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Photoinactivation of *Escherichia coli* with pheomelanin nanoparticles and a chelant agent.

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Photodynamic inactivation is an effective method to inhibit pathogenic microorganisms. It is based on the excitation of a photosensitizer molecule (PS) with UV-Vis radiation to produce reactive oxygen species (ROS), which eventually produce cell death. In the last decades, many studies have been carried out with different PS to suppress the growth of bacteria, fungi, viruses, and malignant tumours. Here, our main motivation is to employ pheomelanin nanoparticles as sensitizers to inhibit the growth of *E. coli* bacteria after the exposure to blue and UV-A radiation. We synthesized pheomelanin nanoparticles using an oxidation process. We carried out experiments at different particle concentrations and different energy fluences. We found that cultures exposed to UV-A at 166 μg/mL and 270 J/cm^2, previously treated with the chelant agent EDTA, decreased in colony-forming units (CFU) as much as 5log10. Different reactive oxygen species were detected using two methods. Our results suggest that photosensitization using pheomelanin nanoparticles is a potential agent against *E. coli*, which could encourage further investigations in other type of bacteria.