H71 Present State and Future Prospects of Forensic Age Estimation in Living Adolescents and Young Adults: Recommendations of the Study Group on Forensic Age Diagnostics

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After attending this presentation, the attendees will become acquainted with the spectrum of methods recommended by the Study Group on Forensic Age Diagnostics for age estimation in living adolescents and young adults. Moreover, attendees will understand the influence of the ethnicity and socioeconomic status of the individuals to be examined on the systems of characteristics studied, as well as that of diseases affecting growth and development.

This presentation will impact the forensic science community by demonstrating the complexity of forensic age estimations in living individuals. Age estimations performed *lege artis* are of great sociopolitical significance as they reinforce legal certainty.

As a result of increasing cross-border migration movements, recent years have seen a rise in numerous countries in the numbers of immigrants whose birth date is not unequivocally documented. Because of this development, forensic age estimations in living adolescents and young adults have become an integral part of forensic practice. The persons to be examined are foreigners without valid identification documents who appear to have misstated their age, which is of legal significance in criminal, civil, and asylum procedures.

The interdisciplinary Study Group on Forensic Age Diagnostics was founded in the year 2000 in Berlin, Germany. According to the recommendations of this study group, a physical examination, an X-ray examination of the hand, and a dental examination which records dentition status and evaluates an orthopantomogram should be carried out. In cases where skeletal development of the hand is complete, an additional radiological examination of the clavicles should be used.[1]

Besides anthropometric measurements such as height, weight, and constitutional type, the physical examination covers the externally recognizable signs of sexual maturity. The physical examination is of particular significance in excluding potential externally recognizable age-relevant diseases and checking whether the results of the skeletal and dental age determination are consistent with the development of the organism as a whole.

Criteria in evaluating the hand radiograph are the shape and size of the individual bone elements and the state of ossification of the epiphyseal plates.

Of particular relevance in the dental examination are the stages of eruption and mineralization of the third molars.

After skeletal development of the hand is complete, assessment of the state of ossification of the medial clavicular epiphysis plays a decisive role. Reference studies are available both for projection radiography and for computed tomography.

To increase reliability and improve the detection of age-relevant developmental disorders, all the above methods should be used. In this process, each part of the examination should be performed by a specialist with forensic experience.

As a rule, no forensically applicable reference studies are available for the regions of origin of the persons to be examined, giving rise to the question of whether serious developmental differences exist between the different ethnic groups which would preclude application of the relevant age standards to members of ethnic groups other than that of the reference population. Within the relevant age group, ethnicity has no appreciable influence on skeletal maturation. The rate of ossification is primarily dependent upon the socioeconomic status of a population. A comparatively lower socioeconomic status leads to a delay in development and, when standard reference studies are applied, to an underestimation of age. In the case of the eruption and mineralisation of the third molars, it has been determined that Black Africans manifest an accelerated development in comparison to Europeans. By contrast, in the case of Asians, a comparative retardation is to be reported. For this reason, population-specific reference studies must be used in assessing third molar development for the purposes of age estimation practice.

In the future, it is to be expected that radiation-free imaging techniques will increasingly be used for assessing skeletal maturation and tooth development. First ultrasound studies have been undertaken on ossification of the radius, pelvis, and clavicle. Furthermore, MRI studies on ossification of the radius, knee, and clavicle have been published. Most of these studies do not fulfill the requirements of forensically usable reference studies. There is a need for further research in this area.

Reference:

1. Schmeling A, Grundmann C, Fuhrmann A, Kaatsch HJ, Knell B, Ramsthaler F, et al. Criteria for age estimation in living individuals. Int J Legal Med 2008;122:457-460.

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