Potential In Vivo UVC Disinfection of Catheter Lumens: Estimation of the Doses Received by the Blood Flow Outside the Catheter Tip Hole - DTU Orbit (10/12/2018)

Potential In Vivo UVC Disinfection of Catheter Lumens: Estimation of the Doses Received by the Blood Flow Outside the Catheter Tip Hole

We have demonstrated that it is possible to launch UVC LED light into bacterial contaminated polymer tubes/catheters and disinfect the intraluminal space of these tubes. This can be achieved by UVC treatment of the catheters on a regular basis. Catheters are in the distal end equipped with an exit hole for administration of drugs, bloods or nutrients into the bloodstream. Even if the UVC light is strongly attenuated during its propagation through the catheter tube a fraction of the UVC launched into the catheter will escape through the exit hole and irradiate the blood. We demonstrate by calculations that very small effective doses are exposed to the blood (ca 10^{-4} J m^{-2}). This dosage level is very low compared with UVC doses reported from other therapeutic applications. The very short residence time of the blood constituents in the irradiated volume in front of the exit hole is the main reason why the UVC exposure to the blood in the catheter application is so low. The very low dose received by the blood through the catheter tip indicated that possible side effects are negligible and makes the UV disinfection technique feasible in a clinical setting.

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