LETTER TO THE EDITOR

In vitro comparison of digital and conventional bitewing radiographs

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We would like to comment on the recent DMFR article: *In vitro* comparison of digital and conventional bitewing radiographs for the detection of approximal caries in primary teeth exposed and viewed by a new wireless handheld unit.¹

We are worried that the erroneous statements the authors make could lead practitioners to use the device improperly and without regard to operator and patient safety. Namely, there are no dosimetry studies supporting their conclusions. The authors have only looked at the image quality in an *in vitro* environment, but even more important, in our opinion, is the safety of the handheld device for the operator and patient. Holding the device can never assure a safe distance behind the X-ray machine and, furthermore, can never prevent the operator being exposed to backscatter radiation from the patient. It is for the latter that we do not agree with the conclusion of this article, especially the recommendation that the device can be used in nursing homes, paediatric dentistry and with disabled patients. What's more, this recommendation cannot be a conclusion of the article because the use of the device is not studied at all!

We are very concerned that the authors recommend the device to be used in a paediatric dental setting. The device's focus-to-skin distance is only 10 cm instead of the required minimal 20 cm. This is, therefore, not a safe X-ray device. The manufacturer should provide a longer spacer cone, a tripod to mount the X-ray machine and a remote control. Only then will an acceptable situation be provided for the patient and the operator. However, because of the low tube current of 1 mA, the exposure time will increase tremendously with greater focus-to-skin distance, increasing the risk of motion unsharpness, especially in the patient groups the authors recommend this device for.

The exposure times mentioned in the article seem convenient, but this is only due to the excessively short focus-to-skin distance and probably the absence of any soft tissue equivalent material in the setup of the study. So, *in vivo* much longer exposure times will be needed, resulting in many adverse effects for operator and patient. This issue is not discussed and in our opinion is of great interest.

We also question the fact that the focal spot is 0.8×0.8 mm. This is of minor quality compared with recent X-ray machines from various manufacturers.

The focal spot should be as small as possible to obtain a sharper image as less penumbra will be available to degrade the image. This issue is not discussed and, in our opinion, is not of minor interest.

We agree devices like these can, in certain circumstances, be the only choice, for instance, in humanitarian operations, forensic investigations in the field and in the military (field operations). However, the use of these kind of devices for "current" dental radiography should at all times be discouraged, as it gives the operators and dental practitioners a false sense of safety, while in fact they are probably prone to quite substantial amounts of backscatter radiation. The stochastic effects of these low energy photons should never be underestimated or neglected.

In the European Union the problem, as mentioned above, with these kinds of machines is recognized. Member states of the Union aim to abandon these machines for general dental use, including paediatric dentistry and for disabled patients. In the USA some states have regulations stating that the operator must be at least six feet away from the X-ray generator unless a waiver can be obtained showing that the device is both safe to the operator and the patient.

We hope that the authors, in their future research with these kinds of devices, take our concerns in mind.

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Reference

1. Ulusu T, Bodur H, Odabas ME. *In vitro* comparison of digital and conventional bitewing radiographs for the detection of approximal

caries in primary teeth exposed and viewed by a new wireless handheld unit. *Dentomaxillofac Radiol* 2010; 39: 91–94.