

## Image Analysis

The experienced forensic anthropologists at Cellmark can undertake examination of images in conjunction with the research required to obtain correct reference population data.

This research is an essential part of analysis as studies have shown that different ethnic groups achieve skeletal maturity at different rates and this must be taken into consideration when interpreting results.



Our team will also be able to advise on protocols relating to informed consent.

The Cellmark forensic anthropologists who provide this service are both professionally accredited with the Royal Anthropological Institute at the most senior level (Cert FA-I). They are also members of the European Study Group on Forensic Age Diagnostics.

IDENTIFICATION  
INTERPRETATION  
INNOVATION

## ANTHROPOLOGY IMAGE ANALYSIS - enhancing the evidence



Specialist analysis  
of x-rays and  
CT scans

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## Introduction

In both criminal and civil investigations there may be a need to estimate the age of a living person when the age of the individual is either not known or is under dispute. Experienced and suitably qualified forensic anthropologists are able to undertake this type of analysis using x-rays, CT scans and other types of imagery.

They can also look for indicators of stress in the skeleton which may provide good supportive evidence in cases of suspected child neglect or abuse.

This leaflet provides you with details of how the forensic anthropologists at Cellmark can assist you in these types of cases. Further information on our full range of laboratory and scene services relating to identification of the deceased, analysis of burnt and dismembered remains and interpretation of circumstances surrounding death and disposal of remains, can be found at [www.cellmarkforensics.co.uk](http://www.cellmarkforensics.co.uk) or by calling the team on 01235 528609 to discuss how we can help you get the best outcome.

## INDICATORS OF STRESS IN THE SKELETON FROM RADIOGRAPHS

Periods of arrested growth in the skeleton can be seen on x-rays in the form of transverse lines of increased radio-opacity. These are termed Harris lines and they represent episodes where the growth of the bone has temporarily stopped and then re-started.

They are most commonly found at the ends of the shafts of the femur and the tibia in the leg and the radius in the forearm and they are usually most evident between the ages of 0–3 years and 12–14 years. There is much debate regarding the cause of Harris lines but it is generally accepted that they form as a result of stress, whether biological, mechanical or even psychological.

When interpreting the lines, an individual's resistance to stress must be taken into consideration, in addition to the fact that the lines will remodel and disappear with age.

This means that the number of lines present might not necessarily correspond directly with the number of episodes in the child's life where bone growth stopped.

For this reason, when undertaking this type of examination, it is a good idea to also examine the teeth for evidence of periods of arrested growth.



Delayed skeletal development and / or retarded growth of long bones may also be an indication of ill health or physiological stress. Measurements of long bones can be taken from radiographs, which can then be compared to normal standards for different ancestral groups. X-rays and CT scans can also be used to assess the stage of development of individual bones and secondary centres of ossification (epiphyses).

Data derived from x-rays can be compared to actual chronological age (how old the individual is thought to be) in order to assess whether skeletal growth and development is within a normal range and whether there have been periods of arrested growth.

Evidence of delayed skeletal growth and development and the presence



of Harris Lines do not necessarily mean that a child has been ill-treated, abused or is malnourished but they can provide indications of stress to the skeleton that may be related to such factors.

This type of evidence is best used in conjunction with assessment from other specialists and medical experts such as dentists and paediatricians.

The combined findings may then provide powerful evidence in cases of suspected child abuse, neglect, manslaughter or murder.

Cellmark forensic anthropologists have undertaken work on a number of such cases, including some in which their evidence resulted in successful prosecutions for manslaughter by gross neglect.

## ESTIMATION OF AGE IN THE LIVING

Recent years have seen an increase in the requirement for forensic age estimations in the living. This now takes place in cases where there is no verified information about the age of a person suspected of a criminal offence, where it is suspected that a convicted criminal is providing false information about his/her age, illegal immigration, people trafficking, suspected forced marriage, child labour or unaccompanied minors.

Age estimation can be undertaken by examination of skeletal and dental x-rays in conjunction with the physical examination of the individual by a physician. Age ranges have been calculated for the development of each skeletal element and the anthropologist uses these to estimate age at death in the developing skeleton.

Typically x-rays of the left hand, wrist and chest of the individual concerned will be examined and the stage of skeletal development and maturity observed will be compared to appropriate reference data.

This is best done in conjunction with examination of dental x-rays by a dentist. It will rarely be possible to provide a single value age, therefore, age ranges that take into account margins of error will always be given. The margins of error will depend on the individual concerned and it is often possible to be more precise in younger individuals.

Cellmark forensic anthropologists have been involved in a number of important cases in which their evidence on 'age estimation in the living' has resulted in the convicted person being sentenced as an adult rather than as a juvenile.

