

# MSK Imaging Tips and Tricks

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Our MRI centre performs a wide range of MSK examinations ranging from standard joint work to whole limb tumor evaluation. These tips can be applied equally to both groups depending on clinical indications. Much of this is common sense, but it doesn't hurt to revisit the basics occasionally.

- Preparation is very important. Make sure you have your examination planned, previous imaging available for tumor cases, and relevant patient history.
- Always speak to the patient before the examination to determine the mechanism of injury, identify the area of injury, or to identify the relevant pathology under investigation. Ask the patient to show you the 'lump' they may be concerned about and identify any previous surgical sites or biopsy sites related to the lesion. This seems like a basic point, but maybe sometimes overlooked in a busy department, and is the key to providing an efficient and targeted MRI examination.
- Always mark the lesion of interest with a vitamin E capsule or similar MRI visible marker for all tumor studies. This is particularly important for small lesions, which may be very difficult to identify once imaging has commenced. If the patient has had a previous resection or biopsy of the lesion, mark each end of the scar or the biopsy site.
- Pre-cannulate patients who need contrast. This is particularly important for those patients who are difficult to position or have to lie in an awkward position for their scan. This will minimize patient time on the table, reduce scheduling hold ups due to difficult cannulations and minimize change in patient position between pre and post contrast scans.
- Make sure the patient is positioned comfortably to reduce the chances of patient movement during the scan. Do not get too caught up in trying to place the joint or limb in the anatomically correct position – this is pointless if the patient moves on every sequence.
- The beauty of MRI is its multiplanar capability, so use this to its full advantage when producing scout images. After your first scout, take a minute to scout again using your first scouts as a baseline, this time positioning your slices to produce orthogonal images which cover the full extent of the joint or tumor, and show any potential problems such as sources of aliasing etc. An extra few minutes spent here can save you a lot of time during the examination.
- Always position coils to cover the full extent of the area of interest in tumor cases – usually including both joints. This is very easy with Tim systems where a combination of body array coils and the peripheral array coil can be used for long bones, and specific joint coils are available for all other areas. The body array coils or flex coils can also be used for patients who, either due to body habitus or disease process, are unable to be accommodated with the standard joint coils.
- Talk to your radiologist and have a set of consistent protocols saved for use with all of your cases. This may be different for every joint, but should be the same for a specific joint and a specific clinical question. These should be well labelled and saved with any specific notes in your protocol tree. Make sure you know how much signal-to-

noise latitude you have in each sequence i.e. for tumor cases can you drop your field-of-view (FOV) from 250 mm to 200 mm to look at a smaller lesion without degrading your image too much. This will allow you to produce consistently high quality results.

- It is very important (for all MR imaging) to use the same slice position, thickness and gap, for the differently weighted sequences (e.g. T1, T2, T1 post Gd) in each plane of an anatomical area. This will allow better characterisation and localisation of normal anatomical structures and pathology.
- All sites will have their own protocol set for bone and soft tissue tumors, but it helps to identify the full extent of a lesion at the outset of the examination. We find that for tumor cases after running the scouts that a wide field-of-view (wfov) STIR series, usually in the coronal plane, helps to plan the rest of the examination. This is particularly true in lower limb cases where, by using Tim planning, we can cover the whole limb or joint to joint (for example from above the hip to below the knee or to below the ankle) to show the full extent of related

edema, identify skip lesions and demonstrate potential lymph node involvement.

- We always run all sequences to cover the whole lesion. It is important that these slices, particularly the transverse T2 fatsat, also cover the full extent of the edema not just the identified mass lesion. The transverse T1 and post contrast transverse fatsat T1 scans should cover the same area. This is important to accurately identify the tumor margins prior to surgical intervention or radiotherapy. This is also true for non-tumor MSK imaging involving muscle tears, where the extent of edema or haemorrhage should be identified and the extent of muscle retraction should be well demonstrated. Usually contrast is not needed in these cases unless an underlying lesion is suspected.

- Ensure that the basic protocol is tailored to the specific clinical question and size of the lesion being evaluated as well as the patient's ability to cooperate for the length of the examination. This may involve modifying the FOV, resolution and time for each sequence to obtain the best imaging outcome. This is not usually an issue for routine joint imaging where standard protocols are the norm, but it is basis for MSK tumor patients.
- We always finish our MSK tumor cases with a post contrast wfov fatsat T1 to match our original wfov STIR sequence to identify and characterize lesions outside the scope of the primary examination.

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