg' *Rheumatology* 2002; 41: 7-13)***

Idiopathic inflammatory myositis is a group of acquired conditions characterized by inflammation of skeletal muscles. Bohan and Peter proposed that these conditions be divided into primary idiopathic polymyositis, primary idiopathic dermatomyositis, dermatomyositis/polymyositis associated with neoplasia, childhood dermatomyositis/polymyositis, dermatomyositis/polymyositis associated with vasculitis and polymyositis/dermatomyositis associated with collagen vascular disease. Although the aetiologies of these six categories are likely to differ, they share some common features,

notably striking proximal muscle weakness, histological evidence of endomysial inflammation and activation of the immune response.

***Aspects of management,***

- sun-blocking agents for the skin in patients with dermatomyositis,
- the appropriate use of physiotherapy, occupational therapy and
- occasionally surgery

**Idiopathic Inflammatory Myopathy (Chester V. Oddis)**

The treatment of the idiopathic inflammatory myopathies is challenging for a number of reasons. Patient heterogeneity, limited clinical trial data and suboptimal. Assessment tools to quantitative disease activity and damage and reliably distinguishes between them, all contribute to the therapeutic challenges clinicians face with these diseases. Despite these limitations and challenges -- after confirming the diagnosis, determining the clinical and serologic subgroup of the patient, assessing extramuscular manifestations and defining the relative contribution of disease activity and damage to the patient's current condition -- a therapeutic plan should be developed and followed. Rehabilitative measures and physical therapy interventions are critical elements to include at every stage in the treatment plan, as patients with inflammatory myopathy are being treated more aggressively with these non-pharmacologic modalities. Although corticosteroids remain the mainstay of an initial treatment plan, combination immunosuppressive regimens and other novel disease-modifying immunologic agents are new additions to the therapeutic arsenal of inflammatory myopathy. Systemic complications, particularly interstitial lung disease, continue to significantly contribute to the morbidity and mortality of the myositis syndromes, and comprehensive management approaches must address both the muscular and extramuscular features of these disorders.

**Arthritis and other rheumatic diseases**

Are characterized by pain, swelling, and limited movement in joints and connective tissues in the body. Arthritis, which literally means inflammation of a joint (where two or more bones meet), actually refers to more than 100 different diseases. Rheumatic diseases include any diseases that cause pain, stiffness, and swelling in joints or other supportive body structures, such as muscles, tendons, ligaments, and bones. Some forms can also affect other parts of the body, including various internal organs.

Arthritis and other rheumatic diseases are often mistakenly associated with old age, because osteoarthritis (the most common form of arthritis) occurs more often among elderly persons. However, arthritis and other rheumatic diseases affect people of all ages.

Arthritis is usually chronic, which means that it rarely changes, or it progresses slowly. Specific causes for most forms of arthritis are not yet known.

Many people use the word "arthritis" to refer to all rheumatic diseases. However, the word literally means joint inflammation; that is, swelling, redness, heat, and pain caused by tissue injury or disease in the joint. The many different kinds of arthritis comprise just a portion of the rheumatic diseases. Some rheumatic diseases are described as connective tissue diseases because they affect the body's connective tissue--the supporting framework of the body and its internal organs. Others are known as autoimmune diseases because they are caused by a problem in which the immune system harms the body's own healthy tissues. Examples of some rheumatic diseases are:

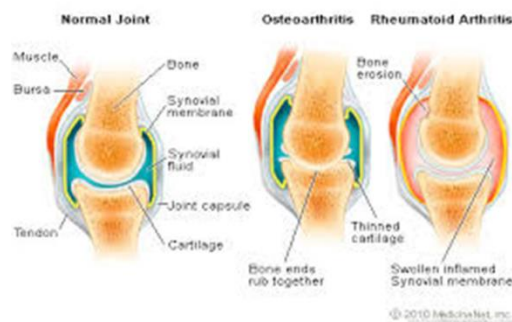
- Osteoarthritis
- Rheumatoid arthritis
- Fibromyalgia

- Systemic lupus erythematosus
- Scleroderma
- Juvenile rheumatoid arthritis
- Ankylosing spondylitis
- Gout, etc

In this booklet, the term arthritis will be used as a general term to refer to arthritis and other rheumatic diseases.

## OSTEOARTHRITIS; OSTEOARTHROSIS; DEGENERATIVE JOINT DISEASE

Is a non-inflammatory, degenerative condition of joints Characterized by degeneration of articular cartilage and formation of new bone i.e. osteophytes.



### ***What is osteoarthritis (OA)?***

Osteoarthritis the most common joint disease. OA of the knee joint is found in 70% of the population over 60 years of age. Both male and females are affected. Radiological evidence of OA can be found in over 90 % of the population. Common in weight-bearing joints such as hip and knee but is also seen in spine and hands.

Osteoarthritis is characterized by the following:

- destruction of cartilage
- overgrowth of bone
- spur formation
- impaired function

OA may cause functional loss, therefore interferes with Activities of Daily Living (ADL). It is the most important cause of disability in old age and a major indication for joint replacement surgery.

Risk factors for OA are:

- *Obesity (esp knee, hip OA)*
- *Abnormal mechanical loading: meniscectomy, instability*
- *Trauma (repeated)*
- *Genetics (inherited type II collagen defects in premature Occupation (eg farmers)*
- *Infections: (eg Non-gonococcal septic arthritis)*

Pathogenesis of OA is determined by the ageing process in joint cartilage which leads to defective lubricating mechanism. The cartilage is the 1st structure to be affected. Erosion occurs, often central & frequently in wt. bearing areas. Fibrillation, which causes softening, splitting and fragmentation of the cartilage, occur in both wt. bearing & non-wt. bearing areas. Collagen fibres split and there is disorganisation of the proteoglycon collagen relationship such as H<sub>2</sub>O is attracted into cartilage, which causes further softening and flaking. These flakes of cartilage break off and may be impacted b/w the joint surfaces causing locking and inflammation.

OA can be classified in :

**Primarily OA:**

- More common than secondary OA
- Cause –Unknown
- Common-in elders where there is no previous pathology.
- Its mainly due to wear and tear changes occurring in old ages mainly in weight bearing joints.

