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Fast methods for the detection of adulterations and counterfeits in food supplements: their development and validation

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ABSTRACT

In the last years, the consumption of dietary supplements, in particular those containing botanicals, has increased significantly due to the common believe that they are natural and safe. Adulterants may be intentionally added to food supplements to increase product effectiveness or to reduce manufacturing costs. Food supplements for body weight reduction or for athletes are the products most frequently involved in illicit additions. The control of adulterations and counterfeits requires suitable methods, capable to identify and quantify illicit additions in samples characterized by complex matrixes. In the first step of analysis simple methods are necessary for a fast screening of different groups of molecules and High Performance Thin Layer Chromatography (HPTLC) is a technique suitable for this purpose. When positive detections are obtained at screening, more advanced techniques (e.g. High-Performance Liquid Chromatography with different detectors including mass spectrometer) can be used to confirm and quantify the illicit additions. The aim of this work was to set up different analytical approaches to detect adulterants in food supplements. Two HPTLC methods, for the detection of active amines and steroid hormones, were validated and applied for the screening of different food supplements, suspected for a possible illicit adulteration. The positive samples were further investigated and the presence of adulterants was confirmed by mass spectrometry analysis. HPTLC showed good performances as a fast and simple method for the detection of potential adulterants in food supplements. This screening technique is a useful tool for laboratories involved in food control to perform rapid and relatively cheap identifications of several classes of adulterants. The use of more expensive and sensitive techniques, such as HPLC coupled with different detectors, can be limited only to the positive samples, allowing wider control of the market by public institutions.