Stress biomarker candidates identified from serum proteins by proteomic analysis and their application

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We first focused on "stress-induced gastric ulcer" as a model of stress-related diseases, and developed a hydrolyzed pork meat (HPM), probably useful as a functional food, which can prevent the disease caused by excess stress. In order to identify stress-induced gastric ulcer-related biomarkers, we analyzed the serum proteins from HPM-fed and -unfed rats before and after stress treatment by proteomic approaches. Proteins from each serum were fluorescence-prelabeled and applied to two-dimensional difference image gel electrophoresis, and the protein spot volumes obtained were statistically analyzed by Decyder software program. Of over 2,000 protein spots detected, approximately 100 spots were 1.5-fold changed or more before and after stress treatment in a rat with stress-induced gastric ulcer. So far, we successfully identified several protein species of these stress marker candidates by MALDI-TOF/TOF-MS. When compared to the HPM-fed rat before and after stress treatment, some of the protein spots on the gel became obviously smaller in HPM-fed rat than HPM-unfed rat. These proteins may be useful as stress biomarkers for the evaluation of HPM as well as for diagnosis of gastric ulcer. Furthermore, to evaluate the usefulness of these markers for the detection of other stresses, the hard running test was conducted. The blood from three persons were taken before and after the hard running and the biomarker candidates detected from each serum by ELISA were compared between before and after the running. The results showed that some were quantitatively changed up or down in the sera by the running stress. These findings suggest that the stress marker candidates identified by this study could be applicable for the detection of several different stresses.

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