Assessment of Cortisol in Human Saliva Using a Portable Measurement System - Nanosensor-Based Real-Time Monitoring

Master, Diplom

The steroid hormone cortisol as the end product of the Hypothalamic-Pituitary-Adrenal (HPA)-axis is a biomarker for the stress response in biopsychological research. A wide range of cortisol indices were associated with psychological outcomes and mental disorders [1, 2]. Normally, cortisol is measured in blood, saliva or hair and analysed after the sampling with an immunoassay or LC-MS/MS in the lab [3-5]. However, higher reliability/validity is expected when cortisol is measured via an ecological momentary assessment in daily life, but a corresponding platform is missing in previous literature. The chair of material sciences and nanotechnology (TUD) developed a portable multiplexes platform based on an array of nanowire sensors for label-free monitoring of daytime levels of cortisol in saliva. An effective quantification was achieved with specific DNA aptamer sequences as receptors to bring the complex target-receptor closer to the nanowire surface [6].

The student will:

- Get familiar with the label-free detection of (stress) hormones with nanomaterial-based sensor devices
- Understand the physiology of the human stress axis and implementation of portable multiplexed platforms
- Perform tests concerning the reliability and validity of the nanosensors
- Perform sensing experiments and biofunctionalization optimization experiments

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