

Is post-mortem CT of the dentition adequate for correct forensic identification? Comparison of dental computed tomography and visual dental record

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Dear editor,

First of all, we really would like to thank you for giving us the opportunity to reply to the letter by Dr. Jackowski and Dr. Persson.

We do thank the authors for reading our manuscript that carefully and for detecting some points worthy to be mentioned and discussed:

Regarding the spatial resolution used in our study, we are totally aware of the fact that the Siemens Somatom Definition scanner itself offers a spatial resolution of 0.24 mm. However, Jackowski and Persson explicitly stress the issue of applicability of CT in cases of mass casualty. In this context, it is absolutely noteworthy that the Siemens Somatom Definition scanner represents the current high-end scanner type and is only available in distinct centers but most likely not in most disaster scenes. Therefore, we applied a “normal” slice thickness of 0.6 mm with an increment of 0.3 mm ending up with also very thin slices and almost equal resolution as provided by the scanner itself. According to our opinion, this protocol presents a more realistic version of forensic dental CT.

Regarding the second point of criticism in terms of the use of the extended CT scale, we have to admit that the statement in the text might be misleading, but it is incredibly helpful that such experienced colleagues as Drs. Jackowski and Persson comment on this issue. In any case, we were aware of the fact that the extended CT scale is of course only effective on reconstructed images.

For the point regarding streak artifacts, it is known that Jackowski et al. have published an article on the use of ultra-high-resolution CT of the dentition for the differentiation of dental foreign material, using the identical CT we did (Somatom Definition, Siemens Medical Solutions) [1]. However, in their article, only six different materials were analyzed using six single teeth which were not examined as in natural dentition but with a certain interspace, thus resulting with less or even no artifacts, especially in terms of streak artifacts. But in this context, the readers should know that more than 25,000 different materials for dental fillings or replacements exist [2]. It is obvious that such a large variety of materials cannot be safely differentiated with CT; even the clear differentiation of the six materials described by Jackowski et al. with dental PMCT was achieved. CT uses measurements of material density for differentiation, which, in other words, is a measurement of specific X-ray absorption by the material itself. In knowledge of the absorption characteristics of different materials, it is also obvious that a sharp differentiation of all of the implants cannot be warranted by CT alone. For identifying persons in case of mass catastrophes with CT alone, one has to be aware that this method bears a considerable risk of errors.

In this context, we disagree on their comment trying to emphasize that the CT methods used are not state-of-the-art for dental imaging which is not true since we were studying dental post-mortem CT for forensic identification and not for use on patients. Thus, our conclusions are based on solid data.

In addition to the comment on Fig. 2f, we have to admit that the image was vertically flipped, since the right side was turned to the left and vice versa, but there we can definitely exclude a mixture of the upper and lower jaw and, consequently, no false exclusion would

Response to Letter to the Editor by Jackowski C

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have resulted which probably was suspected by the authors of this letter.

In conclusion, we agree that post-mortem CT of corpses including the dentition is a feasible possibility and should be evaluated in more detail. In case of a mass catastrophe, it should be performed to gain objective data and experience in the adequate evaluation. At this time, there is not enough valid data from such an event to definitely state if this method can be safely used alone for individual identification. Consequently, it should be used only in addition to the gold standard in terms of visual dental record in reference to our work because there is still space for objective and

observer-independent data which are not contradictory to starting data acquisition anymore today.

References

1. Jackowski C, Wyss M, Persson A, Classens M, Thali MJ, Lussi A (2008) Ultra high resolution dual source CT for forensic dental visualization—discrimination of ceramic and composite fillings. *Int J Leg Med* 122:301–307
2. Jakstadt H A, Häbeler C, Kroszwesky K. *Zahnärztliche Werkstoffkunde—ein Arbeitsbuch*, Books on demand, GmbH Norderstedt, ISBN 3-8334-4260-3