

Micro fluidic paper based analytical devices for point-of-care biochemical assays of chronic diseases biomarkers

Raquel B. R. Mesquita*, Francisca T. S. M. Ferreira, António O. S. S. Rangel

Universidade Católica Portuguesa, CBQF – Centro de Biotecnologia e Química Fina –
Laboratório Associado, Escola Superior de Biotecnologia, Porto, Portugal

[*rmesquita@ucp.pt](mailto:rmesquita@ucp.pt)

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The recent interest in on-hand, easy-to-use analytical methods has grown exponentially, and if used correctly, they can be an effective aid in healthcare, such as point-of-care testing (POCT). To attain an immediate, on-hand response, the use of low-cost, easy-to-use devices like microfluidic paper-based analytical devices (μ PADs) is a powerful tool. However, if a faster analysis results in a faster decision on the course of action, then it is crucial to have an accurate and reliable tool. The downscaling of the analytical procedure raises sample handling challenges, namely the reduced sample volume and matrix complexity, particularly when using biological fluids. The use of μ PADs as innovative diagnostic tools aims to combine microfluidic principles with paper substrates to offer simple, portable, and cost-effective solutions. The μ PADs do not require external pumps or power sources, and the colorimetric reactions performed directly on paper enable immediate visual detection. For accurate quantification of the biochemical parameters, the image of the coloured product can be scanned, and the colour intensity converted into absorbance units to attain precise quantification. These measurements then correlate with the concentration of the individual biomarkers, like glucose and urea, enabling real-time, quantitative analysis without complex equipment. These features make μ PADs ideal for point-of-care applications as easy-to-use and disposable devices, especially when developed targeting biological samples of non-invasive collection, namely saliva. The use of saliva as a biological sample for diagnosis and monitorization of health conditions is more convenient as it reduces patient discomfort compared to traditional blood sampling and it is also easier to handle in field settings, making it highly valuable for low-resource environments.

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