

#### Title of Abstract:

Decrease defibrillation thresholds and minimize myocardial damage by implanting cardioverter defibrillators in the left axilla

#### Abstract Contents:

##### I. Background:

Implantable Cardioverter defibrillators (ICD) are routinely used for the prevention of sudden cardiac death due to fatal ventricular arrhythmias. However in both appropriate and inappropriate activation of implantable cardioverter defibrillators (ICD), there have been reports of the possibility of worsening the prognosis. As the reason for this, the involvement of myocardial damage due to ICD activation in low cardiac function patients has been strongly suggested. The electric current cannot conduct linearly from ICD generator to the lead tip coil in the body, because the internal organ have a peculiar resistance level, respectively.

##### II. Objectives:

We simulated the conduction of defibrillation in a torso model to estimate the defibrillation threshold (DFT) and myocardial damage when an ICD generator was set in the left axilla and left anterior chest, respectively. And We performed animal experiments in order to corroborate the results of the computer simulation. Twenty-five patients with the ICD generator implanted in the left axillary fossa and 50 patients with the ICD generator implanted in the conventional left precordial region were included, and the capability of defibrillation with 5 J was investigated.

##### III. Result:

When ICDs are implanted in the left axilla, computer simulation and animal experiments demonstrated that both the left and right ventricles may be more efficiently defibrillated with a lower defibrillation energy, and thus cardiac myocardial damage may be reduced. In related human clinical studies, ventricular fibrillation was successfully terminated with a defibrillation output of  $\leq 5$  J in 88% of the left axillary group (26 subjects), and 12% of the left anterior group (50 subjects) ( $P \ll 0.05$ ).

#### IV. Conclusion:

This research may provide theoretical and clinical evidence for an improved ICD implantation site in the left axilla, and suggests this method may lessen the myocardial damage due to ICD shocks.