Detection of oxytocin and vasopressin using biological nanopore

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Oxytocin and vasopressin are neuropeptides that are synthesized in the hypothalamus region of the brain. These peptides play a pivotal role in various physiological processes, including uterine contraction during childbirth, lactation, social bonding, regulation of peripheral fluid balance and blood pressure etc., as well as responsible for a plethora of neuropsychiatric functions [1]. This makes oxytocin and vasopressin highly promising targets for medical research and clinical diagnosis[2]. The levels of oxytocin in body fluids such as blood or cerebrospinal fluid are mostly measured using Enzyme-Linked ImmunoSorbent Assay (ELISA), which has high sensitivity but may induce cross-reactivity with other molecules. Recently, single-molecule nanopore sensing is emerging as a powerful tool for detecting biomolecules, including DNA and peptides[3]. In our research, we use a biological protein pore, aerolysin, to identify and quantify the oxytocin and vasopressin neuropeptides. By tuning the buffer condition, a strong electroosmotic flow was generated to capture these non-charged peptides. Our nanopore results showed that, oxytocin and vasopressin interact with the aerolysin nanopore differently which led to characteristic ionic current signatures. In the future, we expect to use such method for monitoring the level of certain neuropeptides in the body fluids.

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