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## Interrelationship among muscle, fat, and bone: connecting the dots on cellular, hormonal, and whole body levels.

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### Abstract

While sarcopenia and sarcopenic obesity have been recognized in the last decade, a combined concept to include decreased muscle mass and strength, as well as decreased bone mass with coexistence of adiposity is discussed here. We introduce a new term, osteopenic obesity, and operationalize its meaning within the context of osteopenia and obesity. Next, we consolidate osteopenic obesity with the already existing and more familiar term, sarcopenic obesity, and delineate the resulting combined condition assigning it the term osteosarcopenic obesity. Identification and possible diagnosis of each condition are discussed, as well as the interactions of muscle, fat and bone tissues on cellular level, considering their endocrine features. Special emphasis is placed on the mesenchymal stem cell commitment into osteoblastogenic, adipogenic and myogenic lineages and causes of its deregulation. Based on the presented evidence and as expounded within the text, it is reasonable to say that under certain conditions, osteoporosis and sarcopenia could be the obesity of bone and muscle, respectively, with the term osteosarcopenic obesity as an encompassment for all.

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**KEYWORDS:** Inflammation; Mesenchymal stem cells; Osteopenic obesity; Osteosarcopenic obesity; Sarcopenia

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