**Secondary OA:** Due to a predisposing cause such as:

- Injury to the joint
- Previous infection
- RA
- CDH
- Deformity
- Obesity
- Hyperthyroidism

**Clinical features of OA** are Pain and tenderness – Usually slow onset of discomfort, with gradual and intermittent increase – Pain is more on wt. bearing due to stress on the synovial membrane & later on due to bone surface, which is rich in nerve endings coming in contact. – initially relieved by rest but later on disturb sleep. -Diffuse/ sharp and stabbing local pain

Types of pain

- Mechanical: increases with use of the joint
- Inflammatory phases: Rest pain later on in 50% , Night pain in 30% later on

Movement abnormalities:

- ‘Gelling’: stiffness after periods of inactivity, passes over within minutes (approx 15min.) of using joint again
- Coarse crepitus: palpate/hear (due to flaked cartilage & eburnated bone ends)
- Reduced ROM: capsular thickening and bony changes in joint,ms. Spasm or soft tissue contracture.

Deformities – Soft tissue swelling: mild synovitis: small effusions – Osteophytes – Joint laxity – Asymmetrical joint destruction leading to angulation

Investigations:

- Blood tests: Inflammatory markers normal
- Radiological features:
- Cartilage loss
- Subchondral sclerosis
- Cysts
- Osteophytes

### **Hip Osteoarthritis, Coxarthrosis**

Hip pain when walking, climbing stairs Active and passive movements are limited, internal rotation is affected first

Flexum position of the hip, lumbar scoliosis

Clinical tests:

- „shoe sign” (Duverney) - patient can not achieve the flexion-rotation necessary to support the foot against the affected side on the shoe's opposite shoe,
- "Mark 4 sign" (Patrick) - the patient with dorsal decubitus, with fixed basin, abduction thigh, knees kneeling and heel supported on the opposite knee - will measure the distance between the knee and the bed plan, which in the case of the presence of the osteoarthrosis changes more than 20 cm

The osteoarthrosis changes may be located polar superior (most frequently), medial or concentric.

The positive diagnosis criteria for coxarthrosis established by the American College of Rheumatology (ACR) are as follows:

- pain in the co-femoral joint
- and at least 2 of the following criteria:
- ESR <20mm / 1h
- the presence of osteophytes (radiological)
- a narrowing of the articular space (radiological)

### **Knee Osteoarthritis, Gonarthrosis**

The most common risk factors encountered in the etiology of gonarthrosis are obesity, axial deviations and trauma. Pain is exacerbated by walking, climbing and lowering stairs, unipodal support.

Clinical examination reveals swelling, joint deformities, progressive limiting of movements, cramps and crepitation, joint instability, muscular hypotrophy.

The diagnostic criteria established by ACR for gonarthrosis are:

- knee joint pain
- at least one of the following criteria:
- age > 50 years
- morning stiffness <30 minutes
- crepitations
- the presence of osteophytes (radiological).

### **Spondylosis**

Disorders of the spinal cord. Intervertebral discs are affected by the arthritic process, intervertebral disc lesions and hernias, the development of the anterior and posterior osteophytes, stenosis of the conjugation holes and nerve compressions, spinal canal stenosis, spinal sliding.

Local pain may be accompanied by symptoms of nerve root compression or spinal cord compression, paravertebral muscles contraction.

### **Hand osteoarthritis**

The most commonly affected distal and proximal interphalangeal joints, carpometacarpal joint (rhinotrophic or polyclinic arthrosis).

Clinically, the Bouchard nodes (proximal interphalangeal joints) and Heberden (at the distal interphalangeal joint), articular deformities, subluxes (more frequently the first metacarpian) are emphasized.

### **Management: Treatment Principles**

Education:

- Nonsystemic nature of disease, prevent overloading of joint and Obesity!!
- Appropriate use of treatment modalities – Importance of exercise program – Aids, appliances, braces

Physiotherapy

- Kinetotherapy: Exercise program usually on extensor muscles. Exercises
  - Will not 'wear the joint out'

- Important for cartilage nutrition
- Some evidence that lack of exercise leads to progression of OA
- Exercise to encourage full range low impact movements (eg swimming, cycling),
- Avoid – Prolonged loading – Activities that cause pain – Contact sports – High impact sports (eg running)
- Quadriceps exercises for knee OA. Quadriceps exercises are of proven value for pain relief and improving function, therefore everyone with knee OA should be taught the correct techniques and encouraged to make these exercises a lifetime habit.
- Electrotherapy: Pain relief modalities: The use of transcutaneous nerve stimulation (TENS) as an adjunct to other therapy for pain relief at the knee joint.
- Hydro& thermotherapy: Hot packs, exercises through water

Aids and appliances: splints, orthosis, canes:

- Braces / splints, Special shoes/insoles,
- Mobility aids: dressing, reaching, tap openers,
- Kitchen aids
- Taping of patella in patello femoral OA
- Use of a cane, stick or other walking aid: This patient, who has hip OA, has found that she can reduce the pain in her damaged left hip by leaning on the stick in the right hand as she walks. The reduction in loading can be huge, and the effect on symptoms and confidence with walking very beneficial.
- The use of shoes and insoles to reduce impact loading on lower limb joints. Modern sports shoes ('trainers') often have appropriate insoles. Alternatively, special heel or shoe insoles of sorbothane or viscoelastic materials (hyaluronic acid) can be used. They may help relieve pain as well as reducing the peak impact load on the joints during walking.

Medical Treatment:

- NSAID (Diclofenac, Naproxen, ketoprofen, Ibuprofen, Celecoxib, Etoricoxib, Nimesulid, high dose Paracetamol)
- Chondroprotective agents (Glucosamine sulphate, Hyaluronic acid, Chondroitin sulphate, Collagen)
- Intra-articular corticosteroids/ hyaluronic acid/ PRP
- Topical treatment eg NSAID creams, capsaicin

Surgical Treatment: endoprosthetics

Preventing OA:

The most important thing a person can do to ward off osteoarthritis is keep weight in check. Over the years, extra weight puts stress on the joints and may even alter the normal joint structure. Preventing injuries is also important. Precautions should be taken in order to avoid repetitive motion injuries on the job.

Example of proper training:

If you play a sport, you should use proper equipment and observe safety guidelines. Stretching exercises loosen muscles, improve flexibility, and help prevent pain and injury.

Use a chair for balance. Bend your right leg. Step back with left leg, slowly straightening it behind you. Press left heel towards the floor. Feel the stretch in your back leg.

