USING VIDEO SPECTRAL COMPARATOR TO DETECTION COUNTERFEIT MEDICINES: THE VIAGRA® AND CIALIS® EXAMPLES

Ortiz R.S.[1,*]; Limberger R.P.[2]; Mayorga P.[3]

[1]Setor Técnico-Científico, Superintendência de Polícia Federal no Rio Grande do Sul; [2] Laboratório de Toxicologia, Faculdade de Farmácia, UFRGS; [3] Laboratório de Desenvolvimento Galênico, Faculdade de Farmácia, UFRGS.
***Doutorando – Início: 2009/2**

Introduction: Counterfeit medicines are drugs that have "been deliberately and fraudulently mislabeled with respect to identity and/or source". It is estimated that 10% of the global pharmaceutical market is counterfeit. In Brazil, Viagra and Cialis, coated tablets of sildenafil and tadalafil, respectively, are the most counterfeited medicines. The counterfeit verification of such medicines is carried out by different advanced techniques. It is known that the interaction of light with matter is quantized, so a study of the radiation frequencies emitted or absorbed can characterize a material. The video spectral comparator – VSC – is equipped with light sources and filters of different wavelengths, being able to acquire and perform a comparison of spectra of electromagnetic radiation.
Objective: The present work proposed to develop a new analytical methodology, using a VSC, to quickly distinguish fake and genuine coated tablets of Viagra and Cialis.
Materials and Methods: Fake (n=57) and authentic (n=12) tablets were used as sample. A VSC 5000 (Foster & Freeman Ltd., UK), employing optical amplification of 20 times was used. Scans were performed between 400 nm and 1000 nm, at one point for each tablet. Were employed reflectance, absorption, transmittance, infrared fluorescence and visible fluorescence (after irradiation at 254 nm and 365 nm), in order to test the abilities to differentiate between fake or authentic tablets. Images were obtained from samples analyzed.
Results and Discussion: Using VSC all fake samples could be identified due to the differences displayed in their spectral data compared with those of standard tablets. The absorption, reflectance and infrared fluorescence spectra exhibited greater ability to distinguish authentic or fake tablets of Viagra and Cialis. Fluorescence was found in Viagra counterfeit tablets and it was not observed in the authentics. This divergence in the behavior of the coating opposite the radiation can be easily perceived in the visual comparison of images and spectra obtained under the conditions considered ideal for the detection of counterfeits.
The pharmaceutical industry applies high technologies in the coating process and a rigid quality control that discard any tablet with physical imperfections. The coating is characterized by homogeneity, color and brightness peculiar to each coated tablet. The uses of substances, concentrations or methods different from those standardized by industry in the production of batches of tablets originate coatings different from those in authentic tablets. Therefore, inauthentic coatings, yet visually mimics the true, will display differences with regard to interaction with electromagnetic radiation, enabling the differentiation between genuine and counterfeit medicines.
Conclusions: A rapid, reliable and without sample preparation method was employed in the detection of counterfeit Viagra and Cialis. This is the first study that used a VSC in medicine analyses. This technique can easily differentiate genuine from counterfeit tablets and showed promising to be used in routine analysis.