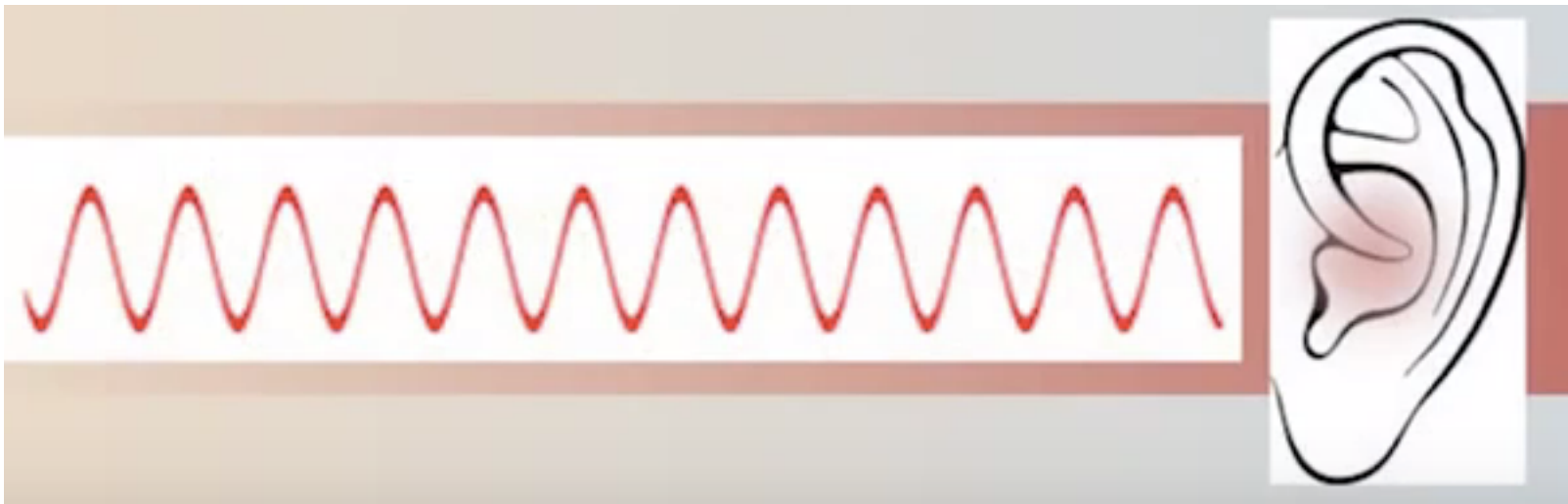


Bazele ecografiei

Adrian Ratiu

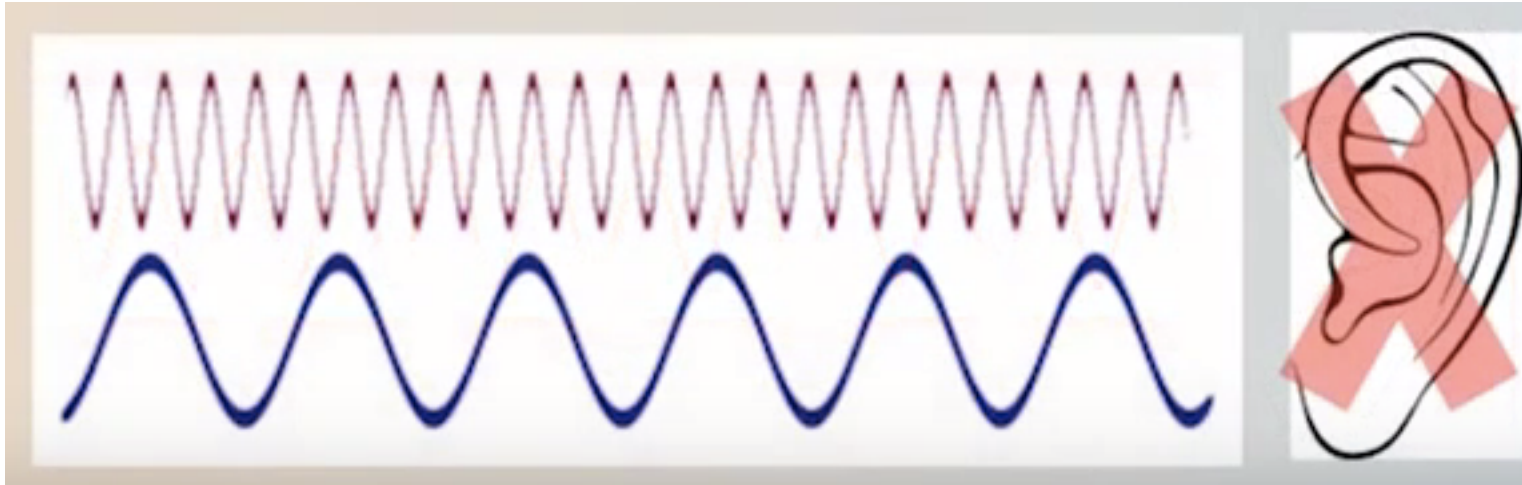


Undele sonore - sunetele



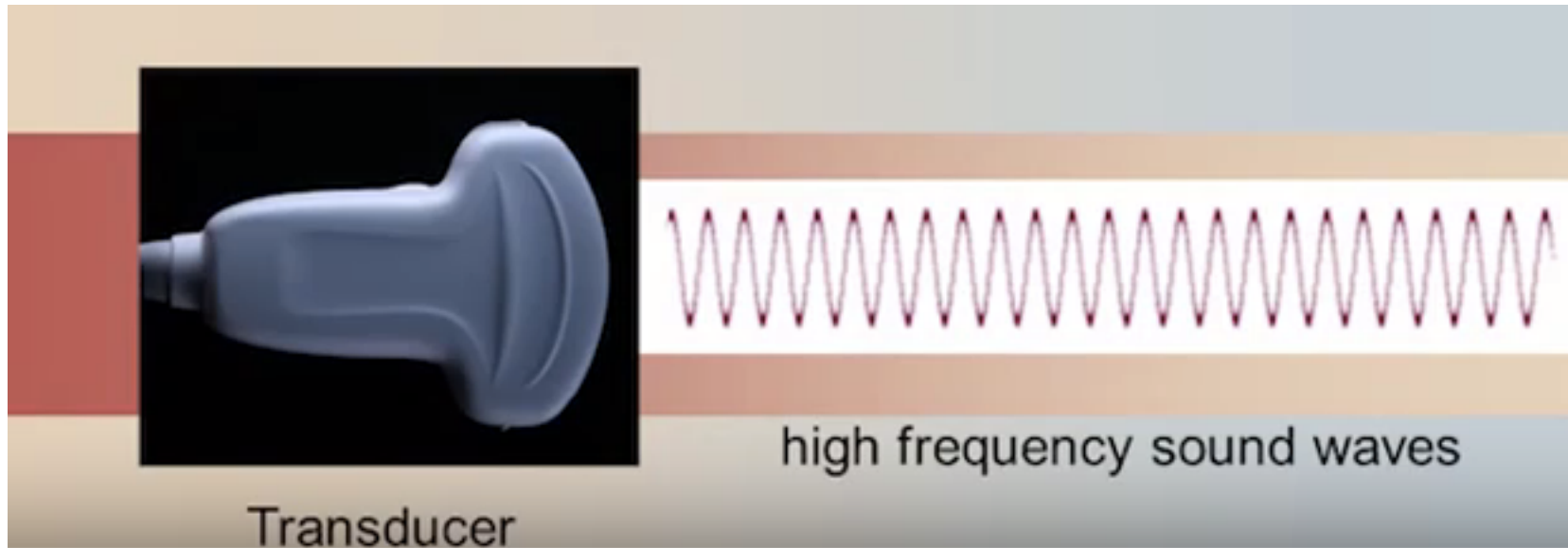
Sunetele sunt constituite din unde care sunt propagate prin aer spre urechea umana

Frecventa



Cand undele sunt foarte stranse sau vibreaza la o frecventa mare sau sunt departate si vibreaza la o frecventa joasa urechea umana nu le poate percepe