For more of a stretch: Lean forward, bending the right knee deeper. Don't let the right knee go past your

toes. Hold for 20 seconds. Do twice, then switch legs.

To try this leg strengthening move, lie on the floor. Prop your back up on your elbows. Bend your left knee, keeping foot on floor. Keep the right leg straight, toes pointed up. Tighten thigh muscles of your right leg. Slowly and smoothly use your thigh muscles -- not your back -- to raise your leg.

Pause, as seen above, for five seconds. With thigh still tight, slowly lower leg to ground. Relax. Repeat 10 times. Rest. Do another 10; then switch legs.

## **Inflammatory rheumatisms: RHEUMATOID ARTHRITIS**

Rheumatoid arthritis is a chronic inflammatory disorder that affects small joints of undetermined etiology involving primarily the synovial membranes and articular structures, clinically manifesting with pain, stiffness, and swelling of joints, leading to deformity and ankylosis (fused joints)

It associates significant extra-articular manifestations related to the widespread systemic auto-inflammation.

Key features include:

- Symptoms >6 weeks' duration and can often last the remainder of the patient's life
- Inflammatory synovitis
  - Palpable synovial swelling
  - Morning stiffness >1 hour, fatigue
- Symmetrical and polyarticular (>3 joints)
  - Typically involves wrists, MCP, and PIP joints
  - Typically spares certain joints
    - Thoracolumbar spine
    - DIPs of the fingers and IPs of the toes

Lacking proper treatment the disease evolves with damage that occurs early in most patients. 50% show joint space narrowing or erosions in the first 2 years and by 10 years, 50% of young working patients are disabled. Death comes early by multiple causes compared to general population. Women lose 10 years, men lose 4 years.

RA is the most common inflammatory disease. 1% population or 3 per 10,000 are affected, 3:1 female to male. Highest peak is in 3rd and 4th decades. Two peaks incidence. Morbid/mortal disease. Description dates to the 17th century - A New World Disease.

Laboratory tests:

- Elevated inflammatory markers:
  - ESR elevated
  - CRP elevated
- ANA positive in 20%
- Rheumatoid Factor present (90%)
- Anti Cyclic Citrullinated Peptide (anti CCP) present (90%)

On Hand and Wrist **x-rays** can detect:

- Juxta-articular osteopenia
- Frank erosions
- Not cysts, not osteoarthritis changes

Diagnosis is established according to the EULAR/ ACR criteria as follows:

JOINT DISTRIBUTION (0-5)	
1 large joint	0
2-10 large joints	1
1-3 small joints (large joints not counted)	2
4-10 small joints (large joints not counted)	3
>10 joints (at least one small joint)	5
SEROLOGY (0-3)	
Negative RF <u>AND</u> negative ACPA	0
Low positive RF <u>OR</u> low positive ACPA	2
High positive RF <u>OR</u> high positive ACPA	3
SYMPTOM DURATION (0-1)	
<6 weeks	0
≥6 weeks	1
ACUTE PHASE REACTANTS (0-1)	
Normal CRP <u>AND</u> normal ESR	0
Abnormal CRP <u>OR</u> abnormal ESR	1

## ≥6: definite RA

Disease activity is assessed and followed using the Rheumatoid Arthritis Disease Activity Score DAS-28. It is a international acknowledged composite index calculated by the following formula:  $DAS28 = (0.56 * \text{sqr}(TJC)) + (0.28 * \text{sqr}(SJC)) + (0.7 * \ln(ESR)) + (0.014 * GH)$

Cutt-off point values are:

DAS28 < 2.6: Remission

DAS28 ≥ 2.6 and ≤ 3.2: Low Disease Activity

DAS28 > 3.2 and ≤ 5.1: Moderate Disease Activity

DAS28 > 5.1: High Disease Activity

At each visit, evaluate for subjective and objective evidence of active disease

- Degree of joint pain (by visual analog scale)
- Duration of morning stiffness
- Duration of fatigue
- Presence of actively inflamed joints on examination (tender and swollen joint counts)
- Limitation of function

#### Treatment:

- Education
  - Build a cooperative long-term relationship
  - Use materials from EULAR and the ACR
- Assistive devices
- Exercise
  - maximize ROM,
  - conditioning, and strengthening exercises
- Medications
  - NSAIDs
  - Disease modifying drugs (DMARDs)
    - Methotrexate (gold standard for RA)
    - Leflunomide
    - Sulfasalazine
    - Hydroxychloroquine
  - Biologics:
    - Infliximab
    - Adalimumab
    - Etanercept
    - Rituximab
    - Tofacitinib
    - Baricitinib
  - Low-dose prednisone (≤10 mg qd)
  - Analgesic and/or anti-inflammatory
  - If used long term, consider prophylactic treatment for osteoporosis
  - Intra-articular steroids
- Balance efficacy and safety with activity

#### Rehabilitation procedures:

- Galvanic baths
- TENS
- Kinesiotherapy: training on extensors
- Ultrasound
- Occupational therapy
- Splints

### **Inflammatory rheumatism: Ankylosing Spondylitis**

Inflammatory disorder of unknown cause that primarily affects the axial skeleton; peripheral joints and extra-articular structures may also be involved

Rheumatoid factor absent

HLA-B27 present in > 90% cases

M:F= 3:1

Etiology is unknown, but probable etiologic factors is the genetic predisposition - % of people with AS share the genetic marker HLA-B27

*Pathogenesis:* Immune mediated and in some cases, the disease occurs in these predisposed people after exposure to bowel or urinary tract infections. The enthesis, the site of ligamentous attachment to bone, is thought to be the primary site of pathology .

Enthesitis is associated with prominent oedema of the adjacent bone marrow and is often characterized

by erosive lesions that eventually undergo ossification.

Sacroiliitis is usually one of the earliest manifestations. The early lesions consist of subchondral granulation tissue, infiltrates of lymphocytes and macrophages in ligamentous and periosteal zones, and subchondral bone marrow edema.

Synovitis follows and may progress to pannus formation with islands of new bone formation. The eroded joint margins are gradually replaced by fibrocartilage regeneration and then by ossification. Ultimately, the joint may be totally obliterated and ankylosed. The outer annular fibers are eroded and eventually replaced by bone → bony syndesmophytes, which then grows by continued enchondral ossification, ultimately bridging the adjacent vertebra bodies = “bamboo spine”.

