Development of sarcosine quantification in urine based on enzyme-coupled colorimetric method for prostate cancer diagnosis

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Published May 17, 2018

DOI https://doi.org/10.17179/excli2018-1245

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Abstract

An enzyme-coupled colorimetric assay for quantification of urinary sarcosine was developed. The proposed method is a specific reaction based on hydrogen peroxide (H_2O_2) formation via sarcosine oxidase (SOX). The liberated H_2O_2 reacts with Amplex Red in the presence of horseradish peroxidase (HRP) to produce the red-fluorescent oxidation product, resorufin, which can be measured spectrophotometrically (OD570). The method was performed in the 96-well microtiter plate. Reaction conditions, such as pH and reaction time were optimized. At the optimum conditions, the limit of detection (LOD) and quantification (LOQ) were found to be 0.7 and 1 µM, respectively. A good linearity was revealed with a coefficient of 0.990. The assay showed no significant interference from ascorbic acid, glucose and bilirubin. In addition, it is extremely specific for sarcosine rather than other amino acids. The determination of sarcosine in human urine displayed high accuracy and good reproducibility. This method is promising to differentiate prostate cancer patients from healthy subjects according to urinary sarcosine level. Altogether, this study provides a rapid, simple and specific tool to determine urinary sarcosine which could be useful for prostate cancer diagnosis.

How to Cite

Yamkamon, V., Phakdee, B., Yainoy, S., Suksrichawalit, T., Tatanandana, T., Sangkum, P., & Eiamphungporn, W. (2018). Development of sarcosine quantification in urine based on enzyme-coupled colorimetric method for prostate cancer diagnosis. *EXCLI Journal*, *17*, 467-478. https://doi.org/10.17179/excli2018-1245

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