

THE MACROPHAGE REACTION TO WEAR DEBRIS IS EXEMPLIFIED BY A HIP IMPLANT

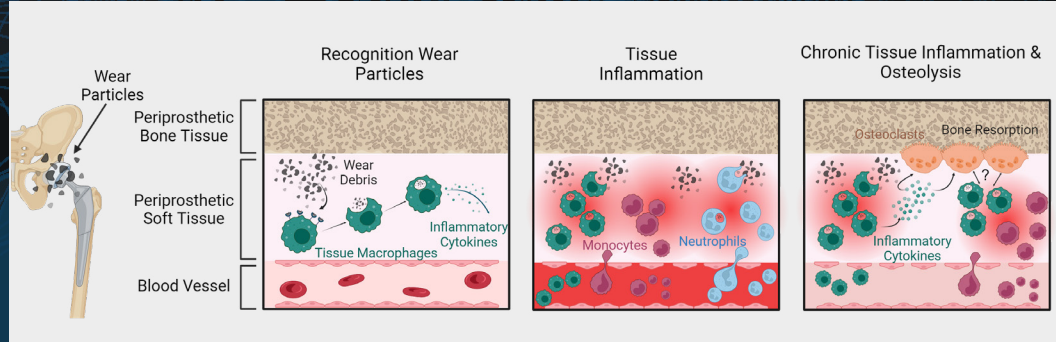


Figure created with BioRender.com, 2024.

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Wear debris from implant bearing surface is generated and released into joint space.

Recognition wear particles: Tissue-resident macrophages (green cells) in periprosthetic soft tissue recognize wear debris particles by specific receptors on their surface and become activated. Macrophages start to engulf and digest wear particles by phagocytosis and release **inflammatory cytokines** (green dots) into the periprosthetic tissue.

Tissue inflammation: Inflammatory cytokines attract other immune cells to the site of wear particle accumulation. **Neutrophils** (light blue cells) and **monocytes** (dark red cells) migrate into tissue. Monocytes differentiate into macrophages. Macrophages and neutrophils engulf and digest wear particles.

Chronic tissue inflammation and osteolysis: Depending on size/shape, material and tissue concentration of wear particles, the acute inflammatory response does not resolve and progresses into a chronic tissue inflammation. Monocytes constantly migrate into tissue, differentiating into macrophages. Activated, particle-laden macrophages persistently release pro-inflammatory cytokines into periprosthetic tissue, maintaining chronic tissue inflammation. Furthermore, the released cytokines as well as particle-laden macrophages themselves activate **osteoclasts** (orange cells), which then start to resorb the periprosthetic bone, resulting in periprosthetic osteolysis.

