

3rd European Food Safety & Standards Conference

October 24-25, 2016 Valencia, Spain

Analysis of glutathione and other low molecular weight antioxidants using colorimetric detection on smartphones

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Glutathione is a tri-peptide composed of cysteine, glutamic acid and glycine. Its level is discussed in wine and must be in connection with loss of aroma and browning. This low molecular weight antioxidant plays important role as a scavenger of free radicals and reactive oxygen compounds. Smartphones are commonly used devices that can serve as colorimetric detectors. We designed and made on three-dimensional printer as well holder for smartphone glutathione analysis. In this paper, we present smartphone as an analytical tool for the determination of glutathione. Other low-molecular weight antioxidant's influence was studied. On the paper target, low-molecular weight antioxidants were added to the samples of glutathione and finally 5, 5' dithiobis-(2-nitrobenzoic acid) (DTNB) reagent to form light yellow, yellow or orange drop. Red, green, blue (RGB) channel intensity data were evaluated in silico. The result was compared with standard Ellman spectrophotometric method. The picture analysis based on the camera in smartphone gave us promising results. The red and green channel intensity data were almost the same for all the range of concentration for glutathione. Blue channel intensity data decreased from the concentration 0 mmol/L to 16mmol/L of glutathione. The limit of detection (S/N=3) was 0.4 mmol/L for glutathione while 250 μ mol/L ascorbic acid or 150 μ mol/L Trolox had minimal influence on glutathione analysis. We can say that smartphone based method seems to be suitable for the glutathione analysis. The smartphones are widely spread in the population; the machine is portable that is why this assay can be carried out in the field or at home. There is low cost for the instrument equipment, the own manipulation is easy and fast. Other advantage of this method is robustness and reliability.

Biography

Irena Vobornikova is working as a Researcher at the University of Defense, Czech Republic. Her experience includes various programs, contributions and participation in different countries for diverse fields of study. Her research interests reflect in her wide range of publications in various national and international journals.

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