"PREDICTION OF CARDIOVASCULAR STATUS DURING CARDIAC ARREST USING SIGNAL PROCESSING AND MACHINE LEARNING" VCU #11-54

Applications

- Assess and analyze cardiac health
- Emergency patient care
- Cardiac therapy
- Use in ER or First responder setting

Advantages

- Guide resuscitation procedures
- Predict counter shock success
- Automated real-time analysis
- Increase accuracy of defibrillation with machine learning

Inventors

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Market Need

During cardiac arrest, chances of successful defibrillation and full recovery decrease rapidly with the passage of time. In addition, repeated unsuccessful shocks can cause both thermal and electrical damage to cardiac tissue. With the low survival rates of cardiac arrest victims, a method to guide resuscitation efforts and predict counter-shock success will assist in dramatically increasing defibrillation success.

Technology Summary

Using advanced signal processing and machine learning techniques a real-time analysis of an electrocardiogram of a patient is conducted to remove noise and non-essential data. The output data is then analyzed along with other basic physiologic signals (temperature, blood pressure, etc.) to predict the cardiac state of the victim. This technique allows for instantaneous analysis and predicts the return of spontaneous circulation and cardiac deterioration. This information can provide the medical practitioner with decision tools for resuscitation procedures and the optimal time for shock applications and shock energy levels. In addition, this technique can be used to guide therapy for post cardiac arrests victims. This system has been designed to be used both in the clinical setting as well as by first responders.

Technology Status

Patent pending: U.S. rights are available.

Preliminary testing has been conducted and published.

Shandilya, S, Ward, K, Kurz, M, Najarian, K., "Predicting defibrillation success with a multiple-domain model using machine learning," *Complex Medical Engineering (CME), 2011 IEEE/ICME International Conference*, May 2011

Sharad Shandilya, Kevin Ward, Michael Kurz and K. Najarian, "Non-Linear Dynamical Signal Characterization for Prediction of Defibrillation Success through Machine Learning", BMC Medical Informatics and Decision Making 2012, doi:10.1186/1472-6947-12-116,12:116, Oct 2012.

This technology is available for licensing to industry for further development and commercialization.