

## MRI safety

### MRI and fixed orthodontic appliances

Sir, we were recently requested by a radiologist to remove the fixed orthodontic appliances, prior to magnetic resonance imaging (MRI) of the brain of a 15-year-old girl who sustained a traumatic brain injury in a road accident.

MRI uses magnetic fields, electric field gradients and radiowaves to produce images of the body in multiple planes. It is one of the safest medical imaging procedures currently available as it does not expose the body to harmful radiation and the images show superior soft tissue contrast to CT scans and plain films.

However, motion blur and metal artefact are significant obstacles in achieving a quality MR image.

Ferromagnetic materials, such as iron and nickel, are strongly attracted to magnets and therefore may be moved or accelerated towards the magnet and the function of some devices, such as pacemakers and hearing aids, can be affected if placed near to or within the magnetic field.

They are also known to cause large magnetic field distortions and signal loss resulting in artefact. It is widely known that all metallic removable appliances should be removed prior to MRI but metal dental filling materials do not require removal because they do not dislodge, and titanium, gold and amalgam do not reduce MR image quality of the oral and maxillofacial region.<sup>1</sup>

However, fixed orthodontic appliances are commonly made from stainless steel which has been found to cause more signal loss and image distortion compared to the less commonly used titanium and ceramic, therefore there is a general consensus that stainless steel wires should be removed before MRI to reduce the risk of image artefact, interaction with magnetic field, and possible thermal damage.<sup>2</sup>

Orthodontic brackets are considered to be 'MRI safe' but their stability should be meticulously checked and their proximity to the area of interest determined. Generally, the larger the distance between the orthodontic appliance and the area to be imaged the less image distortion, therefore the decision to remove orthodontic appliances should be based on the appliance composition and the area to be imaged.<sup>2</sup>

However, when imaging the cranium, stainless steel brackets cause significant distortion, rendering several cranial regions non-diagnostic and therefore should be removed when imaging this area.<sup>3</sup>

If the clinician cannot be sure about the type of material, all dental appliances should be treated as MRI unsafe. In this case, we did not know which orthodontic system had been fitted and therefore the material it was made from so removal of the fixed orthodontic appliances was completed prior to MRI.

Unfortunately, in the Paediatric Critical Care Unit it was not possible to remove the composite which bonded the appliance to the teeth; composites contain ferric oxide but it is considered to be an insignificant metal content which could potentially cause distortion at the tooth surface and therefore would not interfere with the image quality of an MRI brain.<sup>4</sup>

G. Stonier and P. Hardee, by email

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## Advertising

### Giacomo Puccini in dental history

Sir, Giacomo Puccini (1858–1924) was one of the most famous Italian opera composers, author of several renowned works, such as *La bohème* (1896), *Tosca* (1900), *Madama Butterfly* (1904) and *Turandot* (1924).

It is less known that at the beginning of the twentieth century, Puccini wrote some verses dedicated to a toothpaste.

In 1902, the German company Dresdner Chemisches Laboratorium Lingner, founded by Karl Augustus Lingner (1861–1916) in 1888, asked Puccini to advertise its new toothpaste Odol, one of the first dental products which combined cosmetic and medical effects, thanks to the addition of antiseptics.

The Italian author composed an ode to the toothpaste, using numerous plays on words around the brand's name.

The verses were published in the Italian journal *Rivista Italiana* in June of the same year, contributing to the success of the product, but also to the diffusion of the utilisation of toothpaste among Italians.

In conclusion, at the beginning of the last century, the internationally renowned figure of Giacomo Puccini played an important and often-forgotten role in the development of oral hygiene, and, therefore, in dental history.

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## CBCT scans

### Teleradiology services

Sir, CBCT scans are increasing in prevalence and there has been a longstanding request from practitioners as to the provision of specialist radiology reports.

As readers will be aware, all radiographic images are required by law to be evaluated (reported) according to IRMER. Non-specialist radiologists may report scans themselves, many having attended a CBCT reporting course; however, practitioners may also wish to have scans reported (or give a second opinion) by a specialist.

GDC registered specialists/consultants in dental radiology are mainly limited to larger dental hospitals so it is likely they will be in a different physical location. This practice is called teleradiology and has been present in medical radiology for several years already.

In a Royal College of Radiology (RCR) census from 2009, teleradiology was present in nearly 40% of hospitals.<sup>1</sup>

The RCR have written guidelines<sup>2</sup> on the provision of teleradiology for medicine and in the absence of dental specific guidance, these guidelines can be extrapolated to dentistry.

The RCR has produced standards for teleradiology but there are two particular standards which dental practitioners should be aware of.

One strand says: 'There should be clear and transparent systems in place for rapid, secure transfer and review of images and, where necessary, storage of patient data.'

A secure data transfer service should be used, such as 256-bit encryption. Non encrypted images on CDs/USB keys sent in the post are unlikely to satisfy this requirement.