The developmental origins of osteoporosis

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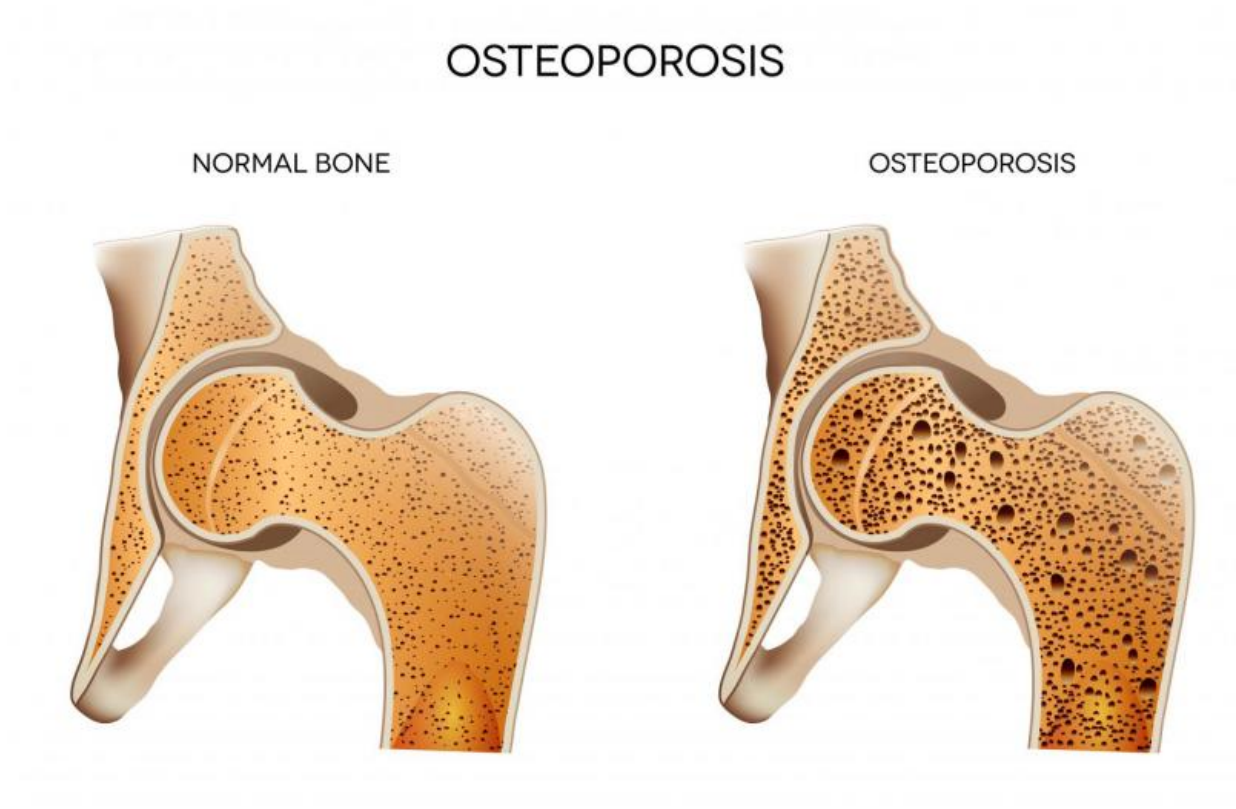

Consequences of osteoporosis are not apparent until late adult life but it originates in early life. Credit: Shutterstock

Osteoporosis may have its origins in early life, but the consequences are not apparent until late adult life, meaning that opportunities that can reduce its occurrence or severity may be overlooked. It remains an extremely common health burden in all societies, with enormous public

health consequences due to the morbidity and mortality of the resulting fractures. Wood et al. discuss the developmental origins of osteoporosis and outline some of the modifiable and non-modifiable risk factors in early life, both antenatal and postnatal. They review data relating to birth size and early growth in both preterm and term born infants and emerging data on the role of epigenetic mechanisms.

Osteoporosis is primarily characterized by a depletion of bone mineral mass, but when combined with alterations in bone architecture results in greater bone fragility and increased fracture risks. Bone mineral content and density in adulthood depends predominantly on growth and mineralization and the peak bone mass achieved in early adulthood. Risks for osteoporosis are therefore determined early in life although the subsequent loss of bone mineral after peak bone mass is also an important factor. Bone mass shows strong tracking during childhood and adolescent growth and into adulthood. Genetic factors may account for differences and gender also influences bone composition with males attaining greater bone mass.

Environmental influences, especially modifiable lifestyle factors, during both childhood and adulthood include smoking, medication use e.g. corticosteroids, and exercise, although much of the variance in bone mass remains unexplained and may reflect differences in metabolic programming of systems controlling skeletal growth during critical periods. Optimizing early growth through diet has positive and lasting effects on bone mineralization, with breast milk exposure thought to be of major importance in certain groups.

Overall the paper provides strong evidence for the developmental origins of osteoporosis, and highlights the importance of prevention at all stages of the life course, including optimizing the in-utero environment and maternal nutrition, and the importance of infant nutrition as preventative strategies.

More information: Claire L Wood et al. The Developmental Origins of Osteoporosis, *Current Genomics* (2015). DOI: 10.2174/1389202916666150817202217