- Axial Arthritis (Eg, Sacroiliitis And Spondylitis)
- Arthritis Of ‘Girdle Joints’ (Hips And Shoulders)

Peripheral Arthritis can occur but it is uncommon

Others:

- Enthesitis
- Osteoporosis
- Vertebral Fractures
- Spondylodiscitis
- Costochondritis

Symptoms in early stages:

- Pain in sacroiliac and lower back regions: permanent; dull worsens in rest; in the morning; nocturnal, reliefs in motion; in the afternoon
- Buttock pain: irradiates into posterior surface of hip migrates from left to right gluteus
- Lower back stiffness: in the morning, for  $\geq 30$  minutes reliefs after activity, warm shower.
- Chest pain: mimics intercostal neuralgia and intercostal muscles myositis worsens in coughing, sneezing, deep breathing.
- Stiffness and tenderness of back muscles.
- Flattening of lumbar lordosis
- Enthesopathies – pain in the site of ligamentous attachment to bone: Iliac crests, trochanters, spinous processes of vertebrae, costovertebral joints
- Extra-articular manifestations – usually eyes affection (anterior uveitis); bilateral, acute onset, lasts for 2-3 months, registered in 30% of patients.

Symptoms in advanced stages:

- Pain in different segments of spine.
- Question mark posture
- Atrophy of back muscles.
- Decreased thorax excursion.
- Ankylosis of sacroiliac and intervertebral joints.
- Cardiovascular system involvement (aortitis; aortic insufficiency; pericarditis)
- Bronchopulmonary system involvement – fibrosis of apical lung segments.
- Urinary system involvement: amyloidosis, IgA-nephropathy
- Gastrointestinal system involvement: ulcerative colitis: Crohn’s disease

Tests and measurements in AS:

- Cervical mobility:
  - Occiput-to-wall distance
  - Tragus-to-wall distance
  - Cervical rotation
- Chest expansion
- Thoracic mobility
- Lumbar mobility

- Schober index
- Finger-to-floor distance
- Lumber lateral flexion
- BASDAI score for disease activity consists of a 0 - 10 scale measuring discomfort, pain, and fatigue (0 being no problem and 10 being the worst problem) in response to six questions asked of the patient pertaining to the five major symptoms of AS:
  - Fatigue
  - Spinal pain
  - Arthralgia (joint pain) or swelling
  - Enthesitis, or inflammation of tendons and ligaments (areas of localized tenderness where connective tissues insert into bone)
  - Morning stiffness duration
  - Morning stiffness severity
  - To give each symptom equal weighting, the average of the two scores relating to morning stiffness is taken. The resulting 0 to 50 score is divided by 5 to give a final 0 – 10 BASDAI score
- BASFI score
- ASDAS score

#### Treatment:

- NSAIDS
  - Diclofenac
  - COX-2 inhibitors
- Sulfasalazine, in doses of 2 to 3 g/d- Effective for axial and peripheral arthritis
- Local Corticosteroids injection- for persistent synovitis and enthesopathy
- Anti-TNF- $\alpha$  therapy - heralded a revolution in the management of AS.
  - Infliximab
  - Etanercept
  - Adalimumab
  - Golimumab
- Regular physiotherapy is essential in the management of a patient of AS.
  - Relieve pain.
  - Maintain the mobility of joints affected like spine, hip, thorax, shoulder etc.
  - Prevent and correct deformity
  - Increase chest expansion and vital capacity
  - Attention to posture.
  - To maintain and improve physical endurance.
  - Advice to patient. A big part of treatment is to help educate patients about AS, how it can affect the patient and what the patient can do to help you minimize the effect AS has on himself and the family. Make sure you ask any questions you might have about work, sleep or anything else that may be worrying you.
  - Education means advice on
    - posture at work,
    - how to sit correctly at a desk,
    - how a computer screen can be positioned and what height it needs to be.
- The relevant physiotherapy modalities in the management of AS include :
  - Supervised & unsupervised exercises and training
  - Manual therapy and Massage
  - Hydrotherapy
  - Electrotherapy: TENS
  - The Super-vised group physical therapy is offered mainly to stimulate and motivate the

- patients to continue exercising, and to provide social contacts with and control by fellow-patients
- The unsupervised individualized exercises may consist of exercises based on a pre defined program , but may also include recreational exercises. These exercises should become part of daily routine in a patient's life
- General instruction to patients Patient information & educational programs
  - Make the exercise part of your daily routine.
  - Try to do a complete set of exercises at least twice daily at a time convenient to you.
  - Heat and cold application may precede exercises to enhance relaxation and decrease pain.
  - Perform only those exercises given to you by your physiotherapist.
  - Perform exercises on a firm surface
  - Exercise slowly with a smooth motion, do not rush
  - Avoid holding your breath while exercising.
- Breathing exercises:
  - Increase chest expansion and vital capacity
  - To increase the chest expansion and vital capacity, the breathing exercises are required.
  - Breathing exercises that are used in Ankylosing Spondylitis Treatment:
  - Apical breathing exercises.
  - Diaphragmatic breathing exercises.
  - Lateral costal breathing exercises
  - Deep breathing exercises are encouraged.
  - Ballooning exercise is also very useful in Ankylosing Spondylitis Treatment. They increase the vital capacity of the lung.
  - Thoracic mobility exercises.
- Therapeutic sports:
  - Swimming
  - Basket

### ***General Rehabilitation recommendations for arthritis:***

An arthritis rehabilitation program is designed to meet the needs of the individual patient, depending upon the type and severity of the arthritis. Active involvement of the patient and family is vital to the success of the program.

The goal of arthritis rehabilitation is to help the patient return to the highest level of function and independence possible while improving the overall quality of life - physically, emotionally, and socially. The focus of rehabilitation is on relieving pain and increasing motion in the affected joint(s).

In order to help reach these goals, arthritis rehabilitation programs may include the following:

- exercises and to control joint pain and swelling
- exercises to improve mobility (movement) and physical fitness
- pain management, including the following:
  - heat and cold therapy
  - massage
  - transcutaneous electrical nerve stimulation (TENS) to help relieve pain
  - acupuncture
- stress management and emotional support
- joint immobilization and methods to protect the joints from further damage, degeneration, and deformities
- nutritional counselling to improve weight control

- use of assistive devices
- patient and family education

### ***Rehabilitation after joint replacement:***

The goal of hip and knee replacement surgery is to improve the function of the joint. Full recovery after joint replacement usually takes about three to six months, depending on the type of surgery, overall health of the patient, and the success of rehabilitation.

