Clinical MRI in Neurology and Oncology

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The use of MR imaging has enormously spread in the past decade, thanks to the wide diffusion of MR scanners all over the countries in the western world. Along with it the incredible technical evolution both of the hardware part of the scanners as of the software side, allowing a very wide range of applications , with ever new imaging features being developed. Thanks to this indications for MR studies have become much larger than they used to be.

In the neurological field MR imaging has become a very powerful tool for the evaluation of any neoplastic lesion either in the central or in the peripheral nervous system. As such these examinations allow surgeons to perfectly now the location of any lesion as their relations with the surrounding structures, therefore being able to define whether a patient will be able to undergo surgery. On the other hand oncologists have a very precise tool with a very good reproducibility profile for follow up during and after medical therapies.

On the other hand there is a very wide range of degenerative disorders of the Central Nervous System that are amenable to be quite well defined and staged by MR. First among ranks Multiple Sclerosis.

A further field of application in the CSN is the study of large vascular structures, either on the arterial compartment, looking for aneurysms or vascular malformations, or on the venous one, mainly investigating thrombotic events. As far as ischemic events are concerned very much has changed since the introduction of diffusion and perfusion imaging, which are nowadays a very appreciated adjunct to the evaluation of stroke patients.

In the trauma field lays one of the few emergency applications of MR: spinal cord injuries that need quick surgical management.

Oncological applications of MR out of the CNS grow larger by the day. MR is the first choice for bone and muscle lesions, either for definition as for assessment of extension and relation to surrounding structures. This, especially comparing with CT, is due to a much better intrinsic contrast distinction between structures that have similar density on CT. The same considerations are true for the pelvis, both female and male, for genitourinary lesions, and also for staging and follow-up of neoplasms of the rectum.

All the organs of the upper abdomen are nowadays very well studied with MR on high field scanners (1.5-3Tesla), and the contest between MR and CT is always on the run, even for very delicate areas like pancreas and liver. As far as the liver is concerned moreover, the possibility of using dedicated contrast media with specific effects on the hepatobiliary system has lead to enhanced detection and characterization power of MR. A lot of scientific investigation is now being held to correctly define the possibilities of diffusion weighted imaging in the abdomen, bringing up another step for this already powerful imaging device.

Further technical developments have lately made imaging of very large areas of the organism possible: Whole Body Imaging is now a reality that seems to threaten nuclear medicine, both for PET and Bone Scan, in fact scanning of the entire body can be performed with no radiation in a short time with very good results in terms of detection and characterisation of lesions.

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