Multiple myeloma (also called Kahler’s disease [MM]) is a hematological malignancy of B lymphocytes characterized by the expansion of a malignant plasma cell clone in the bone marrow (Fig. 1). Five thousand cases of myeloma are diagnosed each year in France, 54% in men. In almost all cases, the malignant plasma cells secrete a monoclonal immunoglobulin or an immunoglobulin fragment (free light chain) which can be detected in the blood and/or urine. This is currently the most common way of diagnosis after having prescribed an electrophoresis or an immunofixation of serum proteins. Indeed, MM is often preceded by a monoclonal gammapathy of undetermined significance (MGUS), which requires a long term biological monitoring [1]. MGUS are 100 times more common than MM (and are observed in 3–4% of the population after 50 years) and their evolution towards an overt myeloma is approximately 1% per year. MM is a hematological malignancy whose incidence is correlated to the aging of the population (the mean age at diagnosis is about 70 years).

Myeloma is the most common neoplasia responsible for osteolysis in 90% of patients; it is responsible for fractures in 60% of cases [2, 3]. Bone lesions were formerly the most frequently way of revelation of the disease and osteolysis can summarize the clinical presentation. The most typical elementary lesion appearing on X-rays is a "punched-out" hole without peripheral condensation (Fig. 2). The size is variable and multiple locations are common, primarily affecting the skull, spine, pelvis or rib cage. The bone lesion can less frequently be unique and large (plasmacytoma). Osteolysis results from an imbalance in bone remodeling with increased bone resorption associated with decreased bone formation. Malignant plasma cells are responsible for the bone remodeling changes.

Several recent reviews have been published showing the complexity of the cellular and molecular interactions occurring between plasma cells and the bone marrow microenvironment composed of hematopoietic, vascular and bone cells [4].

In this special issue of Morphology, it seemed important to us to provide an update on three topics that are rarely discussed in recent reviews:

- the morphology of the normal and pathological plasma cell during myeloma and MGUS is rarely reported. The cytological aspects are described in some classical atlases; Marc Zandecki and Bénédicte Ribourtout have extensively described the different aspects encountered on the bone marrow aspirations. Their work is the result of a long experience as a cytologist concerned with the diagnosis of these diseases;
- the myeloma bone eco-system is described by Régis Bataille who was a pioneer in France to dissect the complex interactions between the tumor plasma cells and the bone marrow microenvironment. This article summarizes
the knowledge on the question and opens new perspectives in understanding the pathophysiology of MM and MGUS:

- animal models of MM are a preclinical approach to solve pathophysiological hypotheses and test new therapeutics active on the tumor cell itself but which can also specifically target bone remodeling to disrupt the "vicious circle" between plasma cells and bone cells. Hélène Libouban wrote an update on the current animal models which are all developed in mice (MM can also be diagnosed occasionally in horses and dogs).

We hope that this special issue of Morphology will interest all cytologists, histologists, radiologists and oncologists who follow the MM patients every day.

Disclosure of interest

The author declares that he has no conflicts of interest concerning this article.

References