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Drug photosensitivity disorders are common side effects for many drugs of both over-the-counter and prescription drug families. Phototoxicity is one type of the photosensitivity disorders, which arises because of reactive oxygen species and radicals formation in different drug photodegradation mechanisms.

This thesis focuses on the studies of photodegradation mechanisms of the non-steroidal anti-inflammatory drugs (NSAIDs): ketoprofen, ibuprofen, flurbiprofen, naproxen, the active form of nabumetone, diclofenac and its main photoproduct, suprofen and tiaaprofenic acid. In addition, photodegradation mechanisms of naphazoline, which is used in eye and nasal medications, as well as the antibiotic drugs norfloxacin and lomefloxacin were studied. Based on the obtained results from the NSAIDs studies, new non-steroidal anti-inflammatory molecules were computationally designed and investigated for their photodegradation, activity and selectivity towards their target isoforms of the cyclooxygenase enzyme.