

COX-2 Function and Wound Healing

Background

The process of bone formation involves three critical steps: production of extracellular organic matrix, mineralization of the matrix to form bone and bone remodeling by resorption and reformation. Prostaglandins are factors that play a major role in bone metabolism. They affect both bone formation as well as healing of bone fracture. Cyclooxygenase is a rate-limiting enzyme in the prostaglandin synthetic pathway. COX-1 and COX-2 are two known forms of cyclooxygenase. COX-1 is constitutively expressed by many tissues and COX-2 is expressed when stimulated by lipopolysaccharide and certain cytokines and growth factors, and mechanical stress. Interestingly, COX-2 can also be expressed in response to wounding and inflammation. Non-steroidal anti-inflammatory drugs (NSAIDS) and aspirin reduce inflammation and pain by inhibiting the activity of both COX-1 and COX-2 enzymes. However, the inhibition of COX-1 enzyme causes gastrointestinal and kidney side effects. NSAIDS selective for COX-2 have also been developed that avoid the side effects associated with non-specific NSAIDS.

Prostaglandins are produced during fracture healing and non-specific NSAIDS have been shown to delay healing in experimental animal models suggesting that prostaglandins are necessary for bone formation. However, it is not known whether prostaglandins produced by COX-1 or COX-2 are required for fracture healing. **The present invention relates to compositions and methods for enhancing wound and fracture healing.**

Description of the Technology

Fracture healing was assessed using a rat closed femur fracture, in which COX-2 function was inhibited with selective NSAIDS such as celecoxib and rofecoxib. In these animals, the femur structure healing was dramatically inhibited indicating that COX-2 has an essential function during normal fracture healing. Histological observations suggest that COX-2 is required for normal endochondral ossification during fracture healing. By contrast, non-selective NSAIDS such as indomethacin delayed, but did not prevent, fracture healing.

Additionally, UMDNJ researchers have designed a vector for use in wound and fracture healing. The vector consists of a promoter linked to cyclooxygenase expression cassette. The vectors of this invention may be used to enhance the levels of COX-1 and COX-2 enzymes at the site of the wound.

Applications

- To enhance wound and fracture healing
- In gene therapy applications to enhance wound healing.

Patent Status

- United States Application Filed
- Application published on 05/01/2003 (Publication Number: US-2003-0082141-A1)

Licensing Opportunity

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This technology is available for licensing non-exclusively or exclusively.

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