Widely used disinfectants and antiseptics aim to destroy microorganisms from usable surfaces and objects, as well as mucous membranes, skin or wounds, respectively. The widespread availability of commercial products containing these active substances unfortunately results in a lack of control over their distribution and proper use, and consequently also in their low concentrations entering the environment with hospital wastewater, after disinfection of clinics and medical equipment, also with wastewater from industrial halls after completed disinfection cycles of production lines and with waste in the form of dressings in home use, or during hand washing and disinfection, which after the COVID-19 pandemic has become a much more common practice among people.

The very well-known phenomenon of antibiotic resistance among bacteria, emerged as a result of exposure of pathogens to low concentrations of drugs, so that bacteria, thanks to their ability to mutate and transmit traits to each other via genetic material, developed mechanisms that allowed them to survive despite the presence of substances designed to get rid of them. As time went on, this began to become more of a problem, both in human and veterinary medicine, with fewer and fewer drugs becoming effective against pathogens, so diseases began to take increasingly severe forms, and treatment times increased significantly.

A key role in the formation and spread of multidrug-resistant bacteria is played by the mucosal structure that clusters of bacteria produce, called a biofilm. It allows bacteria to function as one larger organism, regulating their response to unfavorable environmental conditions, or allowing deeper layers to be alerted by signaling molecules about the presence of antibacterial substances in the environment, resulting in mutational changes and the acquisition of resistance. The components of which this mucus is composed also provide a physical barrier to substances aimed at eradicating them. Drugs used for infections, which in theory have the ability to kill pathogens, ultimately do not harm them, as they are unable to enter the bacterial cells where they could act. The same goes for the immune system of both humans and animals, bacteria surrounded by mucus effectively hide from the host's immune cells, so the organism can't see them and can't fight them.

In the case of disinfectants and antiseptics, there are already reports of the occurrence of an analogous phenomenon, where low concentrations of active substances in the environment are as much the main reason for its appearance as the ability of bacteria to produce biofilm. Unfortunately, there are few studies on the subject and they mainly focus on bacteria taken only from humans, making it impossible to determine the scale of the problem we are currently facing, given the wide spectrum of use of these agents in other areas.

The goal of this project is to determine the effect of active substances contained in the most commonly used disinfectants in veterinary medicine on the biofilm structure of Pseudomonas aeruginosa bacteria from samples obtained from animals. We will study the effect of both minimum pathogen-inhibiting concentrations and particle and concentrated concentrations on the bacteria's ability to form a biofilm and on its formed structure. We suspect that instead of leading to the death of the microorganisms, we will cause their increased multiplication and increased biofilm production. which will confirm our concerns about the emergence of resistance.