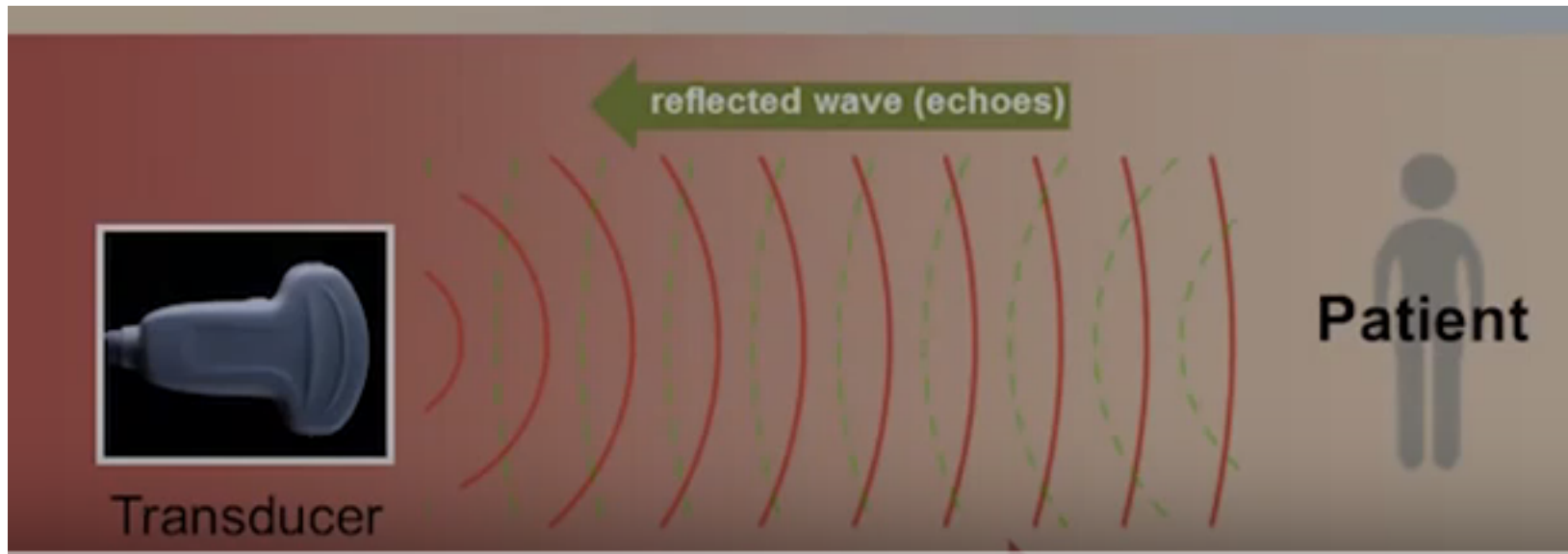
Cum functioneaza ecograful?



Transducerul produce unde sonore la o frecventa mare

Cum functioneaza ecograful?

Undele numite ultrasunete trec prin corpul uman si sunt absorbite sau reflectate de diferite structuri (tesuturi)



Undele reflectate se numesc ecouri

Cum functioneaza ecograful?

