



## Physical Anthropology Section – 2005

### H74 The Effects of Cerebral Palsy on Age Indicators in the Human Skeleton

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Attendees will learn how systemic diseases like cerebral palsy may have dramatic effects on skeletal indicators of age at death.

This presentation will illustrate the potential effects of systemic disease on skeletal indicators of age at death and address how such diseases can impact other aspects of a forensic case, such as identification.

In 2002 the authors were asked to examine human remains believed to be those of a 25-year-old male with a known history of severe cerebral palsy (CP). While the circumstantial evidence for a correct identification is compelling, there are significant inconsistencies between the biological profile indicated by the remains and the profile of the missing person. Most of the age indicators on the skeleton suggest an age of 12-18 years at the time of death with the highest likelihood at around 15 years (10 years younger than the known age of the victim). Since current estimates place the number of individuals with some form of CP in the United States at around 500,000, it is important to know if this case is an exception or if such variation is to be expected in known or suspected cases involving cerebral palsy. This paper has two objectives. First, a case is presented involving a CP patient and attendant maturational disparities to the forensic anthropology community; and second, the authors report on existing medical literature on the effects CP on growth and maturation.

The skeletal remains in question presented with unfused long bone epiphyses and sphenoccipital synchondrosis and partially fused ilium, ischium, and pubis. According to the anthropological literature on skeletal development in the general population, such conditions are associated with an age at death of 12-18 years. In general the skeleton is unusually gracile and individual bones are quite small. In addition, the remains display several developmental anomalies, such as proximal epiphyses on the 2nd metacarpals and a midline defect on the anterior arch of the first cervical vertebra. In contrast to the immature developmental indicators, dental attrition is extensive and suggestive of a much older individual. It is possible that this wear is related to the involuntary contraction of jaw muscles, a condition often associated with CP.

The effects of systemic disease on rates of skeletal maturation are poorly understood. For example there are indications that acromegaly may lead to premature suture closure (Marushia, M. and N.J. Sauer 1997) and diseases like osteoarthritis may suggest that a skeleton represents a much older individual. With respect to CP, Worley, *et al.* 2002 report on a cross sectional study of 207 affected children, that the completion of sexual maturation was significantly delayed compared to the general population. It may be that there is a causal relationship between delayed sexual maturation and skeletal development. This relationship in general and with respect to congenital diseases warrants further study.

Forensic anthropologists need to be aware of the variation in age indicators that may be associated with certain systemic diseases. This case is an important warning for anthropologists pay attention to indicators of disease stemming directly from the remains under study or from supporting documentation such as medical records.

#### Age Indicators, Cerebral Palsy, Dysmaturation