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Development and validation of extraction procedures and quantitative determination methods of natural colorants obtained from agro-industrial waste materials using stepwise extraction techniques and high-performance liquid chromatography

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The manufacture of food products and dietary supplements using natural food colorants has been attracted attention in modern food industry. Carotenoids and anthocyanins as natural colorants show strong antioxidant and immunomodulation activities and may prevent degenerative diseases as well. The present research concerns the development of stepwise extraction procedures and HPLC analysis of carotenoids and anthocyanins containing agro-industrial waste materials (tangerine, orange peel and grape skin). Extractions were carried out in a dynamic supercritical fluid-carbon dioxide (SC-CO2) and ultrasound assisted extraction systems. The effects of operating pressure and temperature, extraction time, pH, flow rate of the SC-CO2, sample size and solvent nature used were investigated. The optimal conditions for extraction were found. The drying process of samples obtained from agro-industrial waste materials was studied as well. The main carotenoids-beta-carotene, lycopene and total anthocyanins obtained in organic extracts were quantified using new, rapid, effective and selective developed and validated HPLC methods. The HPLC methods were validated with respect to system suitability test, specificity, linearity-range, accuracy, precision, limit of detection (LOD) and quantitation (LOQ). The stability of solutions was studied as well. The calibration curves of developed HPLC methods are linear over a concentration range 0.08-6.50 μg/mL for beta-carotene (r^2=0.9992), 0.34-200.20 μg/mL for lycopene (r^2=0.9999); 0.04-80.50 μg/mL and 0.12-80.50 μg/mL for total anthocyanins expressed as cyanidine chloride (r^2=0.9999) and kuromanine chloride (r^2=0.9999); The average recovery equals to 106.8% for beta-carotene, 101.4% for lycopene, 95.62% for cyanidine chloride and 94.9% for kuromanine chloride.

Biography

Imeda Rubashvili is an Assistant Professor, a Scientific Researcher at Ivane Javakhishvili Tbilisi State University and the Head of Validation Department of Pharmaceutical Company "Aversi-Rational" Ltd. He has published more than 30 scientific papers and participated in more than 30 international scientific conferences. He is the Member of the Council of Young Scientists of the Georgian National Academy of Sciences.

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