

Wound healing in diabetic Ossabaw pigs

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Background and Hypothesis: Wound healing drugs are effective in mouse models of diabetes, but have not been tested in diabetic swine, whose skin more closely mimics that of humans. The primary objective was to test the wound healing efficacy of lipid nanoparticles in diabetic Ossabaw miniature swine.

Experimental Design and Project Methods: Diabetes was induced in four Ossabaw miniature swine by ablation of the insulin-producing pancreatic beta cells and 5 months later the pigs received 8 surgically-induced skin wounds. EXCEDE was given at the time of surgery to prevent systemic infections for the first week of wound healing. Wounds were treated with drug-loaded nanoparticles in a hydrogel, an unmodified hydrogel, Promogran Prisma Matrix, or control phosphate-buffered saline (PBS). Photos were taken weekly to compare wound closure and complete skin thickness biopsies were taken for histological assessment.

Results: Severe diabetes was verified with plasma glucose of 357 ± 15 mg/dL (mean \pm SE; n=3), while 1 pig was mildly diabetic (147 ± 18 mg/dL). All pigs exhibited glucosuria. Normal body weight was maintained to mimic human diabetics with poor glycemic control. Complete blood counts confirmed the absence of systemic infection throughout the study. After two weeks, the percent closure by treatment was $53 \pm 4\%$ for Prisma, $48 \pm 7\%$ for the hydrogel, $47 \pm 5\%$ for the lipid nanoparticles, and $59 \pm 4\%$ for PBS.

Conclusion and Potential Impact: The data currently suggest no differences in medication efficacy, but data collection at longer durations of healing is not finished. Beneficial drug effects also may be seen on the composition (histology) of the healed skin, which has not yet been assessed.