

DEVELOPMENT OF AN EPIDERMAL MICROCOLONY ASSAY SYSTEM FOR MEASUREMENT OF RADIOSENSITIVITY IN THE PIG SKIN

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Purpose: To develop an accurate and quantitative measurement technique of the pig epidermal microcolonies as an ideal model system for radiation research on the skin.

Materials and Methods: White male pigs weighing about 30 kg were kept in a separate cage indoors and quarantined for at least 2 weeks before irradiation. All animals were tattooed on the left flank with Indian ink at size of 4 × 4 cm and a gap of 5 cm between the fields. Prior to irradiation the animals were anaesthetized with a gas mixture. Radiation dose was given at 22.5, 25.0 and 27.5 Gy using 3 MeV electrons. At 14 days after irradiation, a chromometer was used to determine the degree of erythema, the skin samples were taken on the next day after erythema reached the maximum. Only 2 × 2 cm skin samples were cutted, fixed, hydrolysed, stained, connective tissues removed, epidermal sheets prepared and mounted for final colony counting under the microscope. Furthermore, a dose-response curve and D₀ value were obtained.

Results: The maximum ΔE value were between 5 to 8, this peak value only lasts for about 2 days. Normally the maximum ΔE value appeared between days 18 to 21. The pattern of the present epidermal microcolonies appears to have dark nuclear stain, regular and compact cellular arrangement with few mitotic cells, which forms strong contrast to the surrounding cells. The D₀ value deduced from the surviving curve was 3.05 ± 0.38 Gy.

Conclusions: The importance of pig skin in radiation research is known for many years by many experts. However, the development of an optimal assay system has to rely on the best combination of the accuracy of radiation dose delivery, optimal sampling time, skin fixation, staining and epidermal sheet separation etc. The present results proved its superiority and applicability in terms of the assay technique. We believe that this technique will draw much attention to the people who study early and late radiation injury on the skin.

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Key words : Pig skin, Epidermal microcolony, Radiation