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Interest of Raman spectroscopy for the detection and analysis of poor-quality medicines

Access to quality medicines is an essential right of the patients. However, in 2017, the World Health Organization estimated that 1 in 10 medical products circulating in low- and middle-income countries is either substandard or falsified. This reinforces the fact that post-marketing surveillance (PMS) of medical products by strong national regulatory authorities (NRA) is crucial. To achieve an efficient PMS, the NRA need analytical tools at the inspection, screening, confirmatory and forensics levels to control the physicochemical properties of the samples.

Among the analytical tools available, Raman spectroscopy is particularly interesting because of its spectral specificity and the wide variety of acquisition modes available. Handheld devices may be used directly on the field to confirm the presence of a specific active pharmaceutical ingredient (API) in a formulation [1]. Thanks to databases of pure ingredients, it is also possible to identify the compound present when a wrong API is present [2]. Recent developments have extended the applicability of handheld devices to the analysis of fluorescent chemicals and the analysis through barriers [3]. The detection of substandard medicines is also made possible with the construction of regression chemometrics models [4].

Benchtop systems and among them imaging systems are particularly useful in the confirmatory and forensic steps. Indeed, the imaging systems enable the visualization and identification of a large range of both organic and inorganic compounds used as API or excipients [5]. In addition, thanks to the high spatial resolution, it allows the detection of trace contaminants. This information may be of particular interest during prosecutions and the clustering of criminal cases. Nevertheless, the extraction of the relevant information from the raw measurements requires once again intensive work by highly trained staff.

In conclusion, Raman spectroscopy have particularly interesting features for the PMS of medicines.

References

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