

Photodynamic therapy of viral contaminants with potential for blood banking applications

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A photodynamic method has been evaluated as a means of eradicating viral contaminants with the potential for rendering blood safe for transfusion. Herpes simplex virus type 1 (HSV-1) was tested under flowing conditions in culture media or in blood supplemented with the virus. Hematoporphyrin derivative was used as the sensitizer and was photoactivated with visible light at 630 nm and 5 J/cm². HSV-1 in suspension both in culture medium as well as in blood was shown to be killed. The human immunodeficiency virus was also found to be photoinactivated in flowing cell culture medium and, thus, potentially may be inactivated in blood. These findings extend our previous studies which demonstrated that enveloped viruses can be photoinactivated with hematoporphyrin derivative in a static fluid system. Analysis of blood cell number, red cell lysis, plasma proteins, and other standard hematological tests showed no significant change. The possibility that transfusion-associated acquired immunodeficiency syndrome (AIDS) may result from a blood unit infected with human immunodeficiency virus that tested negative makes it imperative that a safe and effective means of viral killing be developed. The system reported here offers promise as an effective approach to this problem.