Ecourile se intorc la transducer

Computerul ecografului analizeaza undele si construieste o imagine



Imaginea formata este
constituita din:

Negru

Alb

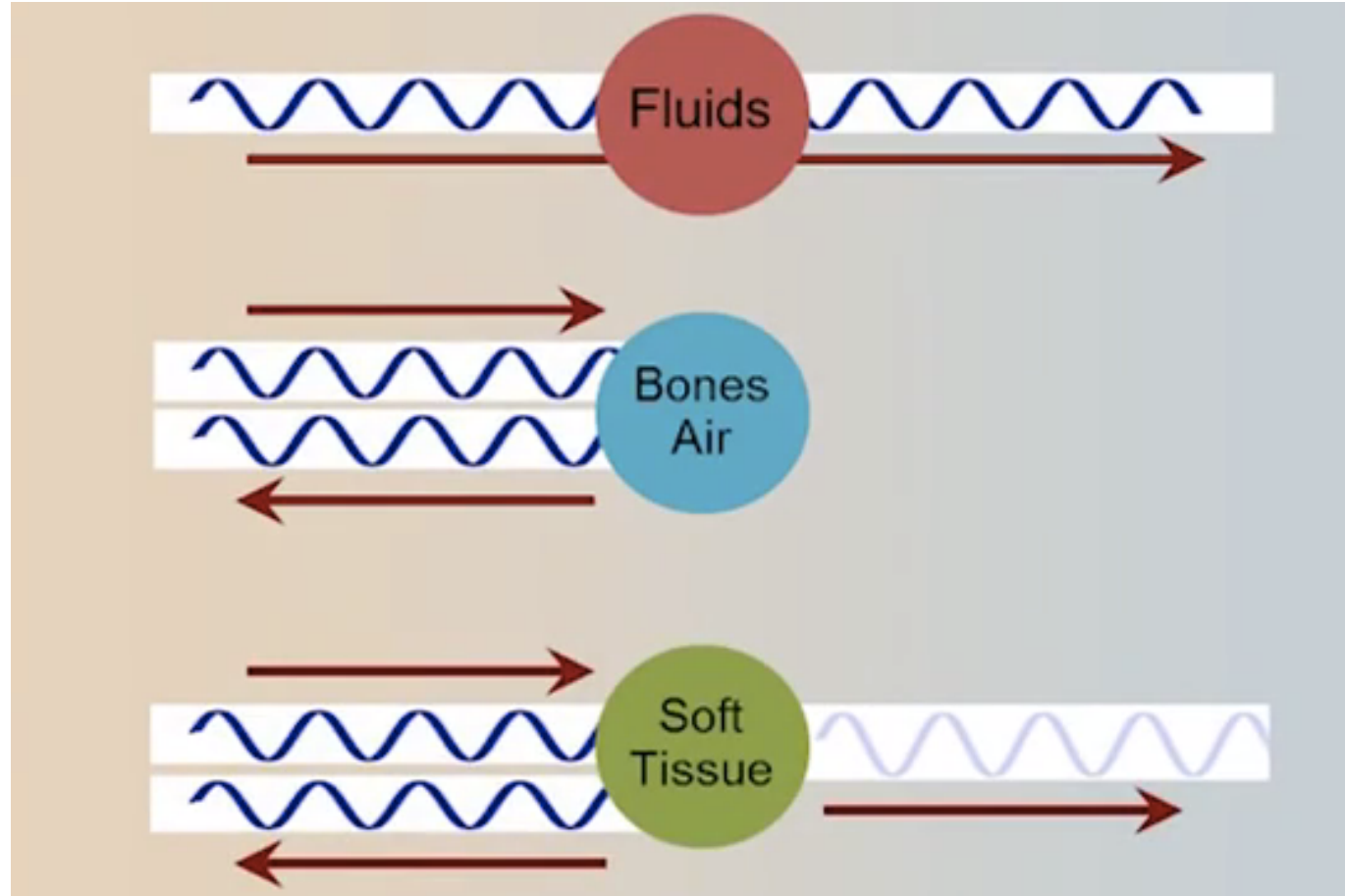
Nuante de gri

Cum functioneaza ecograful?

Traversare totala

Reflectare totala

Reflectare partiala



negru

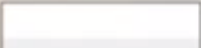



alb

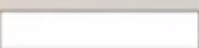
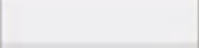


gri

Cum functioneaza ecograful?



Ecogenitatea: 4 niveluri

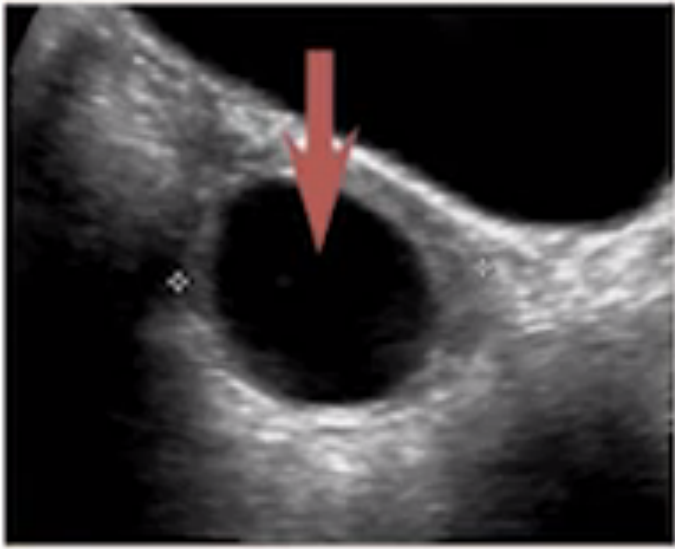
Hyperechoic		Strong echo
Isoechoic		Similar echo
Hypoechoic		Weak echo
Anechoic		No echo

Hyperechoic		Bone, air
Isoechoic		Soft tissues
Hypoechoic		Soft tissues
Anechoic		Fluid



Tesuturi - descriere

Cystic (simple)



