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| **Name:** |
| Marissa Bunge |
| **Group:** |
| 9B-5 |
| **Pathology Question:** |
| What is the process of bone inflammation? |
| **Report:** |
| Bone inflammation, also known as osteomyelitis, is the infection and inflammation of the bone or bone marrow. This occurs after injury or surgery where bacteria enters the bloodstream and gets into bone tissue.  When a bone is exposed to physical or traumatic stimuli, the innate immune system is immediately activated in order to re-establish normal function. Initial fracture hematoma as well as the acute inflammation reaction are critical and essential in fracture healing and begin the process.  With acute inflammation, neutrophils are the first cells to arrive to the site of injury and recruit monocytes and macrophages. Macrophages work to clear necrotic tissue and the provisional matrix via phagocytosis, while monocytes resorb bone fragments and the necrotic ends of damaged bone. Macrophages also secrete inflammatory and chemotactic mediators such as tumor necrosis factor (TNF-alpha), IL-1B, IL-6, and CCL2 that initiate the recruitment of fibroblasts, mesenchymal stem cells, and osteoprogenitor cells needed for repair.  Platelet and macrophage derived inflammatory mediators and growth factors then guide the proliferation, differentiation, and extracellular matrix production of mesenchymal stem cells and osteoprogenitor cells. Members of the growth factor family, such as morphogenetic proteins, vascular endothelial factors, platelet-derived factors, and fibroblast factors are all key mediators in this healing process as well.  To end the inflammation reaction and re-establish hemostasis, anti-inflammatory and reparative cytokines are needed at the site. In ideal healing situations, fracture hematoma and the acute inflammatory reaction is cleared about a week after fracture and replaced by granulation tissue. At this point, the collagen matrix is unorganized and rich in proliferating mesenchymal cells and developing vasculature that will continue to devlope in the healing process.  On the other hand, if cytokines are continuously secreted, tissue damage is uncontrolled, or hemostasis is impaired, inflammation is now considered to be chronic and detrimental to bone healing. |
| **References:** |
| Loi, Florence, et al. “Inflammation, Fracture and Bone Repair.” *Bone*, Elsevier, 2 Mar. 2016. |