Osteoporosis International (2022) 32 (Suppl 1):S33-S34
https://doi.org/10.1007/s00198-021-06109-9

ABSTRACT

World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (WCO-IOF-ESCEO 2021): Special Lecture Abstracts

SL1
UCB-SPONSORED HONORARY LCTURE: WHERE ARE THE CRACKS? UNDERSTANDING THE NEEDS IN FRAGILITY FRACTURE MANAGEMENT

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In 2010, 3.5 million fragility fractures were recorded in Europe, and this is expected to rise to 4.5 million in 2025.[1] Fragility fractures lead to loss of mobility and independence and increase the risk of mortality and subsequent, secondary fractures.[2,3] They are also associated with substantial economic costs[2] and yet are seldom recognised by policy makers.[4]

Despite the prevalence and burden of fragility fractures, up to 80% of patients who experience a fragility fracture are neither assessed nor treated by their healthcare system.[3] This disparity has resulted in a call to action to raise patient and practitioner awareness of secondary fracture prevention and to make osteoporosis and fragility fractures a policy priority.[5]

Why is there a mismatch between evidence, guidelines and patient care? Associate Professor Kassim Javaid (University of Oxford, UK) will provide his insight into the unmet needs that remain within post-fracture care — from the perspectives of policy makers, healthcare professionals, fracture liaison service units and patients — and discuss potential positive steps that can and should be taken to improve secondary fracture prevention for your hospital, region and country.

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SL2
FEAST OR FAMINE: HOW NUTRIENT INTAKE REGULATE BONE REMODELING

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Weight loss from calorie restriction is associated with bone loss. In the more extreme clinical scenario, anorexia nervosa, there is even more rapid bone loss, high blood cortisol levels and fractures. Despite the absence of peripheral fat in these patients, the bone marrow is laden with marrow adipocytes, and bone remodeling is uncoupled with rapid bone loss. Paradoxically, obese individuals also have an abundance of marrow adipocytes, in the presence of large amounts of visceral fat, but bone turnover is actually suppressed in many cases. Animal models in our laboratory have shown that 30% calorie restriction can also induce marrow adipogenesis, whereas a high-fat diet induces an increase in marrow adipocytes. Similar to humans, in mice, bone remodeling is uncoupled during calorie restriction and suppressed with a high-fat diet.

To address this paradox, we studied 26 healthy human volunteers at the Clinical Research Center at Mass General Hospital. Subjects were fed a high-calorie diet (HCD) for 10 days, then went home for 10 days and then were fasted for 10 days. Marrow adiposity was measured by MRI, and bone marrow aspirates were done pre- and post-dietary induction. Both fasting and HCD induced marrow adipocytes, but only fasting stimulated bone resorption and suppressed bone formation. The induction of marrow fat was more consistent and stronger with fasting but readily reversible within 2 weeks. To our surprise, RNAseq and proteomics revealed that fasting was associated with an inflammatory component that included the complement system; other pathways included paradoxical lipid storage, growth factor binding proteins and adipsin, an adipokine made only by fat cells. The enzyme that controls cortisol production,

11beta hydroxydehydrogenase (11BHSD), was one of the highest upregulated gene with fasting in the marrow. A high-calorie diet showed genes associated with increased lipid storage and two cytokines — TNF and semaphorin 3E. Our data suggests that calorie restriction and/or fasting can have detrimental effects on the skeleton via a complement activated innate immune response, induction of local glucocorticoids and high rates of bone resorption possibly induced by adipsin. These findings have important implications for popular weight loss programs that follow an intermittent fasting regimen and provide new insights into the pathophysiology of marrow adiposity and skeletal remodeling.