Rehabilitation programs after joint replacement may include the following:

- exercises to improve mobility (movement) and physical fitness
- gait (walking) retraining
- pain management
- nutritional counselling to improve weight control
- use of assistive devices
- patient and family education

### ***The arthritis rehabilitation team:***

Arthritis rehabilitation programs can be conducted on an inpatient or outpatient basis. Many skilled professionals are part of the arthritis rehabilitation team, including any/all of the following:

- physical and medical rehabilitation specialist
- orthopaedist/orthopaedic surgeon
- rheumatologist
- physiatrist
- internist
- rehabilitation nurse
- dietician
- physical therapist
- occupational therapist
- social worker
- psychologist/psychiatrist
- recreational therapist
- vocational therapist

### ***Should People With Arthritis Exercise?***

Yes. Studies have shown that exercise helps people with arthritis in many ways. Exercise reduces joint pain and stiffness and increases flexibility, muscle strength, cardiac fitness, and endurance. It also helps with weight reduction and contributes to an improved sense of well-being.

### ***How Does Exercise Fit Into a Treatment Plan for People With Arthritis?***

Exercise is one part of a comprehensive arthritis treatment plan. Treatment plans also may include rest and relaxation, proper diet, medication, and instruction about proper use of joints and ways to conserve energy (that is, not waste motion) as well as the use of pain relief methods.

### ***What Types of Exercise Are Most Suitable for Someone With Arthritis?***

Three types of exercise are best for people with arthritis:

- Range-of-motion exercises (e.g., dance) help maintain normal joint movement and relieve stiffness. This type of exercise helps maintain or increase flexibility.
- Strengthening exercises (e.g., weight training) help keep or increase muscle strength. Strong muscles help support and protect joints affected by arthritis.
- Aerobic or endurance exercises (e.g., bicycle riding) improve cardiovascular fitness, help control weight, and improve overall function. Weight control can be important to people who have arthritis because extra weight puts extra pressure on many joints. Some studies show that aerobic exercise can reduce inflammation in some joints.

Most health clubs and community centers offer exercise programs for people with physical limitations.

### ***How Does a Person With Arthritis Start an Exercise Program?***

People with arthritis should discuss exercise options with their doctors and other health care providers. Most doctors recommend exercise for their patients. Many people with arthritis begin with easy, range-of-motion exercises and low-impact aerobics. People with arthritis can participate in a variety of, but not all, sports and exercise programs. The doctor will know which, if any, sports are off-limits.

The doctor may have suggestions about how to get started or may refer the patient to a physical therapist. It is best to find a physical therapist that has experience working with people who have arthritis. The therapist will design an appropriate home exercise program and teach clients about pain-relief methods, proper body mechanics (placement of the body for a given task, such as lifting a heavy box), joint protection, and conserving energy.

### ***Step Up to Exercise: How To Get Started***

- Discuss exercise plans with your doctor.
- Start with supervision from a physical therapist or qualified athletic trainer.
- Apply heat to sore joints (optional; many people with arthritis start their exercise program this way).
- Stretch and warm up with range-of-motion exercises.
- Start strengthening exercises slowly with small weights (a 1- or 2-pound weight can make a big difference).
- Progress slowly.
- Use cold packs after exercising (optional; many people with arthritis complete their exercise routine this way).
- Add aerobic exercise.
- Consider appropriate recreational exercise (after doing range-of-motion, strengthening, and aerobic exercise). Fewer injuries to joints affected by arthritis occur during recreational exercise if it is preceded by range-of-motion, strengthening, and aerobic exercise that gets your body in the best condition possible.
- Ease off if joints become painful, inflamed, or red, and work with your doctor to find the cause and eliminate it.
- Choose the exercise program you enjoy most and make it a habit.

### ***What Are Some Pain Relief Methods for People With Arthritis?***

There are known methods to help stop pain for short periods of time. This temporary relief can make it easier for people who have arthritis to exercise. The doctor or physical therapist can suggest a method

that is best for each patient. The following methods have worked for many people:

- **Moist heat** supplied by warm towels, hot packs, a bath, or a shower can be used at home for 15 to 20 minutes three times a day to relieve symptoms. A health professional can use short waves, microwaves, and ultrasound to deliver deep heat to no inflamed joint areas. Deep heat is not recommended for patients with acutely inflamed joints. Deep heat is often used around the shoulder to relax tight tendons prior to stretching exercises.
- **Cold** supplied by a bag of ice or frozen vegetables wrapped in a towel helps to stop pain and reduce swelling when used for 10 to 15 minutes at a time. It is often used for acutely inflamed joints. People who have Raynaud's phenomenon should not use this method.
- **Hydrotherapy** (water therapy) can decrease pain and stiffness. Exercising in a large pool may be easier because water takes some weight off painful joints. Community centers, YMCAs, and YWCAs have water exercise classes developed for people with arthritis. Some patients also find relief from the heat and movement provided by a whirlpool.
- **Mobilization therapies** include traction (gentle, steady pulling), massage, and manipulation (using the hands to restore normal movement to stiff joints). When done by a trained professional, these methods can help control pain and increase joint motion and muscle and tendon flexibility.
- **TENS** (transcutaneous electrical nerve stimulation) and **biofeedback** are two additional methods that may provide some pain relief, but many patients find that they cost too much money and take too much time. In TENS, an electrical shock is transmitted through electrodes placed on the skin's surface. TENS machines cost between \$80 and \$800. The inexpensive units are fine. Patients can wear them during the day and turn them off and on as needed for pain control.
- **Relaxation therapy** also helps reduce pain. Patients can learn to release the tension in their muscles to relieve pain. Physical therapists may be able to teach relaxation techniques. The Arthritis Foundation has a self-help course that includes relaxation therapy. Health spas and vacation resorts sometimes have special relaxation courses.
- **Acupuncture** is a traditional Chinese method of pain relief. A medically qualified acupuncturist places needles in certain sites. Researchers believe that the needles stimulate deep sensory nerves that tell the brain to release natural painkillers (endorphins).
- **Acupressure** is similar to acupuncture, but pressure is applied to the acupuncture sites instead of using needles.

