



Belgrade Food International Conference

Food, health and well being

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Belgrade Food International Conference

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Content:

- 1. Session 1: Enzymes in food processing**
- 2. Session 2: Wastes and biomass valorization**
- 3. Session 3: Supplements, micronutrients and food additives**
- 4. Session 4: Food antioxidants**
- 5. Session 5: Nutrition science and bioactive compounds**
- 6. Session 6: New approaches to food analysis**
- 7. Session 7: Food allergens**
- 8. Session 8: Nutrition and immunology**
- 9. Session 9: Molecular biotechnology for the benefit of consumers**
- 10. Session 10: New functional foods**
- 11. Session 11: Health effects of food**
- 12. List of poster presentations**

P 2.18. Comparative electrochemical determination of total antioxidant activity in breast milk with infant formula

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Human breast milk contains all of essential nutrients and is commonly known as best kind of nutrition for neonates. However, when mother is not able to breastfeed, infant formula is a good enough replacement, so that babies not only survive but thrive on it. The study aimed to consider the significance of breast milk and infant formula in preventing oxidative stress by electrochemical determination of total antioxidant potential, demonstrating the relationship between antioxidant capacity in milk and postnatal age. Human breast milk, UHT milk, and infant formulas supplemented with prebiotics were used. Milks were diluted in phosphate buffer solution and total antioxidant activity was potentiometrically measured using iodine/iodide redox couple with the Pt Fisher electrode as a working electrode and saturated calomel as reference electrode. Cyclic voltammograms and differential pulse voltammetry were recorded with GC electrode as working, an accessory platinum electrode and an Ag/AgCl reference electrode. Cyclic voltammograms were recorded for milk using oxidation potentials between -400 and +1000 mV versus Ag/AgCl electrode. Only one anodic peak was found in each milk sample, and no reduction wave was observed. The anodic peak potentials were located between 480 and 580 mV, suggesting that +200 mV should be a sufficiently high potential for a stationary electrode to oxidize the antioxidants in the samples. DP voltammograms were recorded between -100 and +700 mV, with anodic peak potential at +500 mV. Potentiometric measurements indicates that human breast milk has highest redox potential (250 mV), while skimmed UHT milk has very low (100 mV). Infant formulas have also high potential of 180mV. Plotting the derivative of the oxidant concentration with potential as a function of potential showed that all samples had a double-peak curve due to the presence of two major oxidizable components that are sequentially oxidized by iodine. A main advantage of the electrochemical methods used to assess total antioxidant activity in milk was that they directly monitored the electron donating ability of the compounds, and can be used for quantitative analysis of the total antioxidants in different types of milk.