

Abstract

Ventricular late potentials (VLP) are very weak signals (a few μV to tens μV) with relative high frequency (up to hundreds Hz) components found in the early ST segment of ECG signals. They are considered to be a marker for ventricular tachycardia and cardiac sudden death. Due to the existing ventricular late potentials instrument can't detect the variance of ventricular late potentials from beat-to-beat, this study tries to develop a system to solve this problem by introducing a novel method which based on wavelet transform and filter bank.

However, even working somewhat in time-scale domain by using wavelet transform, this method will go back to time domain when the signal has been well prepared, and then, the ventricular late potentials positive criteria will be applied. By this way, it is possible to use the existing time domain criteria, which has already been widely accepted by clinical doctors and has been documented on the "American College of Cardiology Expert Consensus Document". This is different with other non-time domain methods that create new criteria which may be accepted by clinical professional only after a long term clinical testing.

Besides the novel method, a new parameter "VLP Index" is also induced in this thesis after careful discussion with clinical doctors. By applying this parameter, we can solve the problem of how to measure the variance of ventricular late potentials which is existing on most of the previous studies about detecting VLP variance.

The efficiency of this system is verified by experiments supervised by clinical professional and supported by results of both simulation signals and clinical signals with comments from medical doctors.