### *How Often Should People With Arthritis Exercise?*

- **Range-of-motion** exercises can be done daily and should be done at least every other day.
- **Strengthening** exercises should be done every other day unless you have severe pain or swelling in your joints.
- **Endurance** exercises should be done for 20 to 30 minutes three times a week unless you have severe pain or swelling in your joints. According to the American College of Rheumatology, 20- to 30-minute exercise routines can be performed in increments of 10 minutes over the course of a day.

### ***What Type of Strengthening Program Is Best?***

This varies depending on personal preference, the type of arthritis involved, and how active the inflammation is. Strengthening one's muscles can help take the burden off painful joints. Strength training can be done with small free weights, exercise machines, isometrics, elastic bands, and resistive water exercises. Correct positioning is critical, because if done incorrectly, strengthening exercises can cause muscle tears, more pain, and more joint swelling.

### ***Are There Different Exercises for People With Different Types of Arthritis?***

There are many types of arthritis. Experienced doctors, physical therapists, and occupational therapists can recommend exercises that are particularly helpful for a specific type of arthritis. Doctors and therapists also know specific exercises for particularly painful joints. There may be exercises that are off-limits for people with a particular type of arthritis or when joints are swollen and inflamed. People with arthritis should discuss their exercise plans with a doctor. Doctors who treat people with arthritis include rheumatologists, orthopedic surgeons, general practitioners, family doctors, internists, and rehabilitation specialists (physiatrists).

### ***How Much Exercise Is Too Much?***

Most experts agree that if exercise causes pain that lasts for more than 1 hour, it is too strenuous. People with arthritis should work with their physical therapist or doctor to adjust their exercise program when they notice any of the following signs of strenuous exercise:

- Unusual or persistent fatigue
- Increased weakness
- Decreased range of motion
- Increased joint swelling
- Continuing pain (pain that lasts more than 1 hour after exercising)

### ***Should Someone With Rheumatoid Arthritis Continue To Exercise During a General Flare? How About During a Local Joint Flare?***

It is appropriate to put joints gently through their full range of motion once a day, with periods of rest, during acute systemic flares or local joint flares. Patients can talk to their doctor about how much rest is best during general or joint flares.

### **Cardiovascular and arthritis patient**

#### ***Arthritis and cardiac patient:***

- a) Acute myocardial infarction
- b) Coronary angioplasty
- c) Coronary artery bypass grafting
- d) Heart valve replacement
- e) Ventricular aneurysmectomy
- f) Heart transplantation
- g) Lower extremity obstructive vascular disease

#### ***Aims of***

##### ***a. Arthritis rehabilitation***

1. Pain and related symptoms control

2. Decrease swollen and tender and improve general status
3. Deleing /stopping disease progression
4. Maintain and correct posture, joint mobility and muscle tonus
5. Decrease impairment/disability/handicap
6. Improve quality of life

*b. Cardiac rehabilitation*

1. Improve cardiovascular functional capacity
2. Control coronary risk factors
3. Minimize the chance of recurrence
4. Decrease morbidity and mortality
5. Improve quality of life

***Treatment management of cardiovascular patient***

I. Inpatient cardiac rehabilitation

- A. Progressive range-of-motion exercises
- B. Passive to active exercises with low-level resistive exercises
  - a. 1-2 pound weights
  - b. calisthenics ( Karpovich& Weiss)

- simulate the movements used in self-care and ADLs
- involve not only motion of extremities but also the neck and trunk
- are explained by means of simple pictures that are easy for patient to follow

C. Predischarge stress testing of inpatient

- as early as day 5-6 of cardiac episode: ECG exercise test/ thallium exercise and reperfusion scan
- for risk stratification, as a guide to subsequent medical management, as clearance for ADLs
- not suitable as basis for the exercise prescription, because they do not proceed to a high enough work load
- 70% of maximal age-predicted heart rate

II. Early convalescent cardiac rehabilitation

- A. Walking
- B. Exercise stress test to maximal effort (4-8 weeks)

a. *Electrocardiographic exercise stress testing:*

- cycle ergometer (lower/upper extremity, arm-leg ergometer) or treadmill (Kattus or Bruce protocol),
- graded exercise tests, each level for a minimum of 3 minutes,
- continuously or discontinuously (elderly deconditioned patients)
- at least 85% of their predicted maximal heart rate  $\approx$  oxygen consumption of 80% of maximum VO<sub>2</sub>

b. *Nonstandard testing*

1. walk-through testing
2. second-effort testing
3. nitroglycerin exercise test
4. nonstandard monitoring (Holter monitor or ECG telemetry)

c. *Nuclear exercise stress testing*

1. multigated acquisition scan (MUGA:radionuclid ventriculogram)
2. thallium scan

d. *Echocardiographic stress testing*

### III. Cardiovascular physical conditioning

#### *A. Principles of cardiovascular conditioning*

- a. Principle of overloading: work level greater than that at which the individual usually performs
- b. Principle of specificity: each type of exercise brings about a specific metabolic and physiologic adaptation resulting in a specific training
  1. isometric exercises increase strength but may not increase endurance
  2. aerobic training improve endurance, includes exercise of large muscle masses, improve cardiovascular functional capacity
  3. all types improve ADL and job-related performance
- c. Principle of individual variation: individualized training according to the person's capacities and needs
- d. Principle of reversibility: the beneficial effects of training are not permanent (improvements begin to disappear in 2 weeks, half of the gains may be lost in 5 weeks)→ permanent exercise program/ similar activities

#### *B. Intensity of exercise*

- a. American Heart Association: 70-85% of maximal attainable rate (determined on a stress test or derived for normal young adults by subtracting the exerciser's age from 220)
- b. Karvonen method: peak heart rate attained on a stress test minus resting heart rate→ 40-60% of heart rate range added to resting heart rate=target heart rate zone for exercise
- c. Oxygen consumption method: 67-80% of maximal oxygen consumption (expressed in terms of heart rate using the stress test as a template if expired gases were measured)
- d. Work load method:
  - 2/3 of maximal MET (3.5 ml/kg/min O<sub>2</sub> consumed) attained on the stress test
  - 150 KPM (25 watts) lower than the maximal level attained on the cycle ergometer stress test
  - highest speed reached at 10% grade on the treadmill test as the speed for walking on flat terrain
- e. Perceived exertion method:

