Fondazione I.R.C.C.S.
Istituto Neurologico Carlo Besta

Sistema Socio Sanitario
Regione Lombardia

PROVA ORALE N. 1

Domanda inerente al profilo a bando

Qual è la diagnosi differenziale RM dei principali tumori della fossa cranica posteriore in età pediatrica?

Accertamento delle Competenze Informatiche

Per installare in un reparto di Neuroradiologia un software di Intelligenza Artificiale a supporto della diagnostica neuroradiologica, quali sono i requisiti principali da verificare sul piano della privacy e quali sono i limiti pratici di questi sistemi?

PROVA NON ESTRATTA

Jacopo di Napoli

JACOPO DI NAPOLI

4/11/26

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PROVA ORALE N. 2

Domanda inerente al profilo a bando

Quali sono le principali novità dei criteri diagnostici di McDonald per la sclerosi multipla?

Accertamento delle Competenze Informatiche

Per installare in un reparto di Neuroradiologia un software di Intelligenza Artificiale a supporto della diagnostica neuroradiologica, quali sono i requisiti principali da verificare sul piano della privacy e quali sono i limiti pratici di questi sistemi?

PROVA NON ESTRATTA

JACOPO DI NAPOLI

4/11/26

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PROVA ORALE N. 3

Domanda inerente al profilo a bando

Come si distingue alla RM la progressione tumorale dalla pseudoprogressione dopo trattamento dei gliomi?

Accertamento delle Competenze Informatiche

Per installare in un reparto di Neuroradiologia un software di Intelligenza Artificiale a supporto della diagnostica neuroradiologica, quali sono i requisiti principali da verificare sul piano della privacy e quali sono i limiti pratici di questi sistemi?

PROVA ESTRATTA

Jacopo Di Napoli

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Review article

MR-guided focused ultrasound in movement disorders and beyond: Lessons learned and new frontiers

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ABSTRACT

The development of MR-guided focused ultrasound (MRgFUS) has provided a new therapeutic tool for neuropsychiatric disorders. In contrast to previously available neurosurgical techniques, MRgFUS allows precise impact on deep brain structures without the need for incision and yields an immediate effect. In its high-intensity modality (MRgHIFU), it produces accurate therapeutic thermoablation in previously selected brain targets. Importantly, the production of the lesion is progressive and highly controlled in real-time by both neuroimaging and clinical means. MRgHIFU ablation is already an accepted and widely used treatment for medically-refractory Parkinson's disease and essential tremor. Notably, other neurological disorders and diverse brain targets, including bilateral treatments, are currently under examination. Conversely, the low-intensity modality (MRgLIFU) shows promising prospects in neuromodulation and transient blood-brain barrier opening (BBBO). In the former circumstance, MRgLIFU could serve as a powerful clinical and research tool for non-invasively modulating brain activity and function. BBBO, on the other hand, emerges as a potentially impactful method to influence disease pathogenesis and progression by increasing brain target engagement of putative therapeutic agents. While promising, these applications remain experimental. As a recently developed technology, MRgFUS is not without challenges and questions to be addressed. Further developments and broader experience are necessary to enhance MRgFUS capabilities in both research and clinical practice, as well as to define device constraints. This clinical mini-review aims to provide an overview of the main evidence of MRgFUS application and to highlight unmet needs and future potentialities of the technique.

1. Introduction

The first MR-guided high-intensity focused ultrasound (MRgHIFU) procedure for brain ablation using the currently marketed ultrasound device was conducted in 2008 in Zurich, Switzerland, in the context of a study of patients with pain of neural origin [1]. A few years later, in 2011, MRgHIFU ventral-intermediate (Vim) thalamotomy (i.e., ablation of the thalamic Vim) was innovatively performed by a Virginia group (USA) to treat a patient diagnosed with medical-refractory essential tremor (ET) [2]. A long history of technical developments and preclinical studies had preceded the application in humans of this then-new technology [3]. The preliminary evidence of efficacy and safety, particularly for treating ET, shook up the field of functional neurosurgery and succeeded in being published in highly impactful medical journals [2,4]. Over the 10-year period since those seminal publications, MRgHIFU has experienced a rate of expansion rarely witnessed in the history of new therapies. The proliferation of centers worldwide that have acquired the device, along with published studies and treatment trials, has been remarkable. In 2022 alone, nearly 4000 treatments were performed, marking a tenfold increase in just five years [5]. Accordingly, the advent of this new therapy has notably reshaped the field of functional neurosurgery for movement disorders. With ET and Parkinson's disease (PD) as the two main and established indications, the accumulated body of evidence and experience has already provided us

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