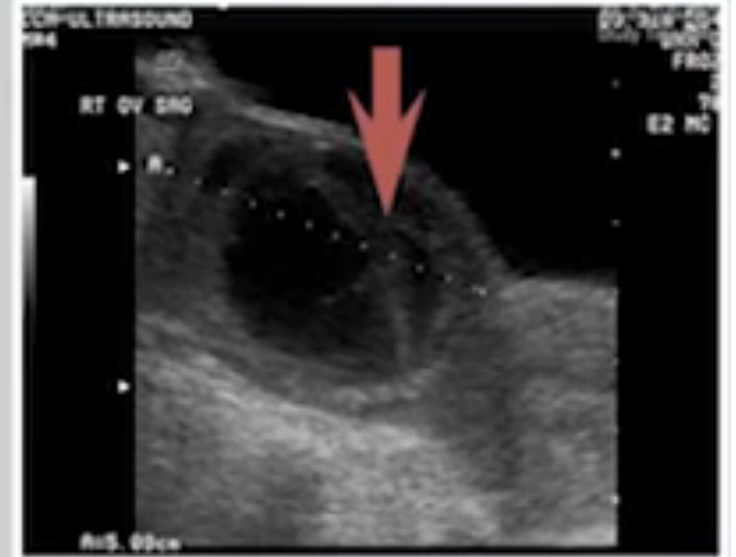
Chist ovarian

Solid



Abdomen fetal

Complex Tissue



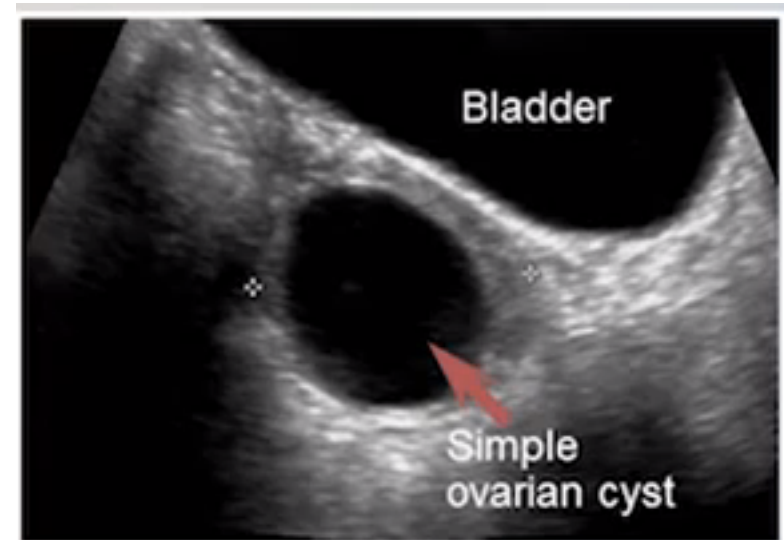
Chist ovarian hemoragic

Structura chistica

Continut lichidian

Pereti subtiri, netezi

Anecogen sau transsonic



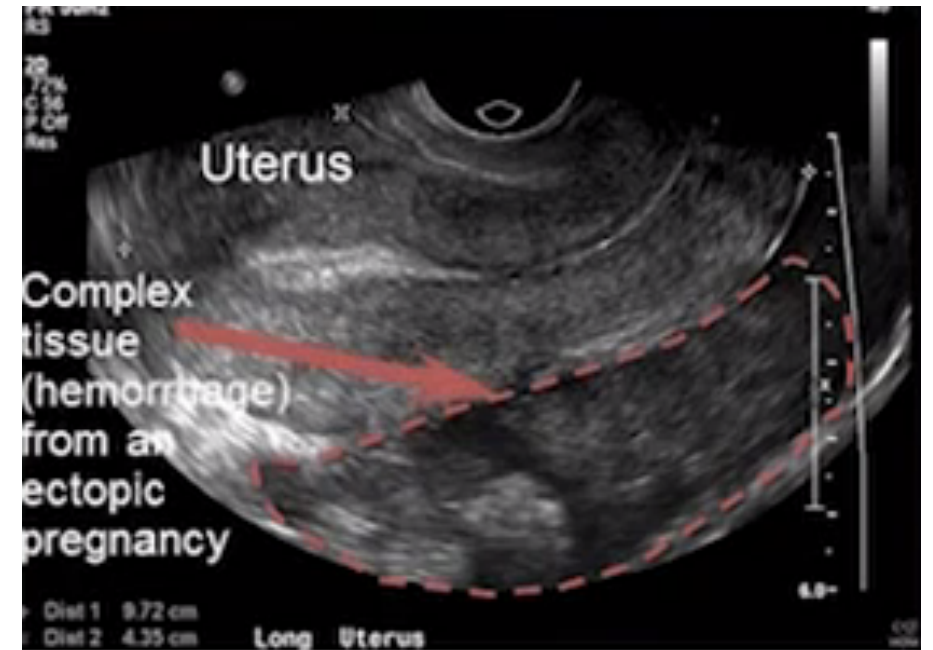
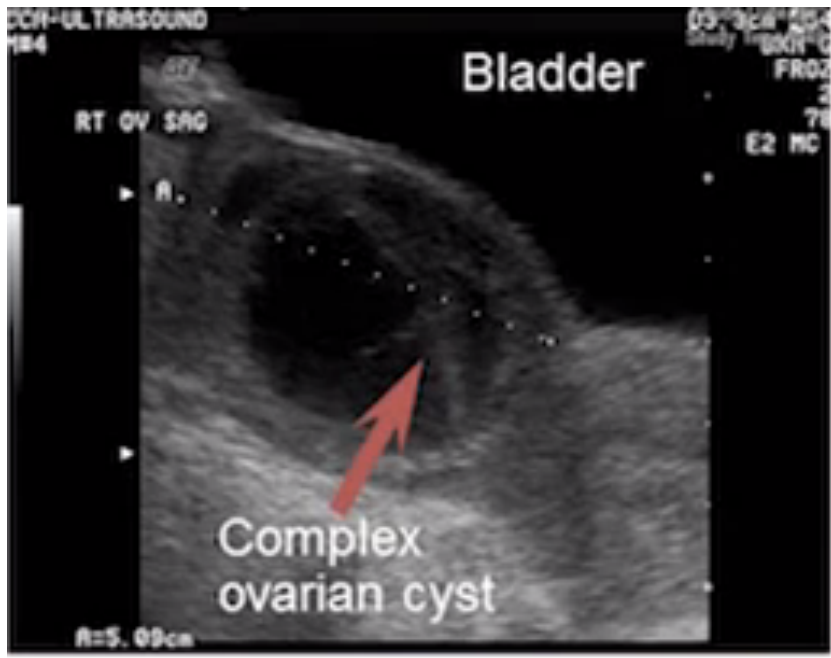
Structura solida

