High fat-fed diabetic mice present with profound alterations of the osteocyte network

Diabetes mellitus is considered to be an independent risk factor for bone fragility fractures. Reductions in bone mass, observed only with type 1 diabetes mellitus, as well as modifications of bone microarchitectures and tissue material properties are landmarks of diabetes-related bone alterations. An interesting feature observed in type 2 diabetes mellitus (T2DM) is the augmented concentration in circulating sclerostin. This observation prompts us to hypothesize that modifications of osteocyte network and perilacunar mineralization occur in T2DM. As such, the aims of the present study were to ascertain by quantitative backscattered electron imaging, confocal microscopy and image analysis, modifications of perilacunar tissue mineral density, osteocyte morphology and osteocyte network topology in a mouse model of high fat-induced type 2 diabetes. As compared with lean control animals, diabetic mice exhibited a significant 48% decrease in perilacunar mineralization heterogeneity although mean perilacunar mineralization was unchanged. Furthermore, in diabetic animals, osteocyte volume was significantly augmented by 34% with no change in the overall number of dendrite processes. Finally, the network topology was profoundly modified in diabetic mice with increases in the mean node degree, mean node volume and hub numbers whilst the mean link length was reduced. Overall, it appeared that in diabetic animals, the dendritic network exhibited features of a scale-free network as opposed to the single-scale characteristic observed in lean controls. However, it is important to ascertain whether diabetic patients exhibit such modifications of the osteocyte network and whether anti-diabetic drugs could restore normal osteocyte and network parameters, thereby improving bone quality and protecting against fragility fractures.
Autre titre : Bone
Identifiant (ID) : 27312542
PubMed : 27312542

Liens :

Publié sur Okina (http://okina.univ-angers.fr)