Title:

Impact Of Connective Tissue Matrix Products and Critical Size Defects on Gut Microbiota and Fracture Healing in Mice

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Abstract:

Approximately 6.2 million people in the USA alone suffer from some form of fracture annually. Depending on the intensity of trauma and complexity of the fractures, some fractures will not heal without medical intervention. It is imperative to develop novel therapies that target fracture healing. Connective Tissue Matrix (CTM) Biomedical is a company that develops human

placenta, amnion, chorion, and other umbilical derived allograft products which may provide a solution to the problem of impaired fracture healing. CTM products contain structural proteins, cytokines, and growth factors that may have regenerative and anti-inflammatory properties. Although these products are already used clinically for fracture and wound healing in humans, no pre-clinical studies exist verifying their efficacy or mechanism of action.

Commensal microbiota is a collection of microorganisms such as bacteria, fungi, and viruses. Disruption of the gut microbiota, known as gut dysbiosis, can lead to a variety of disorders in other tissues. In fact, new studies indicate that alterations in the gut microbiota can affect bone health. This is likely due to impaired nutrient uptake and an increase in inflammation from bacterial byproducts that are not favorable to a healthy gut ecosystem. More recent studies indicate that the microbiota is also implicated in fracture healing.

Our study aims to investigate if CTM products have a positive effect on fracture healing by affecting the gut microbiota composition and bacteriome. To test this, critical sized defects (CSD) were induced in mice and treated with various CTM implants or saline control. Fecal samples were taken on the day of surgery and weekly thereafter. Bacterial DNA was subsequently extracted from these samples and analyzed using PCR. We anticipate seeing changes in load and composition of gut bacteria following CSD surgery.