Tesut fara continut lichidian
Ecourile sunt nuante de gri sau alb

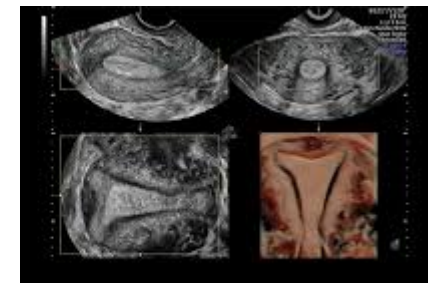
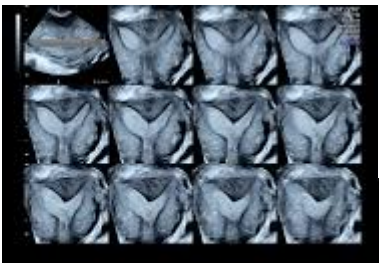
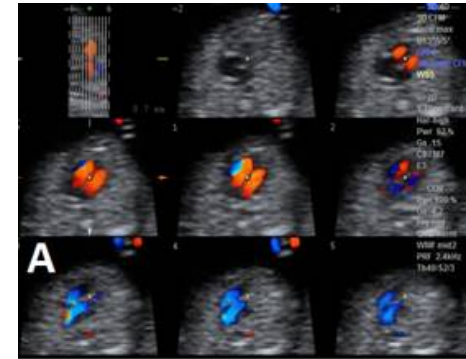
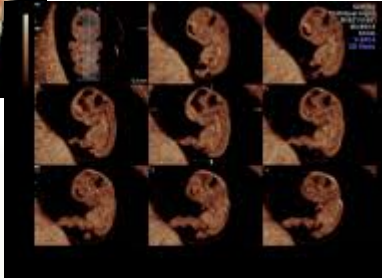
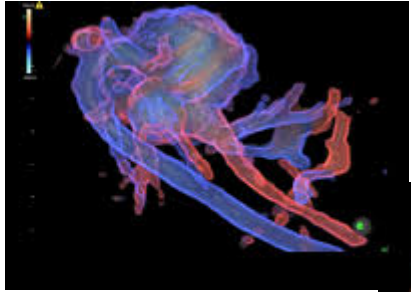


Structura complexa- mixta

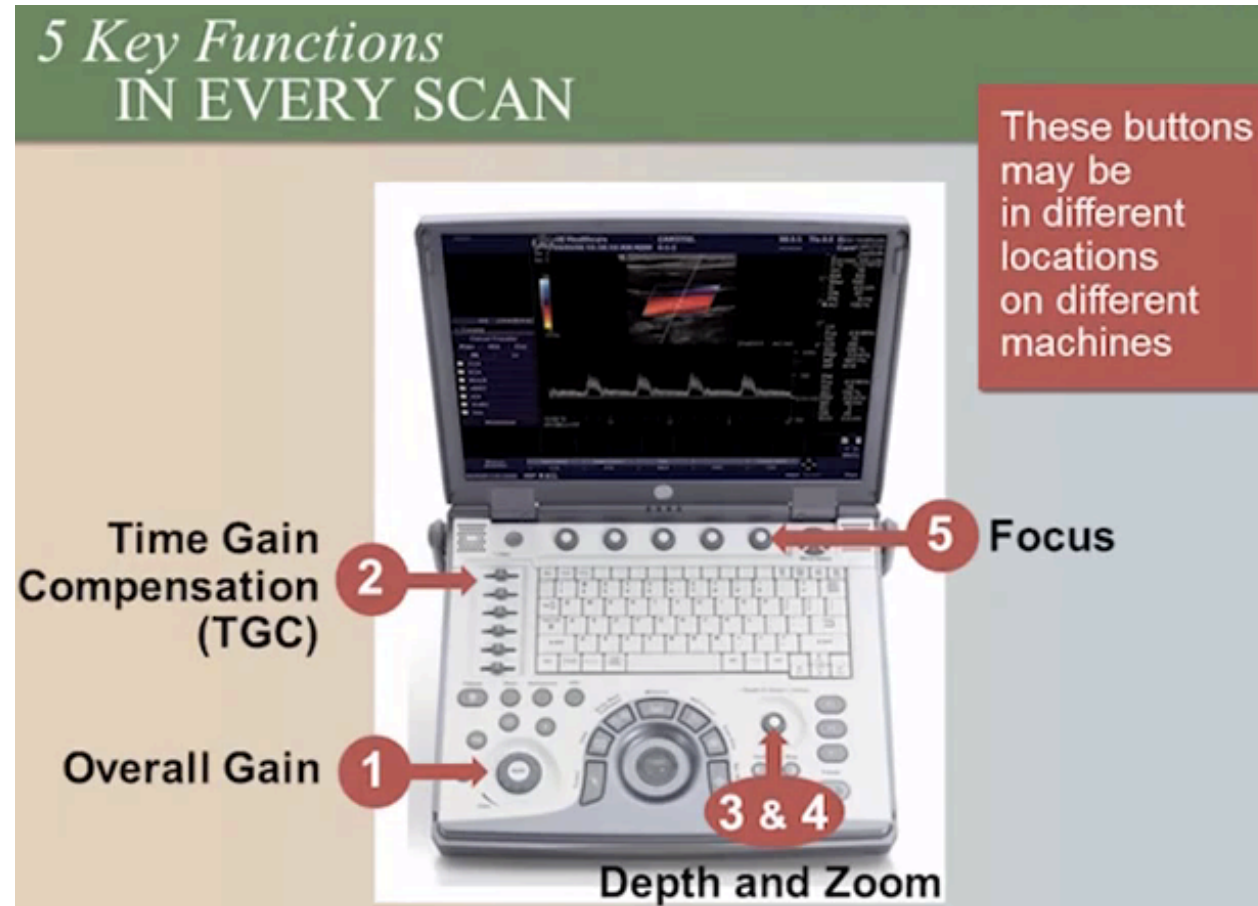
Tesut mixt cu componente solide si chistice
Lichid cu detritusuri interne – ecouri interne
Ecouri de diferite intensitati



Cum utilizam ecograful?



