



## Physical Anthropology Section - 2012

### H90 A Radiographic Positive Identification from a Foot Altered by Diabetes Mellitus

*Jennifer M. Vollner, MS\*, 355 Baker Hall, East Lansing, MI 48824; Carolyn V. Hurst, MA, 354 Baker Hall, East Lansing, MI 48824; Julie M. Fleischman, MS, 6138 Farrington Court, #D10, East Lansing, MI 48823; and Todd W. Fenton, PhD, Michigan State University, Department of Anthropology, 354 Baker Hall, East Lansing, MI 48824*

The goals of this presentation are to reveal how quickly destructive skeletal changes can occur in cases of diabetes mellitus and to demonstrate that even in the event of advanced stages of diabetes, comparative medical radiography can be successfully employed to make a positive identification.

This presentation will impact the forensic science community by addressing how the growing epidemic of diabetes may potentially impact forensic casework and strategies for successfully meeting this challenge.

Forensic anthropologists are routinely called upon to positively identify individuals using comparative medical radiography. Such cases are made more difficult when there is a significant amount of time between the antemortem and postmortem films. Since bone is a living tissue, it is subject to continual remodeling over a person's life. Work by Sauer et al. (1988) reported that despite normal progressive bone maintenance and degenerative change over time, it was still possible to positively identify individuals using antemortem radiographs taken ten to twenty-three years prior. What has not been accounted for is the utility of comparative medical radiography in the cases of diseases, like diabetes mellitus, that significantly impact skeletal structures.

The growing epidemic of diabetes in the western world means more individuals will be passing through forensic laboratories afflicted with this disease. Thus, it is imperative that forensic scientists understand the disease process and its timing for appropriate interpretations and analyses. Although the exact mechanisms for skeletal changes are debated in the clinical literature, it is agreed that diabetes can have an impact on bone mineral density.

The complicated nature of such changes is highlighted by a forensic case in which comparative medical radiography was employed to make a positive identification. The decedent had suffered from hypertension and diabetes, with a history of hospitalization for a diabetic coma. The antemortem radiograph was an anterior-posterior film of the left foot taken five years prior with no noticeable osseous pathology. Examination of the postmortem radiographs revealed that the distal half of the first metatarsal and the associated proximal and distal phalanges had completely resorbed. The second metatarsal displayed resorption of its distal aspect in conjunction with prolific ossification around the mid-shaft. The remaining phalanges, with the exception of the proximal fourth and fifth, all showed either degenerative or proliferative changes. These changes are consistent with Aufderheide and Rodríguez-Martin (1988: 342) who report that diabetes induced ischemia may cause bony breakdown of the distal metatarsals and proximal phalanges and, without treatment, may eventually lead to gangrene of one or more toes.

Despite the significant skeletal alterations that had occurred in the five-year period between the decedent's antemortem medical radiograph and the postmortem films, it was still possible to use overall morphology, trabecular patterns, cortical bone thickness, and osseous spurs to make a positive identification.

As forensic practitioners, it is important to recognize the extreme osseous changes that can occur in a relatively short period of time with diabetes mellitus. Although it is possible to successfully employ traditional radiographic identification methods in these cases, they must be applied conservatively and within the bounds of sound practice.

**Positive Identification, Comparative Radiography, Diabetes Mellitus**