##### *1. Borg RPE scale: ratings of 11-15*

2. conventional exercise level: talk test (talking/ singing while exercising)

#### *C. Duration and frequency of exercise*

- a. Various length of time per session
  1. Usual: 20-30 minutes at conditioning level when exercise is at 70% of maximum heart rate
  2. Poorly conditioned individuals: 3-5 minutes
  3. Conditioned individuals: 10-15 minutes at higher intensities
- b. Training frequency: 3 times per week for 12 weeks or more

#### *D. Format of an exercise session*

- a. Warm-up phase before
  - at the lower intensity levels of the exercise to be performed, gradually increasing to the prescribed intensity / limbering-up intensity
  - increases joint readiness, theoretically opens up existing collateral circulation and prevent sudden changes in peripheral resistance before the maximum contraction of the skeletal muscles required by the exercise
- b. The period of training: exercise is performed at him prescribed intensity and duration that induce a training effect
- c. Cool-down period after

- gradually reduction in exercise intensity: allows the gradual redistribution of the blood from the extremities to other tissues and to prevent sudden reduction in venous return, thereby reducing the possibility of postexercise hypotension or even syncope
- reduces the development of stiffness or soreness of joints and muscle

*E.Maintenance programs after completion of formal exercise training in a cardiac rehabilitation program (approximately 12 weeks, with performance safely up to 7-8 METs verifiable by stress tests)*

- Exercisers should continue their physical conditioning in order to maintain the level of fitness that was attained
  - at the same level as their last exercise prescription
  - pulse rate, conversational exercise level, Borg RPE as guideline to avoid overexertion
- Sport (should not exceed the safe heart rate and symptomatic guidelines previously established): swimming, tennis, bowling, golf played with use of a golf cart

### 3.3. Osteoporosis

- **avoidance of life-styles known to result in bone loss:** cigarette smoking, excessive alcohol intake, excessive weight intake, stress and so forth
- **3x/wk physical medicine program:**
  - stretching,
  - back extension strengthening,
  - isometric abdominal strengthening,
  - upper extremity strengthening,
  - weight bearing and lower extremity strengthening,
  - balance training and transfer techniques,
  - proper lifting techniques,
  - posture correction,
  - pain control after exercises and/or at work (rest, hot packs, cold packs, transcutaneous electrical nerve stimulation -TENS, PTS, abdominal corset or TLSO)

### 3.4. Diseases of the motor unit (MUD)

-Classification of the main pathology

Neuromuscular Disorders	Examples
<i>CNS: Brain and Spinal Cord</i>	
Upper Motor Neuron Disorders	Cerebral Palsy Primary Lateral Sclerosis Familial Hereditary Spastic Paraplegia
Combined Upper & Lower Motor Neuron Disorders	ALS Spinal (bulbosplinal muscular) Atrophies
Lower Motor Neuron Disorders	Poliomyelitis and Post-Polio Syndrome
<i>Peripheral Nerves</i>	
Categorized by:	
- Motor and/or Sensory	Charcot-Marie-Tooth Disease (axonal motor hereditary)
- Axonal and/or Demyelization	Hereditary sensory neuropathies
- Hereditary vs. Acquired	Herpes Zoster

<i>Neuromuscular Junction</i>	Myasthenia Gravis Botulism
<i>Muscle</i>	Muscular Dystrophies Inflammatory Myopathies

-General characteristics:

a.

- Lower motor neurons: are primary motor neurons of the spinal cord and brain stem that directly innervate muscles.
- Disorders of the lower motor neurons result in atrophy, fasciculation, decrease in muscle tone and loss of tendon reflexes.

b.

- Upper pre-motor neurons are from higher regions of the brain (motor cortex) and synapse on lower motor neurons. They convey motor commands for movement.
- Disorders of the upper pre-motor neurons and their axons result in spasticity (increased rigidity in a group of muscles), overactive tendon reflexes and abnormal plantar extensor reflex (Babinski sign)

-“Injuries” in MUD

<i>Limitation and restriction in neuromuscular disease</i>			
<i>Organ</i>	<i>Impairment (often progressive)</i>	<i>Activity Limitation</i>	<i>Participation Restriction</i>
Skeletal muscle	Decreased strength and endurance	Decreased motor performance Decreased mobility Decreased UE function Increased fatigue	Decreased community mobility Decreased educational opportunities Decreased employment opportunities Increased dependency on others
Bone & Joint	Joint contractures Scoliosis	Decreased function for mobility and ADLs Pain & Deformity	Decreased quality of life
Lungs	Decreased pulmonary function	Decreased endurance Increased fatigue	
Heart	Cardiomyopathy Conduction defects	Decreased cardio-pulmonary adaptations Decreased endurance Increased fatigue	

CNS	Decreased intellectual capacity	Decreased learning ability Decreased psychosocial adjustment	
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-Rehabilitation interventions in MUD

Treatment scheme for ALS (amyotrophic lateral sclerosis) - the most characteristic one

<i>Treatment scheme for ALS</i>			
	<i>Disability</i>	<i>Referral</i>	<i>Treatment</i>
Phase 1 <i>Stage 1</i> Mild weakness or clumsiness	ADLs independent Ambulation independent without assist	PT	Education about nutritional principles Institute submaximal strengthening, aerobic and strengthening exercise Psychological support
<i>Stage 2</i> Moderate selective weakness	Difficulty with ADLs requiring increased time Ambulatory but difficulty with stairs	OT	Educate about fatigue management and avoiding overuse Provide adaptive aides for ADLs Reinforce focused stretching for at-risk joints (e.g., ankle) Modify strengthening program to encourage strengthening of less affected muscles Evaluate for Ankle-foot orthoses and gait aides
<i>Stage 3</i> Moderate selective weakness stretch Easy fatigability limits sustained function Positive respiratory symptoms	Moderate difficulty with ADLs. Unable to perform some fine motor functions Difficulty with ambulation distance	Pulmonary PFTs	Focus exercise on range of motion, stretch Consider hydrotherapy referral exercises Instruction in deep breathing Re-evaluate need for adaptive equipment Home/work site evaluation WC considerations for long distance mobility
<i>Phase 2</i> <i>Stage 4</i> <i>Severe LE weakness</i> <i>Spasticity detectable</i>	Need partial assistance with ADLs Non-ambulatory		Instruct caregivers in passive ROM Possibility isometric exercises Modalities and medications to treat pain Institute anti-edema measures