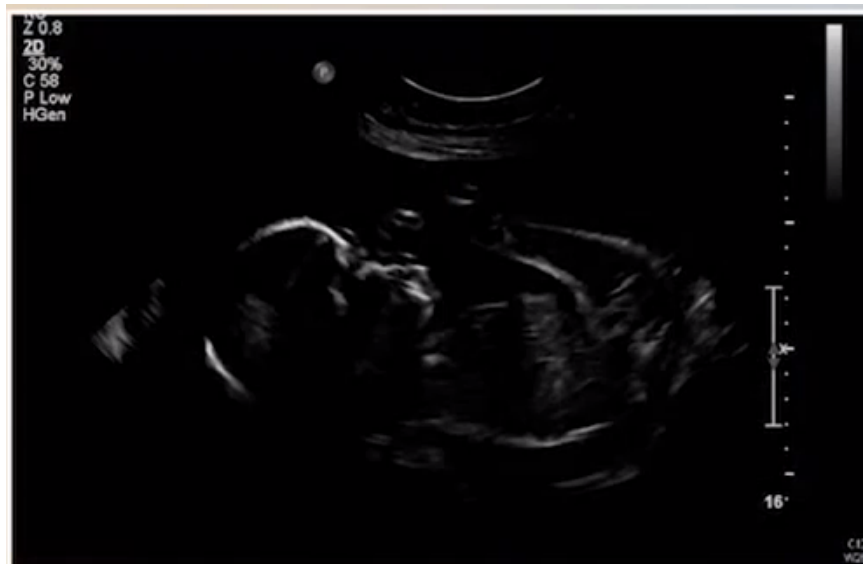
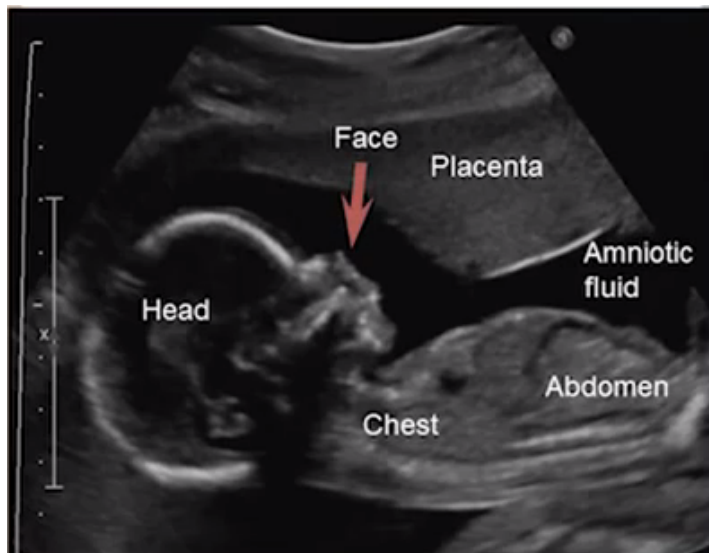
5 butoane la fiecare ecografie



Gain

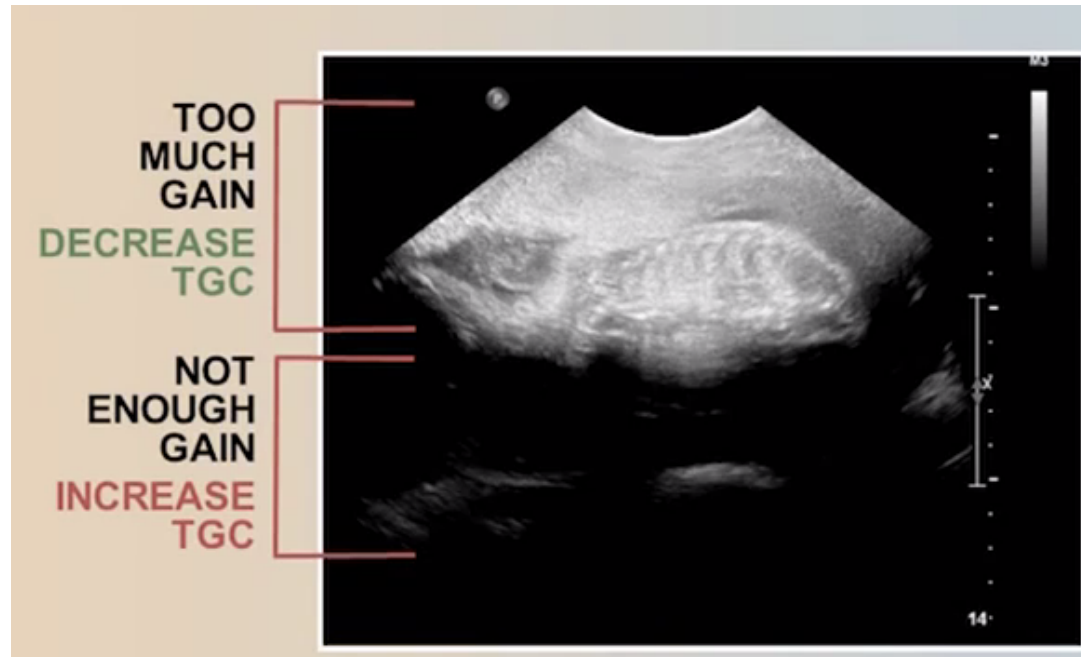


- Ultrasunetele se reduc pe masura ce se intorc de la tesuturi spre transducer
- Cu ecouri slabe imaginea devine de slaba calitate
- Cresterea **GAIN**-ului determina cresterea ecourilor care revin la transducer imbunatatind astfel calitatea imaginii

