EFFECT OF TUMOUR-INDUCED OSTEOLYSIS AND EFFICACY OF ANTI-RESORPTIVE AND CHEMOTHERAPEUTIC TREATMENTS IN METASTATIC BONE DISEASE

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INTRODUCTION
Skeletal metastases are the most common complication of malignancies such as breast and prostate cancers [1]. In tumour-induced osteolysis, bone resorption is increased by the neoplastic activation of osteoclasts which results in rapid bone loss, change in the architectural integrity and ultimately, the load-bearing capacity of the affected bone. Fracture risk is increased by this deterioration in bone structure. The purpose of this pilot study is to assess the efficacy of anti-resorptive (Ibandronate) and chemotherapeutic (Paclitaxel) drug treatments in preserving skeletal integrity in terms of structural and biomechanical parameters, using an experimental model of tumour-induced osteolysis.

METHODS
Forty two 8-10 week old male Sprague Dawley rats were randomly divided into four experimental groups – control (Sham), tumour-only (Tumor), Ibandronate-treated (IB), and Paclitaxel-treated (PAC), of which only animals in the control group were not inoculated with tumour cells. To simulate bone metastasis, approximately $2.5 \times 10^6$ osteolytic Walker 256 (W256) cells were surgically injected into the right femoral medullary cavity via the intercondylar notch to induce tumour growth. Animals in the tumour-only group received no drug treatment while those in the IB and PAC groups received Ibandronate and Paclitaxel drug administrations respectively post-surgery. Serum DPD (deoxypyridinoline) concentration was monitored via regular administrations respectively post-surgery. Serum DPD groups received Ibandronate and Paclitaxel drug received no drug treatment while those in the IB and PAC induce tumour growth. Animals in the tumour-only group right femoral medullary cavity via the intercondylar notch to Walker 256 (W256) cells were surgically injected into the operated femur without tumor cells inoculated

RESULTS AND DISCUSSION
Some abnormality in the medullary cavity of the femur, suspected to be localized tumor growth, was observed in the micro-CT images of the animals with implanted tumor cells (Fig. 1a). In contrast, the medullary cavities of the femora from the control group appeared clear (Fig. 1b).

Figure 1: 35 µm/pixel resolution micro-CT sagittal images of (a) an operated femur with tumor cells inoculated (b) an operated femur without tumor cells inoculated

CONCLUSIONS
Tumor induced-osteolysis caused significant bone loss after 20 days. (Figure 2) Ibandronate treatment had an effect of increasing bone volume fraction significantly as compared to the tumor-only group due to its anti-resorptive effect. However, the effect is systemic as resorption activities in the intact left femur are suppressed as well. Paclitaxel treatment also increased bone volume fraction over the tumor-only group due to its anti-resorptive effect.

REFERENCES