

Innovative biosensor array for key analyte monitoring in human sweat

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Abstract

Statement of the Problem: Stress markers monitoring has been proved to be useful in order to better understand the overall physiological state of an individual. Conventional techniques for monitoring such markers require long and complex analyses on blood samples, at the same time putting the patient in a state of discomfort due to the need of repeated blood samplings in a short amount of time. Thus, the attention has moved to less invasive monitoring procedures based on fluids excreted by the human bodies during normal biological activity.

Methodology & Theoretical Orientation: Sweat has been proven to contain various biomarkers which can be well-correlated with the overall physiological state of the individual. Furthermore, sweat is normally excreted during normal life activities as well during physical exercise. Since sweat quantities are overall small, a system has been designed to capture and convey it towards stretchable screen-printed electrode, produced using renewable green materials, ad-hoc modified with enzymes suitable for the detection and quantification of target analytes such as glucose, lactic acid, uric acid and dopamine.

Findings: Through amperometric measurements, amounts of target analytes in sweat have been quantified. The measurements have been performed firstly on simulated sweat media, then on real human sweat samples. Finally, the system has been applied to volunteers, to monitor target analytes released in sweat during physical exercise.

Conclusion & Significance: The proposed sensing array has proven useful for detection, quantification and monitoring of analytes related to physiological stress released in sweat. Possible applications of the system can be supposed for monitoring and increasing performances of sportsmen and monitoring health status of workers in dangerous or critical workplaces.

Biography:

Dr. Daniele Zappi achieved Master's Degree cum Laude in Analytical Chemistry in 2016 and obtained a PhD degree in Chemistry in 2019, both at University "La Sapienza" of Rome. Currently, he is a researcher at IC – CNR. His research focus is on the development of electrochemical and optical sensors and their optimization for analysis on complex matrixes..

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