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Purpose. This work reports our experience on MRI acoustic noise as acoustic experts as well as advisors for the local authority. The aims are.

- the protection of people health as a state of complete physical, mental and social well-being of any person in the magnetic resonance practice
- reducing possible distortions of competition
- avoiding expensive protection actions after installation.

Materials and methods. In order to correctly assess the risk, a procedure has been adopted in accordance to:

- Italian law and 89/391/EEC Safety and Health of Workers at Work Directive,
- European Standards, literature data and our experience.

E.g. if RMI site is planned in civil contest, the noise levels are to be referred to WHO values and, in Italy, to values of municipal regulation for protection from noise. For the activity of medical reporting and control room we consider quality levels recommended in EN ISO 11690–1-1996.

In this paper, are specified the necessary data and the roles involved as manufacturer, RM site project planner, and physician. When data are insufficient, the procedure describes experimental sets with reference points (isocenter bore&laser cross&..), phantoms, sequences, condenser and optic microphones and protocol to obtain information..

Results. At isocenter ear position (1.5T) SPL shows more than 110 dBA&dB for some sequences. In some cases a surrounding activity had to be moved. To neglect the noise could cause annoying problems as operator/patient interferences and health effects for patient, worker and surrounding inhabitants. It's possible to manage the risk choosing adequate site, technology, HW, reducing noise at source and/or adopting collective protection and finally passive and active ear protectors and PPE. A suitable measurement protocol can be useful to assess noise and to plan adequate protections when RM is by now working.

Conclusions. Acoustic noise has to be considered and assessed as one of the first steps in the MR site planning and activity. It can be reduced to appropriate level. Acoustic noise would be evaluated mandatorily also by competent authorities for the control of compliance of the RM implants for a formal green light.

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[P072] MRI quality control and system performance using ACR phantom tests and automated software

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Purpose. For monitoring the performance of Magnetic Resonance Imaging (MRI) systems, it is essential to implement regular quality control (QC) protocols. We evaluated the MRI system performance

of the Philips Ingenuity TF PET/MR, using the American college of radiology (ACR) QC protocol [1] and automated QC software.

Methods. A total of 80 QC scans were performed during years 2013 to 2018 using the ACR QC protocol. In the initial analysis, 21 scans were analyzed by a human observer and automatic software implemented in MATLAB2015b [2], which performs the analysis according to ACR guidelines [1]. Five quantitative tests were included: geometric accuracy (148 ± 2 and 190 ± 2 mm), slice thickness accuracy (5.0 ± 0.7 mm), slice position accuracy (<5 mm), image intensity uniformity ($>82\%$) and percent signal ghosting (<0.025) with reference limits in parenthesis. We report the mean and standard deviation of the manual (M) and automatic (A) measurements.

Results. For geometric accuracy, ($M = 147 \pm 1$), ($A = 148 \pm 1$) and ($M = 190 \pm 0.5$), ($A = 191 \pm 0.2$) were measured for the localizer and T1 series. For slice thickness accuracy, ($M = 5.5 \pm 0.5$), ($A = 4.7 \pm 0.8$) and ($M = 5.9 \pm 0.5$), ($A = 4.5 \pm 1.4$) were measured for the T1 and T2 series. For slice position accuracy, ($M = 5.6 \pm 3.3$), ($A = 4.2 \pm 2.7$) and ($M = 5.3 \pm 2.8$), ($A = 4.0 \pm 2.5$) were measured for the T1 and T2 series. For image intensity uniformity, ($M = 85 \pm 1$), ($A = 96 \pm 1$) and ($M = 89 \pm 2$), ($A = 97 \pm 2$) were measured for the T1 and T2 series. For percent signal ghosting, ($M = 0.0010 \pm 0.0009$) and ($M = 0.0015 \pm 0.0007$) were measured. The time to analyze and report was two minutes with the automatic software.

Conclusions. Majority of the tests reached the acceptance criteria in the initial analysis. Slice thickness and slice position accuracy were the most common tests to fail. Automated software was beneficial for easing the analysis workflow. The QC software with a test dataset will be provided during the conference.

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[P073] Practical implementation of the 2013/35/EU directive on the occupational risks to electromagnetic fields exposure: Example of clinical MR sites in France

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Purpose. Since August 2016, France has transposed the 2013/35/EU directive on the minimum health and safety requirements regarding professional exposure to the risks related to electromagnetic fields (EMF). Magnetic Resonance Imaging (MRI), which uses different EMFs for image production, falls within the scope of this regulation. As MR Safety Experts (MRSE) to over 20 clinical sites, we have developed a practical scheme to implement the regulation.