<i>Moderate UE weakness</i> <i>Shoulder pain may be present</i> <i>Daytime somnolence</i>	Able to transfer		Evaluate ability to propel WC
<i>Stage 5</i> <i>Severe LE weakness</i> <i>Mod-Severe UE</i> <i>Concern regarding nutritional intake</i> <i>Possible dysphagia for liquids</i> <i>Mild to moderate dysarthria</i>	More assist with ADLs Needs assist with transfer May have difficulty with repositioning	Speech-Language MBS	Stress importance of stretching and instruct in positioning to avoid contractures Retrain in transfers with adaptive equipment and/or family training Evaluate for pressure relief in chair and bed Re-evaluate ability to propel PWC and explore options Consider nutritional supplements Initiate swallow assessment and education
<i>Phase 3</i> <i>Severe Quadriplegia</i> <i>Moderate to severe Bulbar involvement</i>	Dysphagia Severe Dysarthria Difficulty managing secretions Difficulty maintaining O2 saturation Dependant in ADLs Dependant in mobility with exception of PWC		Consideration of gastric feeding tube Augmentative communication devices Suction or medications to decrease salivary flow O2 supplement and consideration of ventilatory support Family education and support for care Transfer devices Hospital bed with appropriate pressure relief Consideration of Hospice care
<i>Phase 3</i> <i>Severe Quadriplegia</i> <i>Moderate to severe Bulbar involvement</i>	Dysphagia Severe Dysarthria Difficulty managing secretions Difficulty maintaining O2 saturation Dependant in ADLs Dependant in		Consideration of gastric feeding tube Augmentative communication devices Suction or medications to decrease salivary flow O2 supplement and consideration of ventilatory support Family education and support for care Transfer devices Hospital bed with appropriate pressure relief Consideration of Hospice care

	mobility with exception of PWC		
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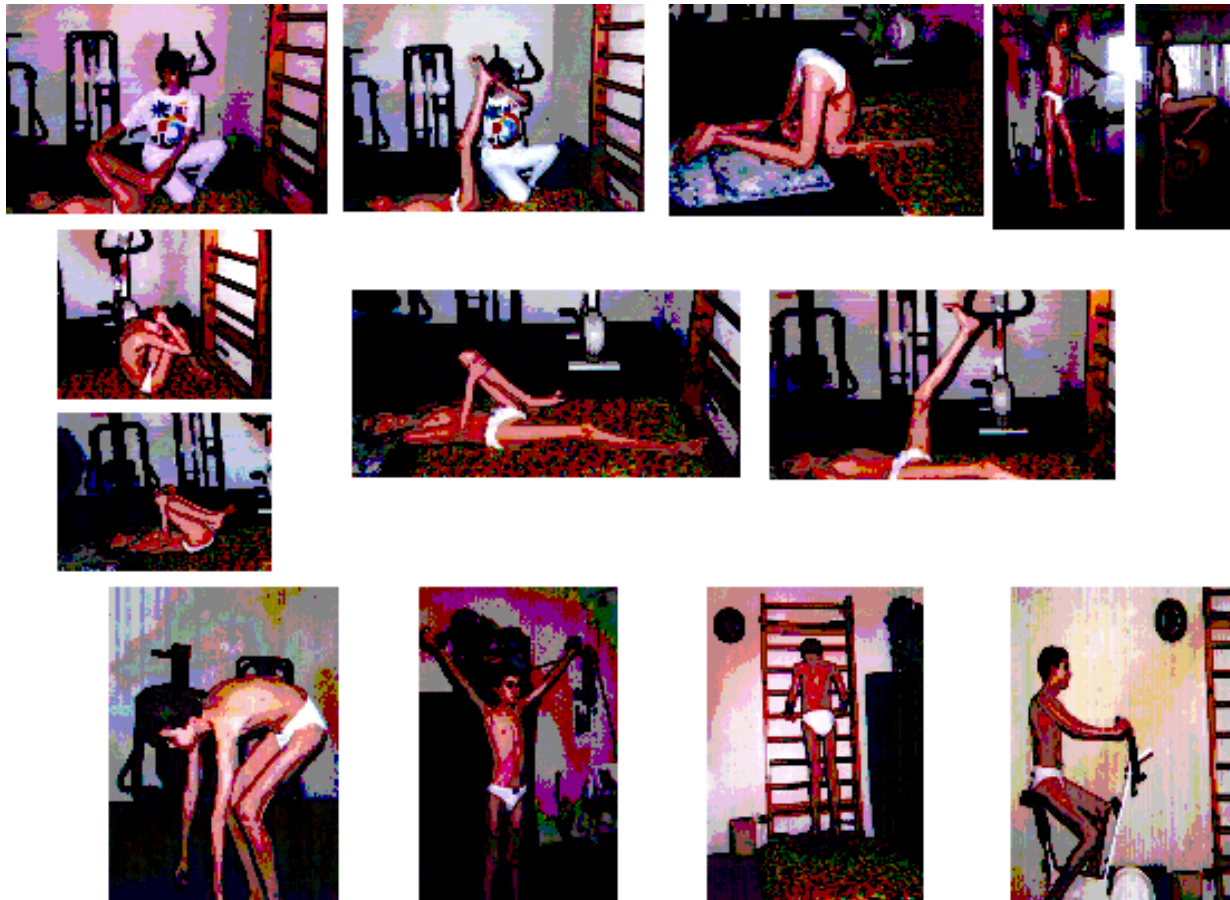


## Examples of treatment schemes

### ►Myasthenia gravis



➤ Muscle dystrophy



### 3.5. Posttraumatic disorders

Medical rehabilitation is useless in pseudarthrosis, osteonecrosis, vicious callus, tunnel syndromes.

In all other posttraumatic disorders (including joint arthroplasty) it is very important, in order to improve patient's quality of life

All the methods and techniques can be used, regarding clinical and functional status.  
Example: Politrauma with nerve roots involvements-*General program for global and analytic rehabilitation, reeducation of activities of daily living, integration of daily complex motor activities in the sensitive training*

