Introduction:
Chondrosarcoma is a malignant cartilage tumour and represents the second most common primary malignant solid tumour of bone. It accounts for approximately 25% of all bone sarcomas (Bertoni et al. 2002). Poorly vascularized and rich in proteoglycans (PGs), chondrosarcomas are considered to be chemo- and radio-resistant with efficient treatment usually limited to surgical resection with large disease-free margins. If the hypoxic and PGs status of the tumour can be assessed by TEP imaging and scintigraphy, it requires however 2 separated exams.

In this context, we propose to develop an MRI strategy based on Chemical Exchange Saturation Transfer (CEST) to simultaneously co-register both hypoxia (pH) and PGs content in vivo.

Materials and Methods:

**In vivo model of chondrosarcoma:** 5 week female nude NMRI mice (n=10) were implanted with rat chondrosarcoma SWARM xenograft (1mm³ fragment) in scapula position. After 2 weeks growth (average tumour volume: 215,04 mm³ ± 86,27), xenografts were characterized in terms of PGs content by 23Na MRI, VivoQuant™. In vivo multimodal imaging: All acquisitions were performed on anesthetized mice (1.5% isoflurane in air/O2 70/30, v/v, mixture). MRI acquisitions: MRI images were acquired at 11.7 T using a 72-mm volume quadratic coil with surface reception. Diffusion weighted imaging (b=500s.mm⁻²) was first performed to localize the tumour, then WASSR (B1=0,1 μT, Δωsat=±2500Hz in 50Hz steps) were acquired based on a RARE sequence. 23Na MRI was recorded thanks to a coil with surface reception. Diffusion weighted imaging (b=500s.mm⁻²) was first performed to localize the tumour, then WASSR (B1=0,1 μT, Δωsat=±2500Hz in 50Hz steps) were acquired based on a RARE sequence. 23Na MRI was recorded thanks to a coil with surface reception.

**Results:**

**1/Evaluation of proteoglycans content**

**Alician blue staining of PGs:**

High alcian blue staining illustrates the high PGs content

**2/Evaluation of hypoxia (pH)**

**Pimonidazole Immunohistochemistry of hypoxia:**

Pimonidazole staining confirms the presence of tumoral hypoxic areas

Conclusion – Discussion:

Preliminary findings reveal potential of CEST MRI as multimodal imaging approach. In a unique acquisition, CEST MRI provides in vivo quantitative data of extracellular matrix as well as a high resolution cartography of hypoxia.

Perspectives are now to evaluate CEST MRI as an in vivo method to assess response to therapy.

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