ABSTRACT

Background: Large cohort studies have revealed that subjects with atherosclerotic risk factors have high mortality. However, there has been no method to predict individual mortality based on these risk factors. Accordingly, we developed a computer model predicting the 10-year mortality of an individual with atherosclerotic risk factors.

Methods: We enrolled two different cohorts in Japan. One was from Tanushimaru-town and the other was from Uku-town. Residents over the age of 40 underwent baseline examinations and were followed-up for ten years. 1,851 subjects in Tanushimaru-town were randomly divided into 1,486 training samples and 365 test samples. We applied supervised statistical pattern recognition (SSPR) techniques to develop, using the training samples, a computer model to predict the 10-year mortality of an individual based on 6 conventional risk factors. The test samples were then used to evaluate the predictive accuracy.

Results: There were 49 deaths and 316 survivors in the test samples in Tanushimaru-town. The correctly simulated number of deaths and survival was 36 and 250, respectively. The predictive accuracy of death was 73.5% (36/49) and that of survival was 79.1% (250/316) with c-statistics of 0.827. In order to verify our model, we predicted death and survival for the other test samples (Uku-town, n=170). The predictive accuracy of death was 72.9% (35/48) and that of survival was 76.2% (93/122) with c-statistics of 0.848.

Conclusions: This is the first computer model to use SSPR methods to estimate individual 10-year mortality based on conventional risk factors with high accuracy.

Keywords: Risk factor, Atherosclerosis, Mortality, Statistical pattern recognition