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ABSTRACTS ›

MICROFLUIDIC PAPER-BASED ANALYTICAL DEVICE FOR THE DETERMINATION OF SALIVARY CALCIUM

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The determination of salivary calcium concentration may anticipate potential problems or help to improve target therapies [1,2]. In fact, the concentration of calcium in saliva can be a symptom of cystic fibrosis or medication abuse. The concentration of calcium in saliva depends mainly on the pH and the salivary flow rate. A fast, non-evasive, disposable, on-the-moment test device available to be used in a routine consultation would facilitate the overall diagnostic.

Microfluidic paper-based analytical devices (μ PADs) have several benefits which make them ideally suited to conduct on-location analyte determinations. While many of the current monitoring techniques require specialised skills, laborious laboratory processes, or/and expensive equipment, μ PADs provide an avenue for very quickly and cheaply attain an analytical result. These μ PADs are composed of a hydrophilic zone, consisting of paper, and a hydrophobic zone that delimits them. The paper cellulose fibers enable liquids transportation by capillarity.

In this work, a novel approach was used to the design the hydrophilic/hydrophobic areas. The developed μ PAD was employed to determine the salivary calcium concentration as an economical and in-loco alternative. The method was based on the reaction between calcium and o-cresolphthalein complexone, generating a coloured complex, quantified through pixel readings [3]. The consumption of both reagents and sample is rather low, about 10 μ L. This feature, along with the intrinsic portability of the μ PADs, enabled to obtain a device suitable for regular monitoring at routine consultation to be used by unskilled operators.

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[1] Johan K.M.; Martens L. **2005**, *150*, 119-131.

[2] Preedy, V. (2015) *Calcium: chemistry, analysis, function and effects*. 1st ed., Cambridge: The Royal Society of Chemistry.

[3] Andres W. Martinez; Scott T. Philips; George M. Whitesides **2010**, *82*, 3-10.