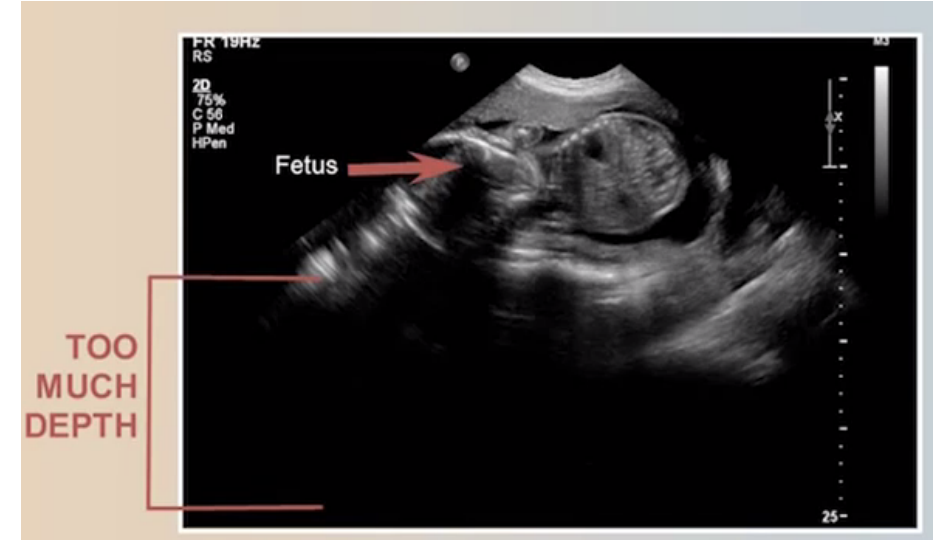


Time Gain Compensation TCG

- Permite ajustarea gain-ului la diferite niveluri in cadrul imaginii (luminozitatea imaginii) – la diferite adancimi si se utilizeaza pentru compensarea scaderii ecourilor care se intorc de la distante mai mari
- Scopul acestei functii este de a face intreaga imagine cu luminozitate uniforma de la varf la baza



Depth

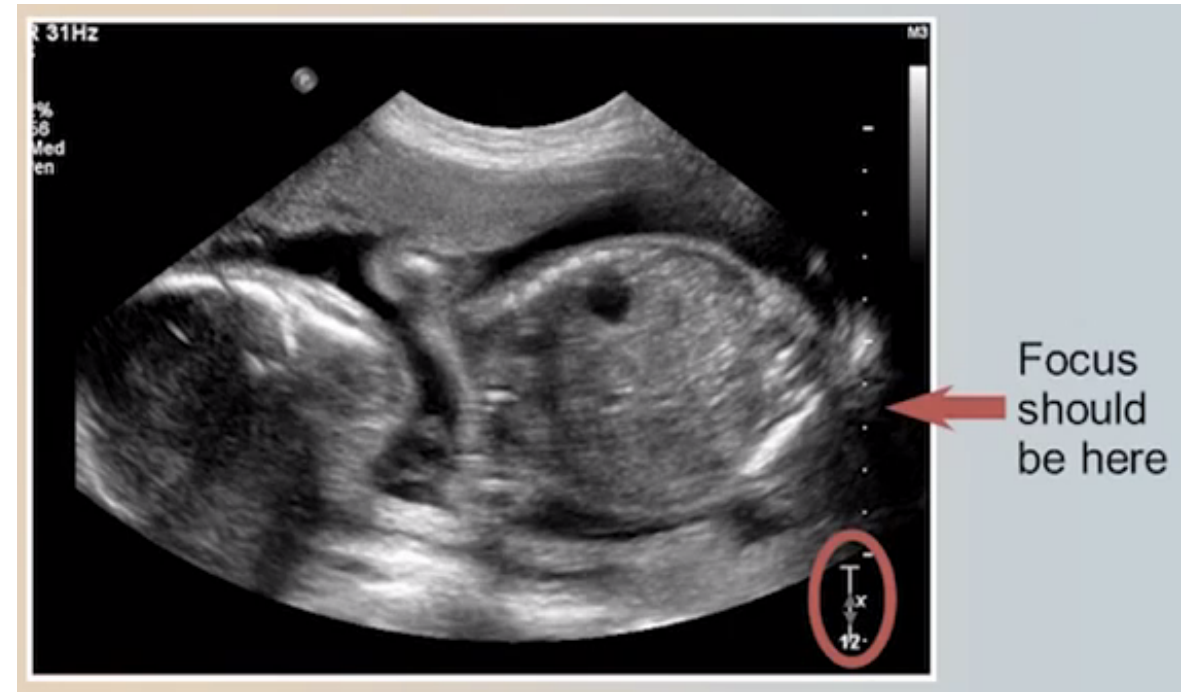
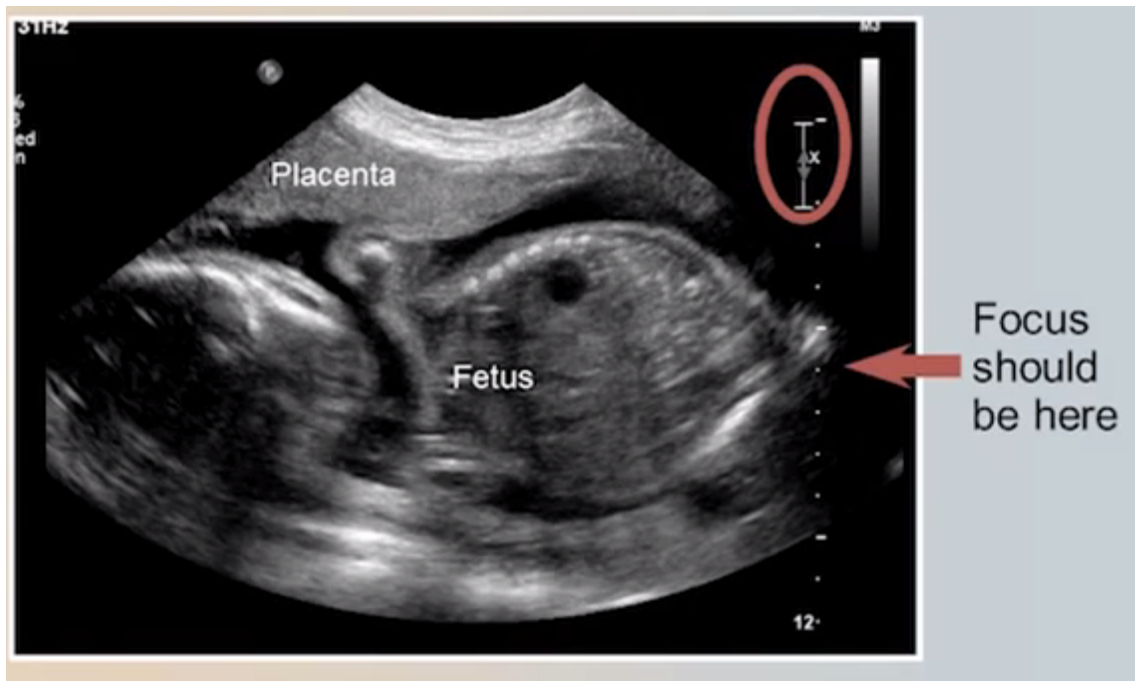


Zoom



Focus

- Creste rezolutia imaginii in zona tinta
- Se plaseaza la mijlocul sau marginea inferioara a zonei tinta



Are ecografia efecte secundare?

