Assessing emotional states: metabonomic profiling and quantification of a salivary biomarker

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Different biomarkers used for assessing emotional states of individuals are documented in the literature.
Our study aims to monitor stress, cognitive (over)load and mental fatigue using non-invasive techniques. We consider the quantification of biomarkers, in particular free 3-Methoxy-4-hydroxyphenylglycol (MHPG) a Norepinephrine metabolite which salivary levels are directly correlated to plasma concentration and linked to different emotional states[1].
Recurrently, electrochemical detection (ECD) methods remain the first choice for catecholamines quantification. As a matter of fact, due to electroactive properties of these molecules, ECD offers a high sensitivity and selectivity when operating at physiological concentrations (ng/mL)[2].
The quantification of MHPG is operated using amperometric and fluorescence detection (FLR) coupled to UPLC separation. We assessed different kinds of column chemistries guiding to the best separation resolution of polar compounds found in oral fluid. We also compared several sample preparation methods to clean up the matrix and concentrate our analyte (SPE and SLE).
We developed a rapid and sensitive method for salivary free MHPG quantification with a LOQ of 7,2ng/mL and 6,4 ng/mL for ECD and FLR respectively on a 5-75 ng/mL linearity range. Physiological average concentrations are 12,4ng/mL for men and 13,5ng/mL for women.[3,4]
In parallel, we performed metabonomic profiling studies using ^{1}HNMR spectra of saliva samples, to assess the correlation between the fluctuation of emotional states and the variability of metabolites content of this biofluid. Samples were collected from subjects submitted to Trier Social Stress Test protocol to induce a psychosocial stress.
We applied multivariate analysis (Principal Component Analysis and Partial Least Square Discriminant Analysis) to compare subject's profiles evolution before and after the test.
Preliminary results showed a variation of the metabolomics profiles after the stress step of the test with a back to initial profile trend following the 30 minutes resting step.

We present here a double approach for emotional states assessment comprising a targeted method operating biomarker quantification and, in another hand, a metabolomic profiling based non-targeted method.

References

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