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Change of radial pulse under thermal stresses

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Physiological responses of thermal stressed human occur mainly by autonomic nervous reaction (ANR) and those are reflected on radial pulse. This study aims to explore the effects of thermal stresses (TS) on radial pulse and investigate some indicators which can reflect ANR. 60 subjects aged from 20 to 29 were enrolled and both feet of subjects were immersed into 15°C water for cold stress (CS) and 40°C for heat stress (HS) with 2x2 crossover design. Radial pulse and respiration signal were recorded before the TS, during the TS for 5 minutes and immediately after the TS. Eight parameters to access the effects of TS were evaluated with adjusted mean of differences with Bonferroni correction. As a result, pulse power was increased and pulse depth was decreased under the CS, and subendocardial viability rate was increased under the HS. There were no significant differences of pulse rate under the three time thermal sequences, on the other hand, respiration rate was increased ($p<.05$) and pulse rate per respiration was significantly decreased under the CS ($p<.01$). It demonstrated the pulse rate per respiration was shown to be more appropriately associated with the ANR than the pulse rate or respiration rate alone under the TS. In addition, higher spectral energy region of pulse was represented to be a potential indicator for ANR during the TS. This clinical study shows that potential possibility of several parameters as simple indicators for ANR.

Biography

Jang-Han Bae completed a master's degree in Biomedical Engineering and he is taking a Doctorate course in the Department of Mechanical Engineering at KAIST. He has been developing pulse tonometric device at Korea Institute of Oriental Medicine since 2010. His research interest is pulse diagnosis using signal processing and diagnostic algorithm..

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