

Magnetocardiography Changes for the Location of Sensor Assembly

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Magnetocardiography (MCG) is a non-contact, non-invasive, and harmless diagnostic tool to detect the abnormal electrical conductivities of the heart caused by the various coronary artery disease or cardiac muscular disease. The purpose of this study is to identify whether MCG signals and parameter values are changed at the different location of sensor assembly. It would be an important reference for the standard measurement. Four male healthy subjects (33.3 ± 6.3 years) participated in this study. Basal recording was made at 2 cm apart from the chest surface. All subjects were requested to take a regular breathe. The gap between the chest surface and the bottom of the sensor assembly was 2, 4, 6, and 8 cm. Recording was made using 64 channel MCG system (Axial type, first order gradiometer) developed by Korea Research Institute of Standards and Science (KRISS). After resting for two minutes in a supine position on the bed in magnetically shielded room, MCG were recorded for 30 s. As the sensor location is getting away from the chest surface signal, the amplitude of R and T wave peak decreases to 70% (at 4 cm gap), 50% (at 6 cm), and 37% (at 8 cm) of the reference strength measured ($y=1.6944x^{-0.7002}$, $r^2=0.98$, where y =amplitude, x =distance between chest surface and sensor location). In addition, the current moment at T-wave peak (T_{Wave} Moment, see Fig 1A) also reduced to 52% (at 4 cm gap), 33% (at 6 cm), and 19% (at 8 cm) ($y=2.3488x^{-1.1442}$, $r^2=0.98$). The regression equations could be a good reference, even though signal strength varied slightly among subjects. In contrast, current angle maximum and Pole distance were increased when the gap was increased. Signal strength should be considered when the baseline and the sensor location are designed according to the results in this study.

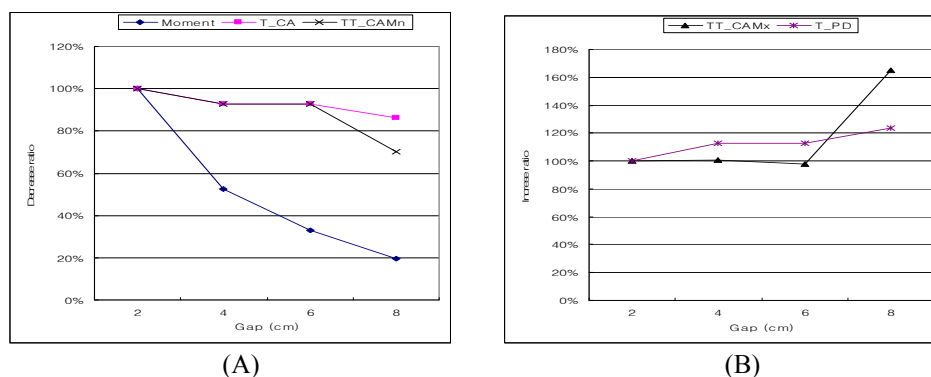


Fig. 1 Decreased (A) and increased (B) parameters of MCG. The gap between the chest surface and the location of sensor assembly is increased to 2 cm, 4 cm, 6 cm and 8 cm. Abbreviations: T_{Wave} = T-wave peak, TT_{Wave} = ST-T period, Moment = magnitude of the maximum current, CA = Maximum current angle, CAMn = current angle minimum during the period. CAMx = current angle maximum, and PD = pole distance

Keywords: Magnetocardiography, Standard measure, Sensor location