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- 200! Make up other 10%
- e.g. proteoglycans (GAGS, chondroitin sulphate)
- e.g. glycoproteins (osteonectin, osteopontin, bone sialoprotein, osteocalcin, fibronectin)
 - Functions, mineralisation, collagen attachment
 - e.g cytokines and growth factors TGFb, TNF, IGF, FGF, PDGF, EGF
- BMPs (1-8) ٠
- M-CSF



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Function of osteoblasts (2) Extracellular matrix is far from inert

- Extracellular matrix is far from inert
- Collagens, proteoglycans active biological participants
- Matrix contains contains numerous growth factors
- Proteoglycans modulate growth factors and cytokine activity (Burgess and Maciag 1989), protect vs enzymatic degradation
- Growth factors bind to GAGS and proteoglycans, resulting in a reservoir of growth factors (Ruoslahti and Yamaguchi 1991)
- Matrix bound growth factors





Site dependent differences in osteoblasts

- Osteoblasts differ form different sites
- In vitro studies, osteoblast from neural crest bone e.g. mandible (M) differ from those from mesodermal origin e.g. iliac crest (IC).
- M has increased FGF-2, IGF-2 whilst IC has increased TGF-beta and divides more slowly
- M>IC for grafting? (Hall 1999)

























