



## LV BEST OP 5

### Estimation of fibrosis and steatosis of liver using electrochemical impedance spectroscopy on a needle: A preliminary result.

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**Introduction** : Preoperative estimation of the liver function is mandatory for safe hepatectomies and successful liver transplantations. Aim of this study is to evaluate the diagnostic and predictive value of electrochemical impedance in estimation of the degree of fibrosis and steatosis of the liver.

**Methods** : A specialized electrochemical impedance spectroscopy on a needle(EoN) for measurement of tissue impedance was designed and made in Gwangju Institute of Science and Technology(GIST). The electrical impedances for nine resected liver parenchyma were measured at two different points of each specimens in the frequency range of 100Hz to 1Mhz. The electrical impedance were analyzed comparing to pathologic grading of fibrosis and steatosis.

**Results** : The nine specimens were diagnosed with one of fibrosis grade 0, two of fibrosis grade 1, one of fibrosis grade 2, three of fibrosis grade 3, and two of fibrosis grade 4. Of these data, one preoperative portal vein embolization case, and one preoperative chemotherapy were excluded. The specimens with higher fibrosis grade have shown the significantly higher impedance value. The fibrosis grade was significantly correlated to electrical impedance in all current frequency range ( $p<0.001\sim0.022$ ,  $R=0.341\sim0.753$ ,  $R^2=0.1335\sim0.566$ ). The highest correlation coefficient was observed at the current frequency of 735703Hz ( $p<0.001$ ,  $R=0.753$ ,  $R^2=0.566$ ). Macrosteatosis was significantly correlated to electrical impedance in the current frequency from 100 to 544Hz ( $P<0.001$ ,  $R=-0.583$ ,  $R^2=0.340$ ).

**Conclusions** : The electrical impedance of liver parenchyma was significantly correlated to fibrosis and steatosis. This study have shown the possibility of preoperative quantification of hepatic fibrosis and steatosis using the electrical impedance spectroscopy on a needle.

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