Oestrogen is known to reduce the activity of M-CSF and to stimulate OPG, thus inhibiting osteoclast formation and survival. Oestrogen may maintain bone mass by inhibiting the release of cytokines that stimulate bone resorption (IL-1, TNF) while upregulating the synthesis of other cytokines (TGF-beta) involved in bone formation.

**OSTEOMYELITIS**

**Definition:** Infection of bone is uncommon. It can affect the periosteum (periostitis), the cortex (osteitis) or the medullary cavity (osteomyelitis). However in practice the infection affects more than one tissue plane and the term osteomyelitis is now used for all bone infections regardless of localisation.

**Aetiology:** Any microorganism can cause osteomyelitis but the commonest are pyogenic bacteria, usually *Staphylococcus aureus*. E. coli affects neonates and elderly people or debilitated patients. Salmonella also affects bone. Tuberculous osteomyelitis is a problem where TB is endemic. Brucella infections are associated with chronic low grade osteitis. Multiple organisms are involved in trauma.

Bone becomes infected by
- **blood spread** from another lesion (urinary or respiratory tract infection); organisms colonise the cancellous bone of the metaphysis because of the vascular pattern
- **spread from** infected subcutaneous tissue or organ
- **direct implantation** from a broken wound

The infection spreads fast from the metaphysis to the cortex, raising the periosteum. The cartilaginous plate prevents spread to the epiphysis. Bone becomes necrotic and vessels may be thrombosed. With severe infection, there is too much necrotic bone to be removed by the natural process of healing and by new bone formation. Surgery may be needed. Otherwise the infection becomes chronic. If the periosteum is breached, infection spreads to soft tissues and skin with local abscesses and sinuses. If it spreads to the joint, it leads to septic arthritis.

A weakened bone may result in deformity or even fracture.

**Clinical Features:** There is fever and local pain and swelling but X-ray changes need at least a week to develop. Therefore there may be considerable bone destruction before diagnosis. There is a danger of septicaemia if treatment by antibiotics is delayed.

When infection is cleared normal healing will proceed through osteoblastic activity and remodelling. If large sequestra of bone are not removed, chronic infection persists and there is often marked fibrosis and new bone formation (involucrum of bone). Risks of chronic infection include amyloid deposits and even squamous carcinoma.

With inadequate antibiotic treatment, an acute inflammation may be transformed into a low grade chronic osteitis. This is seen with staphylococcal and brucella infections of the spine.