26–86 years), who underwent unilateral Vim thalamotomy (left=50, 96.15%; right=2, 3.85%) for medication-refractory essential tremor (n=39; 78%) or Parkinson tremor (n=13; 22%) were considered. The data collected refers to patient-speci c features such as skull density ratio (SDR) and skull area (SA) and patient-speci c parameters such as sonication duration (S_d), user-de ned energy (E), e ective measured energy (E_m), maximum temperature (T_{max}).
Results: The energy released onto the planned target was found to decrease with the SDR for all temperature ranges. A positive correlation was observed between the slope of T_{max} vs. E_m plot and the SDR (R^2=0.765; p<0.001). In addition, the T_{max} was positively correlated with SDR (R^2=0.398; p<0.005). On the contrary, no significant correlation was found between SDR and SA or T_x.
Conclusions: Our results con rm the factors that significantly influence the course of a tcMRgFUS procedure even when a 1.5-T MRI scanner is used for procedure guidance. The experience we gained in this study indicates that the SDR remains one of the most significant technical parameters to be considered in a tcMRgFUS procedure. The possibility of prospectively setting the sonication energy according to the presented curves of energy delivery as a function of SDR for each treatment stage could provide a further understanding and a greater awareness of this emerging technology.
Keywords: high-intensity focused ultrasound ablation, interventional magnetic resonance imaging, stereotaxic techniques, essential tremor, Parkinson's disease

P152

Medical imaging in rural health centers and the challenge of Covid-19 patients

C. Borrás[1]

[1]*Radiological Physics and Health Service, Washington DC, USA*

Purpose: A rural health center is an establishment of ambulatory primary healthcare attention in a rural location, sparsely or densely populated, generally distant from urban areas. Staff may consist of a medical doctor or physician assistant, a nurse or nurse practitioner and a technician. Given the limitations of recruiting specialists, would access to basic imaging techniques such as ultrasound and x rays, allow the Center to manage patients –including Covid-19 patients– locally, rather than having to refer them to a district or general hospital?
Materials and Method: After identifying clinical pathologies and health conditions in rural health centers, we will evaluate imaging modalities that can provide diagnostic support to medical findings; technical specifications of equipment and software, workstations, and teleimaging capabilities; training of the healthcare staff needed to operate and maintain the equipment safely and efficiently, and frequency of physical and virtual visits by clinical and technical consultants.
Results: Rural health centers can treat trauma, chest diseases (viral and bacterial infections such as pneumonia), acute abdominal pain, diarrhea, kidney stones, gynecological problems, and pregnancy. Medical imaging support can be provided by a basic x-ray system, using computed radiography or digital imaging with a simple computer interface, and by an all-purpose general ultrasound unit or a handheld ultrasound probe using a mobile phone application. The center's healthcare practitioners, imaging technicians and/or nurses should have minimal medical and technical knowledge of conventional x-ray imaging and basic ultrasound, and access to on-line continuous education. Equipment installation and imaging protocol selection is facilitated by initial visits of a radiologist, who will provide teleradiology consultation, and of a medical physicist, who will set up quality control and radiation safety programs and monitor them remotely. Imaging algorithms to help deciding whether patients should be referred to a hospital will be described. Examples include visually counting opacity areas due to coronavirus patterns in chest radiographs to assess infection severity, and using artificial intelligence software to detect Covid-19 in lung ultrasound images.
Conclusions: Rural health centers may diagnose and treat many health conditions without having to refer patients to hospitals. They can even manage Covid-19 patients. However, to operate effectively and safely, the centers need on-line clinical and technical consultations and the adoption of programs monitored remotely.
Keywords: x rays, ultrasound, quality control, teleradiology, Covid-19

P153

Application and evaluation of the "linearity of the signal to noise ratio" parameter in quality assurance for magnetic resonance equipment

R. Castiello[1,2], S. Proietti Cignitti[1,2], G. Anastasio[1,2], R. Rauco[2], D. Aragno[2]

[1]*Post-graduate School in Medical Physics, Department of Medico-Surgical Sciences and Biotechnologies, Sapienza University of Rome, Rome, Italy*
[2]*Medical Physics Unit, San Camillo-Forlanini Hospital, Rome, Italy*

Purpose: The signal-to-noise ratio (SNR) and slice thickness (ST) are parameters influenced by the characteristics of the magnetic resonance (MRI) system. This makes both the SNR and the ST sensitive and unspecific parameters for quality controls (QC). Conversely, the signal-to-noise ratio linearity (SNRL), that is the linear variation of the SNR as a function of the slice thickness (thus, for the same acquisition matrix, as a function of volume) is a self-consistent, highly sensitive and specific characteristic. The SNRL allows the monitoring of all factors that can degrade the ST and the SNR, and can allow the monitoring over time of the scanner's performance. It can also be used to compare scanners of different manufacturers or with different static magnetic field strengths.
In present work, the results of SNR measurements as a function of ST are analyzed to study the SNRL of MRI equipment from different manufacturers and with different static magnetic field strengths.
Materials and Method: The SNRL was studied on six superconducting scanners, installed at A.O. San Camillo-Forlanini: 0.7 T-GE; 1.5T-Philip, Siemens, Toshiba, GE; 3T-Siemens. In total, 50 measurement sessions were performed: 25 for the Head coil (2 on the 3T scanner) and 25 for the Body coil (2 on the 3T scanner).
The measurements were performed using cylindrical phantoms (filled with an 8 mM CuSo4 solution) with a diameter of 16 cm for the head coil and 20 cm for the body coil. For the 3T scanner, the same phantoms were used but filled with paraffin.
The ST was varied in the range from 2-10 mm and the SNR was calculated by applying the protocol (AAPM Report 100, 2010) using the spin echo sequence.
Results: For each scanner, the trend of SNR as a function of ST was measured by applying a linear fit showing R^2 values from 0.92 to 0.99. The measurements have been repeated several times during the last two years in order to monitor the time trend of R^2 (SNRL) for each scanner.
Conclusions: The study of the SNRL in each QC measurement session over the last 2 years has allowed simultaneous multi-parameter control of the MRI equipment in place. The SNRL was conceived as a parameter to be monitored over time, in the QC program, to check the performance of each individual scanner. This operational option