A Ketone Detecting Patch using Perspiration to Detect Type 1 Diabetes

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What if type-1 diabetes could be cheaply and non-invasively detected? Untreated type-1 diabetics produce large amounts of ketones, which are not otherwise typically produced in the body. Tests for ketones that are currently on the market utilize urine or blood, which are invasive to obtain. The purpose of this project is to create a patch that uses sweat, which is easily obtained, to detect ketones. This was done by impregnating sodium nitroprusside (a ketone reactive chemical) into glass filter paper and monitoring ketone levels by color changes to the patch. For initial testing, a 0, 0.5, or 2 mmol/L concentration of ethyl acetoacetate was used to stimulate human sweat without/with ketones present. Human testing was done on people who had not engaged in vigorous activity but were still sweating (control group) and recent half-marathon/30k finishers (more likely to produce ketones). Commercially available urine ketone strips were used as a control while doing this testing. The urine strip and sweat patch gave the same result 100% of the time (ketones/no ketones), meeting the engineering goal of designing an accurate patch. Among the runners, 84.62% had ketones present and 15.38 did not, different but still similar to previous studies conducted on ketone presence in long-distance runners.

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