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Application of phthalocyanines in blood sterilization

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The therapeutic properties of light have been known for thousands of years but it was only in the last century that anti microbial photodynamic therapy (aPDT) was developed. aPDT involves interaction between light and a chemical dye or photosensitizer in the presence of molecular oxygen. This interaction produces reactive oxygen species (ROS) which cause oxidative damage of microbial vital molecules. The medical importance of blood combined to the advent of the AIDS epidemic and other infectious diseases led to an improved pathogen screening techniques for donated blood. However, due to the "window" periods where infective agents cannot be detected, the ability to disinfect blood and its derivatives has assumed great importance. Whereas conventional disinfection techniques (solvent-detergent treatment or ultra-violet irradiation) may be employed in plasma or protein concentrates, the collateral damage associated with such treatments disallows their use with cellular fractions. The aim of this study was to evaluate the suitability of the phthalocyanines to disinfect blood products and blood derivatives. The blood products (plasma and complete blood) were infected with 108 colony forming units (CFU)/mL of Escherichia coli and exposed to red light at 150 Wm-2 during 270 min. The *E. coli* reduction was determinate at 0, 30, 60, 90, 180 and 270 min and compared with that of light (irradiated in the absence of phthalocyanine) and dark (incubated with phthalocyanine but non-irradiated) controls. The results showed that the phthalocyanine decreased the *E. coli* concentration in plasma and blood by 3 log CFU/mL after 270 min of exposure. The effect of the aPDT treatment on blood cells (red and white blood cells) was also evaluated. The numbers of red and white blood cells after treatment were similar to those of the controls. The effective reduction of *E. coli* and the absence of effect on red and white blood cells demonstrated that is possible the utilization of phthalocyanines in blood products disinfection process.

Biography

Adelaide Almeida is an Assistant Professor at the Department of Biology from the University of Aveiro (Portugal), where she got her PhD degree in 2001. She is an Integrated Member of the Associated Laboratory Centre for Environmental and Marine Sciences (CESAM). In the previous years, she was involved in the development and application of alternative methods to the use of antibiotics such as photo dynamic therapy and phage therapy and has publications in these fields.

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