

A non-invasive diagnostics platform for measuring glucose levels in saliva

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Technology description

A non-invasive diagnostic platform for detecting glucose in saliva. #healthcare #diagnostictool #diabetes

BACKGROUND

The glucometer is currently the state of the art technology for at home glucose detection and is based on electrochemical analytics of blood samplings. Patients prick their finger and transfer blood onto the glucose test strip, which is then inserted into the glucometer. They receive a reading of their blood glucose level. This test requires the uncomfortable need to prick one's finger repeatedly, which is both invasive and inconvenient for many patients, particularly elderly people and children. Technology that would enable a non-invasive glucose diagnostic platform that is inexpensive, easy to use and readily available could offer a highly attractive alternative on the market.

ABSTRACT

Northwestern inventors have developed a library of nanocomposite materials using a novel one-step exfoliation method that is environmentally friendly and amenable to large-scale production, making it cost effective. From this library, a nanocomposite material that exhibits enhanced peroxidase-like catalytic activity is used to detect H_2O_2 , a key product in the oxidation reaction of glucose catalyzed by glucose oxidase. In combination, the nanocomposite material and glucose oxidase have been developed into a colorimetric method for detecting glucose concentration from saliva. This technology has the potential to disrupt the market for in vitro diagnostics by offering patients the first reliable and non-invasive platform for glucose detection without blood pricking. The inventors have created a test strip-based glucose sensor that is easily fabricated by inkjet printing the nanocomposite on paper. Glucose can be detected in any transparent fluid by dipping the test strip and observing a color change (or grayscale for color blind patients) on the strip (see figure). Based on the preliminary studies, the strip can detect glucose concentrations as low as 225 mg/dL with the naked eye, however efforts are underway to digitally quantify the color change to detect the targeted diabetic glucose level (130 mg/dL fasting, 180 mg/dL 2 hours after meal), given by American Diabetes Association. Also, in development is a smartphone-based attachment/module for more automated recognition that can monitor the glucose readings and/or send the results to a physician/clinic. The nanocomposite-based test strips show great potential in detecting glucose in body fluids such as saliva, tears, and sweat.

Given the established close correlation between glucose in blood and saliva, the strip is capable of detecting glucose in saliva with a level of sensitivity comparable to the glucometer.

Application area

Point-of-care glucose diagnostics e.g. in the clinic, at home, in developing countries

One-step fabrication method of nanocomposite materials

Inkjet printing of nanocomposite materials

H₂O₂ sensing in food security and environmental protection

Advantages

Easy to use

Convenient

Low-cost

Non-invasive

Institution

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