

The Skin Tunnel

A Device for Keeping Substances in Contact with the Skin

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In experiments designed to assess the importance of smegma and phimosis in the genesis of penile carcinoma, the following method of skin surgery was used: A buried skin tunnel was made and the substances to be tested were placed in this so as to be in contact with two opposing skin surfaces for a long, continuous period. This was done to imitate the condition which occurs when smegma is retained under the foreskin.

Mice about 4 weeks old were used. The skin tunnel was made on the back. The mouse was anesthetized with ether and the skin of the back shaved with a fine razor. Two parallel incisions, on either side of the midline, and about 1.5 cm. apart, were made with scissors through the skin from the pelvic to the scapular region. We then converted the central skin area into a tube by bringing its edges together with interrupted sutures of fine silk, using a small curved cutting needle and a small hemostat as a needle holder. Finally the outer skin edges were approximated over this with similar sutures so as to bury the tunnel completely. Sterile instruments were used, but no aseptic precautions were taken considering the well known resistance of mice. The operation can be completed in a few minutes. Hemorrhage was slight, for the only two vessels of importance, which are on the shoulder blades, can be avoided by not prolonging the incisions too far forward.

Healing was generally complete in 2 to 3 weeks. A probe then was passed through the tunnel. Our experimental material, which happened to be semisolid, was packed into the tunnel by inserting the nozzle of a small syringe, without a needle, into the caudad opening and forcing in the material. However, the technic for depositing material to be tested in the skin tunnel will naturally vary somewhat, according to the char-

acter of the experiment. It was not found practicable to close the cephalad opening, but this was made narrower by having the original incisions converge slightly toward their cephalad ends.

ADVANTAGES AND DISADVANTAGES OF THE METHOD

The pocket can be refilled repeatedly, and substances can thus be kept in contact with the same small skin area over long periods. The disadvantages are: (a) Growth of hair inside the pocket, which may prevent close contact. Attempts at making pockets out of the hairless skin of ear or tail were unsuccessful, and hairless mice are too delicate and too difficult to breed. (b) The pockets shrink considerably after completion, and continue to do so; this has been noted also with similar skin surgery in man. (c) If the substance used is infected, and there is any injury, the abscesses and ulcers which tend to form cause the pocket to slough off. (d) In spite of continued practice it has not been found possible to obtain 100 per cent of successes with a first operation; the average for 400 animals was 47 per cent, although in individual batches of from 6 to 10 animals 70, 80, and even an occasional 100 per cent has been achieved. A second operation was often successful when the first failed.

POSSIBLE APPLICATIONS OF THE METHOD

The method, developed originally by surgeons to form a skin and muscle tunnel through which tendons or attachments of artificial limbs can be passed, is applicable to all carcinogens acting on the skin, and could be used for substances in pellet form and in weighed or measured doses. Radium, too, might be applied in this manner.