

## LETTER TO THE EDITOR

**To beam or not to beam: that is the question: Author response**

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In response to the letter by Aps<sup>1</sup> concerning our papers published in DMFR<sup>2</sup> and the September 2012 issue of the European Journal of Paediatric Dentistry (EJPD),<sup>3</sup> we would like to provide clarification and evidence of the careful approach taken to the orthodontic and radiological procedures employed in these studies.

Importantly, we would like to clarify that the authors do not use ionizing radiation as a daily orthodontic diagnostic tool. Careful dosage and ionizing radiation should be used only in specific clinical conditions such as impacted canines, supernumerary teeth and temporomandibular joint arthritis, and in planning orthognathic surgery.<sup>4</sup>

As was reported clearly in the article and could be seen easily in the figures, all patients in the study sample presented with severely displaced maxillary canines. Canine impaction is one of the clinical conditions in orthodontics for which evidence-based research for the clinical application of three-dimensional (3D) imaging exists. Thus, the primary indication for the low-dose CT was to evaluate the position of displaced intraosseous canines in the maxilla. These data cannot be detected using dental casts. While it is true that the position of the crown determines the surgical approach and direction of traction, the direction of eruption and location of the root apex play important roles in the orthodontic mechanics, avoiding damage to adjacent teeth and improving the effectiveness of canine traction.<sup>5</sup> Hofmann et al<sup>6</sup> developed a system on 3D imaging that allows for accurate evaluation of the position of the displaced canines relative to three spatial planes. The Department of Orthodontics at the University of Rome "Tor Vergata" is specialized in the treatment of impacted canines often associated with other dental anomalies such as supernumerary teeth and missing or peg-shaped lateral incisors.<sup>7,8</sup> Consequently, we applied the protocol reported in several papers<sup>9–12</sup> demonstrating that rapid maxillary expansion (RME) is an orthopaedic procedure that improves the initial intraosseous position of the canines and increases the rate of eruption of palatally displaced maxillary canines compared with an untreated control group.

The present study sample is a very unique sample in the literature, and it allowed for scientific investigation

of the skeletal, dental and periodontal effects of RME, one of the procedures most commonly applied and most debated in orthodontics. All of these effects (which cannot be derived using dental casts only) were analysed using the same sample in different publications by our research group.<sup>2,13–16</sup>

The imaging protocol in the present study was carefully planned with our radiologist to minimize patient dosage in low-resolution and small field of view (FOV) image acquisitions. The trained radiology technician reduced the voltage to the lowest possible level (80 kV) and restricted the area investigated strictly to the maxilla, adapting the FOV from a minimum of 6 cm to a maximum of 13 cm. Despite this, the accuracy of the measurements performed was not compromised. With this careful imaging protocol, the radiation dosage of three low-dose CT scans, considering their stochastic effect, is much smaller and not comparable to one multislice skull CT.

The two images published in the EJPD demonstrate, contrary to what is claimed by Professor Aps, the high level of standardization involved where imaging acquisition was carried out by a single radiographer at the same scanner console, and the careful positioning of the patients' heads. Head position was standardized using perpendicular light beams, and the axial CT images were reconstructed always as parallel to the palatal plane and passing through the trifurcation of the right upper first molar, with the same method reported in numerous previous articles.<sup>17–28</sup> For this reason, it was not necessary to add a figure; in addition, with the device *in situ*, it was possible to draw clearly the circle area because the expander was located in a more occlusal position at crown level, while the axial images were at the root level of anchored tooth.

We thank Professor Aps for sharing the link to Image Gently, which is an initiative we certainly applaud. We absolutely agree that imaging as gently as possible, keeping the patient benefits and risks in mind, is our most sincere goal.

In summary, as paediatric dentists, we are guarding over the health of our young patients, and as orthodontists, it is our duty to plan a treatment as conservative as possible, especially in clinical cases that need a combined surgical–orthodontic approach. Thus, all subjects

of the study sample benefited from this research protocol and achieved successful treatment outcomes thanks to adequate treatment planning based on careful use of the right diagnostic tools.

R Lione<sup>1</sup>, L Franchi<sup>2</sup>, E Fanucci<sup>3</sup>, G Laganà<sup>1</sup>  
and P Cozza<sup>1</sup>

<sup>1</sup>Department of Orthodontics  
University of Rome “Tor Vergata”  
Rome  
Italy

<sup>2</sup>Department of Orthodontics  
University of Florence  
Florence  
Italy

E-mail: [lorenzo.franchi@unifi.it](mailto:lorenzo.franchi@unifi.it)  
<sup>3</sup>Department of Radiology  
University of Rome “Tor Vergata”  
Rome  
Italy

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