Physiopathologie, diagnostic et traitements des maladies osseuses (LyOS)

Biologie, médecine, santé

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Osteoporosis and bone metastasis induce structural alterations of the skeleton that lead to bone destruction and occurrence of pathological fractures. Despite of recent progress made to treat bone loss, there is clearly a need to better diagnose bone diseases and improve treatments of skeletal complications associated with bone diseases. For example, 50% of osteoporotic fractures occur in women whose bone mineral density is above the threshold described by the World Health Organization (WHO) as being associated with osteoporosis. Similarly, 70% of patients with advanced breast or prostate cancer have bone metastases. Yet, current treatments for skeletal lesions are only palliative.

Our project aims at developing a translational research from basic scientific discoveries into clinical improvements in diagnosis and treatments of bone diseases. Our scientific strategy hinges on 3 teams. Team 1 is doing clinical research. Epidemiological studies are conducted to identify determinants of bone loss for osteoporosis in women and men. Clinical trials are ongoing to study minimal residual disease in breast and prostate cancer, and to examine the therapeutic efficacy of a pharmacological inhibitor of bone resorption in the neoadjuvant treatment of locally advanced breast cancer. Team 2 aims at identifying and characterizing molecular mechanisms responsible for the tropism, osteomimetism and invasion of cancer cells in the bone marrow microenvironment. These studies build on clinical trials...
to detect and isolate cancer cells in the bone marrow. Additionally, new therapeutics are being tested in animal models of malignant bone diseases. Team 3 aims at studying mechanical determinants of bone quality in the clinic (osteoporosis) and in small animals (bone metastasis). Mechanisms of action of bone-targeted therapies are being tested on the determinants of bone quality. Finally, new biomarkers are developed to detect early bone metastasis formation.