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Production of biodegradable pcl/olanzapine rods for potential application in treatment of schizophrenia

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Schizophrenia, which expresses the modern notion of human insanity, is a complex chronic clinical syndrome conditioned to the pathology of mental functioning. The treatment is carried out with the administration of antipsychotics, which promote significant improvements in the symptoms of the disease. Olanzapine (OLZ), a second-generation antipsychotic drug, belongs to the class of thienobenzodiazepines, and has been indicated for treating schizophrenia. Which presents low solubility in water, and, due to the effects of the first passage in the organism, it is necessary to administer high daily doses of this medication. Success in treating the disease is strongly associated with patient adherence to treatment. The number of patients who abandon therapy for schizophrenia is very high, ranging from 50 to 75% after 1-2 years. According to literature, non-adherence increases the risk of relapse, suicide, and rehospitalization. Therefore is essential for patients to respond satisfactorily to treatment. New controlled-release systems have become an alternative to these problems. Among them, the development of subcutaneous implants to release the drug can potentially increase bioavailability and avoid issues related to non-adherence to treatment. The implantable pharmaceutical systems consist of depositing drugs in the patient's subcutaneous tissue through minor surgery, using a polymeric matrix or silicone. Polycaprolactone (PCL), a bioabsorbable, biodegradable, and biocompatible, has found application in biomaterials production. This work aimed to produce PCL/OLZ rods through hot extrusion. The accurate OLZ percentage inside the rod was determined using visible ultraviolet spectrometry (UV-VIS). According to UV-Vis results, 1g of the rod has 0.03mg of OLA. Scanning electronic microscopy (SEM) analyses showed granules of the OLZ homogeneously scattered on the surface. Thermogravimetric analysis (TGA) and differential exploratory calorimetry (DSC) showed that hot-melting extrusion did not degrade or modify the OLZ's thermal behavior. However, small changes have occurred in the PCL's degradation profile when added to OLZ, revealing that this drug can alter the polymer's thermal characteristics. Dissolution tests, realized in four days, were performed in a Distek Evolution dissolution test system (model 6300). The rod released 4.28% of OLZ present in the rod. Therefore, according to analysis, there is an indication that the rod composed of PCL/OLZ has potential applications for treating schizophrenia, promoting the controlled release of the drug.