Elastography

Elastography is a medical imaging technique that maps the elastic properties and stiffness of soft tissue. The main idea is that whether the tissue is hard or soft will give diagnostic information about the presence or status of disease. For example, cancerous tumours will often be harder than the surrounding tissue, and diseased livers are stiffer than healthy ones. The most prominent techniques use ultrasound or magnetic resonance imaging (MRI) to make both the stiffness map and an anatomical image for comparison.

Elastography is used for the investigation of many disease conditions in many organs. It can be used for additional diagnostic information compared to a mere anatomical image, and it can be used to guide biopsies or replace them entirely. Biopsies are invasive and painful, presenting a risk of hemorrhage or infection, whereas elastography is completely non-invasive.

Liver elastography is used to investigate disease in the liver. Liver stiffness is usually indicative of fibrosis or steatosis, which are in turn indicative of numerous disease conditions, including cirrhosis and hepatitis. Elastography is particularly advantageous in this case because when fibrosis is diffuse, a biopsy can easily miss sampling the diseased tissue, which results in a false negative misdiagnosis.

Naturally, elastography sees use for organs and diseases where manual palpation was already widespread. Elastography is used for detection and diagnosis of breast, thyroid and prostate cancers. Certain types of elastography are also suitable for musculoskeletal imaging, and they can determine the mechanical properties and state of muscles and tendons. Because elastography does not have the same limitations as manual palpation, it is being investigated in some areas for which there is no history of diagnosis with manual palpation. For example, magnetic resonance elastography is capable of assessing the stiffness of the brain.

Magnetic resonance elastography (MRE)

Magnetic resonance elastography (MRE) works by combining MRI imaging with sound waves to create a visual map (elastogram) showing the stiffness of body tissues. An MRE examination is usually done as part of a conventional MRI examination. A standard MRI liver examination takes about 15 to 45 minutes. The MRE part of the test takes less than five

minutes. In an MRE examination, a small pad is placed on the surface of the body. The pad emits low-frequency vibrations that pass through the liver. A computer measures the speed at which the vibrations pass through the liver. Vibrations travel faster through stiff tissues. After the MRE procedure, a computer program creates a color-coded map showing the stiffness of the liver tissue. A doctor specially trained to interpret MRE scans (radiologist) analyzes the images from the scan.

English-Polish dictionary:

cirrhosis- marskość
diffuse- rozlany, rozproszony
fibrosis- zwłóknienie
hemorrhage- krwotok
hepatitis- zapalenie wątroby
musculoskeletal- mięśniowo-szkieletowy
palpation-badanie palpacyjne
sampling- pobieranie próbek
steatosis- stłuszczenie
stiffness- sztywność
tendon- ścięgno
thyroid- tarczyca

https://en.wikipedia.org/wiki/Elastography

https://www.mayoclinic.org/tests-procedures/magnetic-resonance-elastography/

Exercises:

I. Read the texts above and answer the questions.

1. What is elastography?
2. What are its applications?
3. Why is elastography more advantageous than biopsy?
4. What liver diseases can be detected by elastography?
5. What other human organs can be examined by elastography?
6. What is an elastogram?
7. Which examination is shorter MRI or MRE?

II. **Describe a magnetic resonance elastography examination. Use the following words:**

MRI/pad/low-frequency vibrations/computer/ speed /stiff tissues/elastogram

III. Match the words (1-10) with their definitions (a-j).

1. palpation
2. sampling
3. fibrosis
4. tissue
5. vibration
6. biopsy
7. hemorrhage
8. tendon
9. stiffness
10. hepatitis

a. the formation of an abnormal amount of fibrous tissue in an organ or part as the result of inflammation, irritation, or healing

b. a disease characterized by inflammation of the liver

c. a profuse discharge of blood, as from a ruptured blood vessel; bleeding

d. an examination of something, usually an organ or part of the body, by touching it with the fingers or hands

e. a group of connected cells in an animal or plant that are similar to each other, have the same purpose, and form the stated part of the animal or plant

f. a flexible but inelastic cord of strong fibrous collagen tissue attaching a muscle to a bone

g. inability to move easily and without pain

h. an examination of tissue removed from a living body to discover the presence, cause, or extent of a disease

i. a small part selected as a sample for inspection or analysis

j. continuous, quick, slight shaking movement

IV. Change the following sentences into the passive voice.

1. The pad emits low-frequency vibrations.

   Low-frequency vibrations…… .

2. MRE can assess the stiffness of body tissues.

   The stiffness of body tissues……. .

3. A computer will measure the speed at which the vibrations pass through the liver.

   The speed at which the vibrations pass through the liver ……. .

4. A computer program has created an elastogram.

   An elastogram…….. .

V. Match the words (1-10) with their pronunciation (a-j). Practise pronouncing the words.

1. hepatitis	a. /ˌmʌskjʊləʊˈskɛlɪt(ə)l/
2. cancerous	b. /fʌɪˈbrəʊsɪs/
3. fibrosis	c. /ˌhepəˈtaɪtɪs/
4. cirrhosis	d. /ˈbaɪɒpsi/
5. steatosis	e. /ˈkænsərəs/
6. hemorrhage	f. /vaɪˈbreɪʃ(ə)n/
7. thyroid	g. /ˌstɪəˈtəʊsɪs/
8. biopsy	h. /səˈrəʊsɪs/
9. vibration	i. /ˈθaɪrɔɪd/
10. musculoskeletal	j. /ˈhem(ə)rɪdʒ/

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