

MEASUREMENT SYSTEM FOR MEDICAL ULTRASONIC PULSE SPECTROSCOPY

K.P. Richter, P.Lange, R.Millner, H.Heynemann, M.I.Richter,
H.Pfeßler, Th.Drescher, E.Letterer

Institute of Applied Biophysics, Urological Clinic, Pathological
Institut, I. Medical Clinic, University Halle - GDR

A useful tool to get insight in the interaction of tissue with ultrasound is the ultrasound spectroscopy. To apply this ultrasonic spectroscopy for in vitro measurements firstly and to find a correlation between clinical statement and the frequency dependent ultrasonic attenuation we developed a measuring system. Thereby we used a modified A-scope device, followed by a linear gate and an electronic spectrum analyzer. The data of the spectrum were stored or directly digitized. The computation of attenuation characteristics from the digitized spectra is performed by a calculator. The system allowed measurements within the frequency range from 2 to 20 MHz. In vitro measurements were carried out in transmission techniques. As transmitter acts a broad-band-transducer with a double-layer matching section and as receiver a PVDF microphone. A comparison between different tissue specimen of human testes with the histology was made. A scanning technique was used and the frequency dependent attenuation was measured across a given scanning line. All pathological changes of testes showed a higher attenuation as a healthy specimen. A series of experiments with different pathological states of rat liver were carried out to distinguish between healthy fatty and cirrhotic liver. Some results of this investigation will be discussed.