**Application of seismo-electric method in medical diagnosis**

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Seismo-electric method is used to generate electromagnetic radiation from porous material by applying sound waves. It is being used in oil and ground water exploration to generate images of the underground to investigate the presence of fluids under the ground surface. In this project we would like to explore the possibility of using the seismo-electric method for medical diagnosis. The method has a great potential for developing non-invasive diagnostic tools for a wide range of diseases. The method could also be used in combination with ultra-sound technique to enhance the imaging quality.

The seismo-electric effect is initiated by a sound wave passing through a porous material which generates a relative motion of the fluid inside the porous body with respect to its fixed matrix of the pores. The walls of the pores are charged, thus they attract the mobile counter-ions in the fluid leading to high concentration of mobile charges near these walls. The sound wave sets these mobile charges to oscillate. The oscillation of the high concentration of mobile charges leads to generation of electromagnetic waves. The electromagnetic waves can be detected by a pair of electrodes. Many biological tissues including bones, cartilage and discs are porous materials filled with physiological salt solution. When sound waves are applied to such tissues one expects generation of electromagnetic radiation. The detected electromagnetic radiation could reveal information about the amount of fixed charges, inhomogeneity, or damages in the tissues. This information can be of great value for medical diagnosis.

In this project we will experimentally evaluate the seismo-electric effect in different biological materials. The results will be compared with theoretical modelling. We will explore ways to enhance the generated electromagnetic waves.

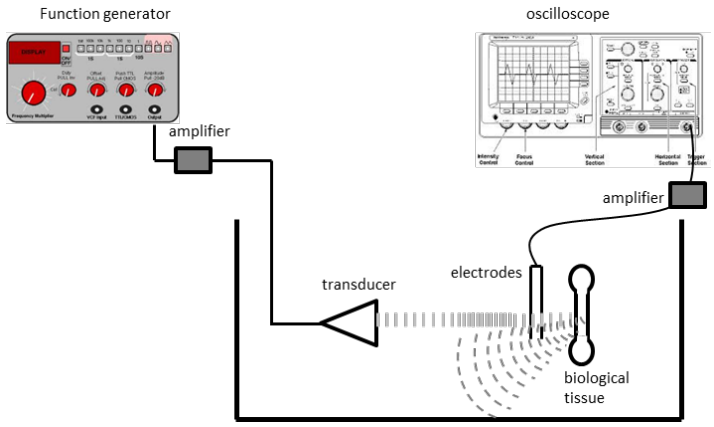


Figure 1: Illustration of a setup for measuring seismo-electric effect in biological tissues