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**Controlling the shear waves Field in soft tissue using vibrator array**

C. Zenzemi, A. Zorgani et S. Catheline

Inserm, U1032, LabTau ; Université de Lyon, F-69003, France, 151 cours Albert Thomas, 69424 Lyon  
Cedex 03, France

chadi.zenzemi@gmail.com

**Background:** Improving cancer diagnostic is an important issue in oncology. Shear wave elasticity imaging techniques, known as elastography, have already shown their ability to locally retrieve the tissue elasticity and therefore suspicious cancer nodules. A method for enhancing the signal-to-noise ratio is discussed in this presentation. To characterize the tissue elasticity, most of the current technics use a single active external source to generate shear waves. This limits the use of elastography to the diagnosis of superficial (shallow) organs. In order to improve the diagnostics of deeper organs, such as prostate, spleen, we propose multiple shear wave sources and the use of time reversal in order to improve the control of the shear wave field.

**Methods:** The experiments are conducted on a Cirs phantom. Multiple vibrators are placed around the phantom box. After each stimulation, the impulse response is measured inside the phantom by a 5MHz ultrasound probe connected to an ultrafast ultrasound scanner. The impulse responses are time-reversed and simultaneously sent back into the medium by their corresponding vibrators.

**Results:** A displacement movie shows a shear wave focusing at the point where the impulse responses are chosen in the first step. The focusing is successful for different locations in our imaging field. We create focus spots in the center as well as in the corner.

**Conclusions:** This study shows that a shear wave field can be controlled with shear wave time reversal focusing. We can concentrate a maximum of energy in any region of interest. These results might bring significant improvement of the signal-noise ratio. Further mechanical parameters such as viscosity as well as non-linearity and anisotropy might profit of the technique.