- Ecografia in sarcina este sigura
- Cu toate acestea, exista standarde care se ghideaza dupa principiul **ALARA**
- **As Low As Reasonably Achievable**
- Se va limita expunerea fatului, mai ales a embrionului

Artefacte ecografice

- Artefactele sunt erori in imagine
- Sunt cauzate de procese fizice care afecteaza undele de ultrasunete
 - Reverberatii
 - Imagine in oglinda
 - Intarire
 - Atenuare

Reverberatii

- Apar cand unda ultrasonica intalneste doua zone paralele puternice reflectoare
- Intre aceste zone paralele undele se misca in fata si in spate (reverbereaza) iar transducerul interpreteaza undele ca venind de la structuri mai profunde deoarece dureaza mai mult ca aceste unde sa ajunga la transducer
- Aceste reverberatii se corecteaza prin schimbarea unghiului de insonatie

Non-visualization of near field lateral ventricle due to reverberation artifact from a normally ossified cranial vault.

Near field ventricle is visualized by scanning through the fontanelles and sutures.



Imaginea in oglinda

- Se observa cand unda primara intalneste o suprafata intens reflectiva
- Unda este reflectata de aceasta suprafata dar in loc sa fie direct receptionata de transducer intalneste o alta structura si este reflectata inapoi pe suprafata intens reflectiva dupa care este reflectata spre transducer iar acesta interpreteaza undele ca venind de la o structura mai profunda si afiseaza o imagine in oglinda de partea opusa a suprafetei reflective

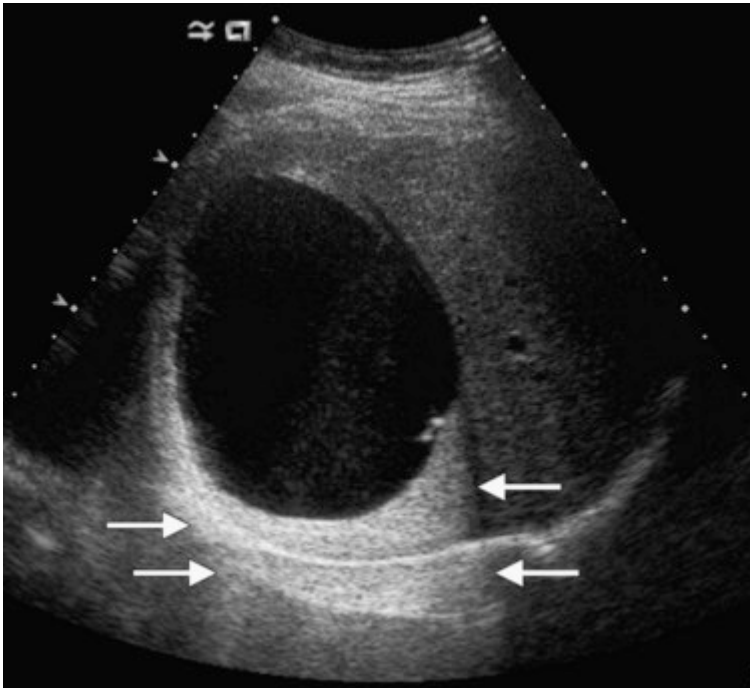


Longitudinal transvaginal sonogram showing the intrauterine pregnancy on the left and the mirror-image pregnancy in the rectouterine pouch on the right.



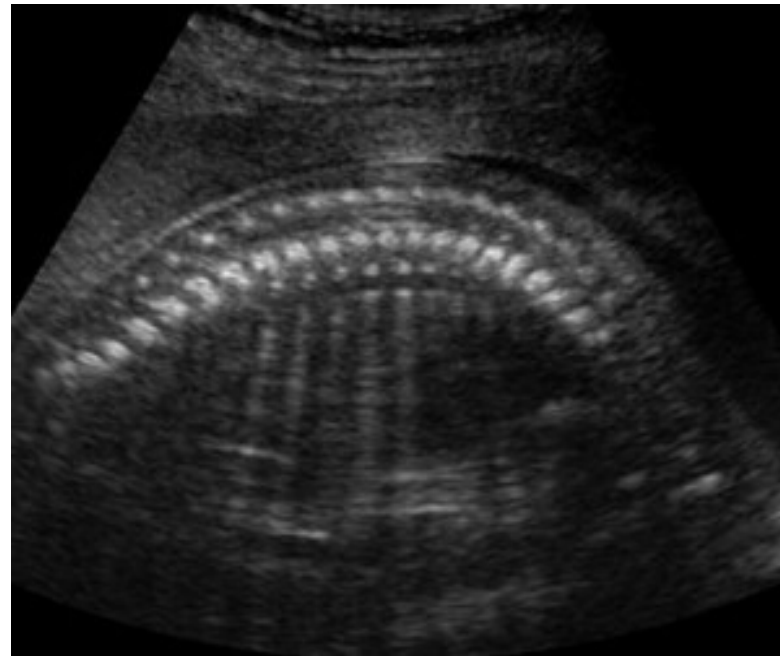
Intarirea

- Cresterea ecourilor inferior unei structuri care transmite foarte bine ultrasunetele (lichid)



Atenuarea

- Lipsa de semnal posterior de o structura care absoarbe sau reflecta marcat ultrasunetele



Orientarea transducerului

