A skin chamber to investigate wound infection and healing in the mouse

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Introduction

The availability of genetically defined mouse strains, plus the abundance of bio-markers and reagents for experimentation adds to the value of mice as an in-vivo research tool to study wound infection and healing. A simple and reliable full thickness murine skin chamber is described which is suitable for use in mice with normal or depressed immune function. We will use it to assess the ability of polyclonal antibodies to provide passive immune protection from Pseudomonas aeruginosa infection, & to assess the effects of bacterial products on wound healing.

Chamber design

The chamber components are polypropylene & stainless steel & can be sterilised by autoclaving. The assembled device weighs 1.8 grams & has a capacity of 400µl. The flanges on the chamber body provide anchorage for sutures, which are protected by the o-ring that is secured by the circlip (Fig 1).

Chamber insertion & sampling

After anaesthesia with Nembutal™, a 10mm incision over the thorax is made through the epidermis and the flanges of the chamber inserted beneath the skin and seated on top of the muscle fascia. The skin layer is repositioned over the chamber flanges and secured with four sutures. The o-ring is then placed on top of the skin and secured with a circlip (Fig 2). When sampling from the chamber, mice are anaesthetised with Halothane and the cap unscrewed allowing access to the interior of the chamber to remove samples or to inoculate with bacteria.

Results

All of the chambers remained in place for at least 15 days in normal and in immuno-compromised mice (Fig 4). When chambers on normal mice were inoculated with 1000 colony forming units (cfu) of a clinical strain of P.aeruginosa all remained in place for a minimum of 10 days, and the mice showed no clinical signs of infection. However, when chambers on immuno-suppressed mice were inoculated with the same organism, the mice became moribund and were euthanased after 3-5 days (Fig 5).

Conclusion and applications

The results show that the chamber can be used in a variety of applications including bacterial infections for a period of up to 10 days post insertion. This device will be a useful tool to investigate many aspects of immunity, infection and healing at the skin surface. The main advantage of its design is that it permits repeated sampling, whilst containing the lesion and excluding environmental contamination. Finally, this chamber should also have potential for the assessment of therapeutic agents.

References


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