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Biodegradable active substances release systems

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Many of the modern drugs developed to combat various diseases cannot be easily used in postoperative treatment due to difficulties in achieving therapeutic concentrations of active agents in the injured areas. This problem is particularly acute in places with limited access, such as the urinary tract, brain, or paranasal sinuses. In order to meet the needs of both patients and doctors, a biodegradable polyurethane-based implant and hydrogel agar-based coating were developed to be placed in the right place during surgery. Combination of modeling, mechanical (bending, compression), structural (FTIR), thermal (DSC, MFR), surface (contact angle), microscopic (optical), degradation (2 M HCl, 5 M NaOH and 0.01 M PBS) analysis, release of the active substance and cell viability (MTT) allowed to assess the suitability of the developed material for the production of implants. Obtained polyurethanes were characterized with high mechanical strength (σ>20 MPa), optimal biodegradability (>10 wt.% mass loss in 56 days), high release of hydrocortisone (up to solubility limit) and biocompatibility (>80% cell viability). The synthesized hydrogel coatings were also characterized with antimicrobial properties. However, before being used in clinical trials on humans, the developed materials must be first tested on animals to assess its impact on a living organisms.