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Editorial

Special Issue on the Application of Analytical Chemistry in Pharmaceutical and Biomedicine

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Pharmaceutical and biomedical products that are developed for therapeutic use are either synthesized in the laboratory or naturally derived from living sources. Different analytical techniques are frequently developed for the determination of active ingredients of medication and pharmaceutical products to increase their therapeutic efficacy. These techniques include the quantification of active pharmaceutical ingredients in bulk drugs and intermediates, pharmaceutical products and formulations, and biological tissue and fluids. Some validated assays have also been developed for the qualitative and quantitative analysis of their ingredients/residues in environmental samples for different purposes such as wastewater management and forensic application. Despite the availability of diverse instrument techniques, developing precise and reliable methods faces several difficulties, which include choosing the best sample preparation procedure for separating analytes of interest from the matrix and selecting analytical tools for identifying the target compounds based on their physicochemical characteristics. Recently, several cutting-edge approaches have been utilized to not only improve the sensitivity and selectivity of the method used but also reduce the use of hazardous solvents or replace them with more environmentally friendly alternatives.

This Special Issue gathers and presents studies on all novel techniques developed for the precise and accurate determination of analytes considering current challenges and limitations.

All eight research contributions covering numerous analytical and biological techniques, including computational studies, involve both in vitro and in vivo applications. Zebryk et al. performed a correlation study between vitamin D3 Levels and systemic sclerosis concerning disease duration, patient age, joints, and heart conditions in Polish patients [1]. Ghabbour et al. synthesized, characterized, and determined the X-ray structure of tetraphenylborate salt of clonidine. The interaction strength and type of complexes were analyzed by conducting computational studies [2]. Wani et al. described the spectrofluorometric method along with a computation approach for studying the binding interaction of flavonoids (rutin, sinapic acid, and naringenin) with serum albumin in order to investigate its possible impact on the pharmacokinetics of erlotinib (tyrosine kinase inhibitor (TKI)) in cancer patients [3]. Iqbal et al. reported a sensitive UPLC-MS/MS method for the quantitative analysis of 5-aminoisoquinoline (a PARP-1 inhibitor) in biological fluids and established its in silico ADME profile and in vitro stability [4]. Similarly, Ali et al. established a precise and eco-friendly approach for the determination of a novel TKI (erdafitinib) in human plasma samples through a validated UPLC-MS/MS method, and the developed assay was further applied in metabolic stability studies [5]. Rogozinska et al. investigated the antioxidant activity of the main metabolites of chlorogenic acid (ferulic, caffeic, dihydroferulic, and dihydrocaffeic acids) by synthesizing them in the laboratory, and they were characterized via LC-MS/MS analysis [6]. Sobolewska et al. reported a post-column derivative HPLC-based fluorescence detection method for the quantitative analysis of a new boronic acid derivative, which is clinically developed as an anticancer agent [7]. Fernández-González et al. explored the feasibility of the attenuated total reflectance–Fourier transform

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infrared spectroscopy (ATR-FTIR) method for identifying ABO blood types and reported that this approach predicts the blood type to a greater extent than random process [8].

Although submissions are no longer accepted for this Special Issue, more investigation in the field of biopharmaceutical analysis is required to continue the research efforts in addressing the challenges and limitations of sample extraction and quantification.

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