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A microbiologically sensitive “intelligent” burns dressing concept

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Rationale: Infection is the single largest contributor to increased morbidity and mortality in burns patients. Infection can often be difficult to diagnose against the background of generalised trauma. The problem of infection diagnosis, and its consequences can be particularly acute in young children, where infection of even small, partial thickness burns can lead to rapid clinical deterioration [1]. The rationale of the work presented here is to produce a prototype dressing which is sensitive to the microbiological environment of the burn by sensing the presence of pathogenic bacteria in the wound exudate.

Methods: The prototype dressing to be discussed here incorporates lipid based “nanocapsules” into a dressing material. The nanocapsules part mimic the eukaryotic outer cell membrane, in that they are substrates for lytic enzymes such as phospholipases and pore-forming toxins such as haemolysin, secreted by key target bacteria including *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Interaction of such toxic bacteria (but not non-toxic, controls) causes the destruction of the nanocapsules and release of their contents which may be an antimicrobial or a colorimetric dye [2].

Results: will be presented which show microscopy images of such nanocapsules on non-woven dressing material and gels, the prevention of bacterial growth on such dressings and results from colorimetric assays which show a simple detection” on/off” response following inoculation of dressings with pathogenic bacteria.

Conclusions: This approach to microbiological sensing/response is intended to be a generic technology which could be incorporated into existing burn dressing systems or into a unique dressing which would combine antimicrobial release following infection, indication of infection and promotion of wound healing. Current plans are to commence in-vivo testing on animal models within three years.

References:

- [1] White MC, Thornton K, Young AE. *Burns* 2005; 31:193-7.
- [2] Jenkins, A.T.A., Young, A.E.R., *Expert Rev Anti-Infective Ther* 2010; 8:1063-5.