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Development of a microfluidic paper-based analytical device for the determination of iodide

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Iodine is an oligoelement fundamental to produce the thyroid hormones, which makes it a key parameter to assess the health condition. The iodine intake will affect the fetal development and the regulation of the cell's metabolic activities as well as appropriate growth and development. When iodine levels are deficient, the synthesis of the thyroid hormones is diminished, causing development and functional abnormalities, also known as iodine deficiency disorders. The most common are goitre and swelling of the thyroid gland both in children and adult. Additionally, iodine deficiency during early childhood can cause irreversible deficits in cognitive development and during pregnancy it can lead to fetal death or cretinism, causing severe retardation both in mental and physical growth [1].

The World Health Organization (WHO) estimates that 285 million children and nearly 2 billion individuals worldwide have insufficient iodine intake, being different geographic areas susceptible to different levels of iodine intake deficiency it is considered a public health problem in more than 50 countries. Trying to prevent the previously mentioned iodine deficiency disorders, the WHO as well as the United Nations Children's Fund (UNICEF) and the International Council for the Control of Iodine Deficiency Disorders Global Network (ICCIDD) promote salt iodization. This approach was easily adopted due to the widely consume of salt by all population groups, the inexpensiveness and well established technologies for the iodization process together with a wide consumer acceptability, as none of the salt's properties are affected [1]. In spite of the benefits, there is also concern that due to population's efforts to reduce salt intake because of elevated blood pressure and hypertension, there may be an increase in iodine deficiency disorders.

In this work, we propose to develop a microfluidic paper-based analytical device (µPAD) to quantify the iodide in salt and iodized salt. A µPAD is a small microfluidic device that presents itself quite relevant in terms of its analytical capacity. It consists of a hydrophilic zone to carry out the chemical reaction, and an hydrophobic zone to be the physical barrier of the reaction. These devices can be produced in different ways and adapted to the target reaction and quantifications [2]. To quantify the iodide present in the sample, the reaction between iodide, peroxide and 3,3',5,5'-tetramethylbenzidine (TMB) was chosen, in which I^- catalyzes TMB to its blue oxidized form, in the presence of H_2O_2 [3].

Being the µPAD easily disposable, low-cost and user friendly, it represents a valuable tool for point-of-care analysis [2] and can be used by untrained personal at home.

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References

[1] N.J. Aburto, M. Abudou, V. Candeias, T. Wu, Effect and safety of salt iodization to prevent iodine deficiency disorders: a systematic review with meta-analyses, (2014).

[2] F.T.S.M. Ferreira, R.B.R. Mesquita, A.O.S.S. Rangel, Novel microfluidic paper-based analytical devices (µPADs) for the determination of nitrate and nitrite in human saliva, (2020).

[3] J. Lin, P. Ni, Y. Sun, Y. Wang, L. Wang, Z. Li, Highly sensitive colorimetric determination of biothiols based on I–-H2O2-3, 3', 5, 5'-tetramethylbenzidine system, (2018).