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Improving wound healing outcomes through science, education, and communication

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# A MODIFIED COLLAGEN GEL IMPROVES ACUTE PHASE INFLAMMATION AND RESOLUTION RESPONSE IN WOUND HEALING

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**Introduction:** Our previous work has demonstrated improved wound healing outcomes in excisional and ischemic porcine wounds following the use of modified collagen gel (MCG) dressing. These studies demonstrated that MCG dressed wounds had greater infiltration of inflammatory cells in the early inflammatory phase followed by timely and efficient resolution. The objective of the current work was to understand the mechanism of action of MCG on the host wound inflammatory cells in early and late inflammatory phase. Polyvinyl alcohol (PVA) sponges containing either MCG or saline were implanted on the dorsal side of mice. Inflammatory wound cells were harvested on d1 and 3 (early) or d7 (late) phase. Flow cytometry data shows that at d3 post wounding, the majority (>70%) of cells harvested from sponge were macrophages (F4/80+), while 25% of the cells were PMN (Gr-1+). RNA was extracted from the inflammatory wound cells on d1, 3 or 7 post-implantation and pro- and anti-inflammatory gene expression was studied. In d1 & 3, expression of pro-inflammatory genes TNF-α and IL-1β were significantly up-regulated ($p<0.05$, n=4) by MCG. Later, on d7, levels of TNF-α and IL-1β were sharply lower ($p<0.05$, n=4) in the MCG treated group. At the same time point, anti-inflammatory cytokine IL-4 was significantly up-regulated in MCG treated group. These observations indicate that MCG transiently mounts robust inflammatory response followed by rapid resolution. Previously we had reported that macrophage efferocytosis helps switch these cells from pro-inflammatory to anti-inflammatory phenotype leading to resolution of wound inflammation. MCG improved macrophage efferocytosis and increased VEGF production compared to saline treated group providing for a mechanism by which MCG may help resolve inflammation and support wound angiogenesis. Taken together, MCG is known to improve wound healing in pre-clinical swine models. Here we note that MCG may achieve that outcome by its effect on the wound inflammation process.