EVIDENCE OF SCURVY IN MEDIEVAL EASTERN EUROPE:
A possible case from Giecz, Poland

Amanda M Agnew[1,2], Hedy M Justus[1,2], Sam D Stout[1]

[1]The Ohio State University, [2]The Slavia Foundation

INTRODUCTION

Vitamin C is obtained by humans only from dietary sources such as fresh fruits and vegetables. Vitamin C deficiency results in scurvy and its presence can aid in establishing dietary and socioeconomic patterns as well as reconstructing health in past populations.

Without necessary levels of vitamin C, collagen synthesis is impaired. Collagen is a major component of bone and other connective tissues. Osteoid formation is hindered and susceptibility to hemorrhage increases as a result of weak vessels devoid of collagen[1]. A small amount of mechanical stress, even normal movement like chewing, can induce the rupture of capillaries and lead to bleeding into the skin and beneath the periosteum[2]. Increased vascularity results in abnormal amounts of bone porosity, and allows for the movement and removal of accumulated blood from the site of inflammation. As Brickley and Ives[3] assert, it is the pattern of abnormal porosity that is most convincing in diagnosing scurvy in archaeological populations.

Giecz

Two hundred and thirty seven burials have been excavated to date from the medieval cemetery (XI-XII c.) in Giecz, Poland (Gz4). The population at Giecz is important because it existed during the transitional period when the first Polish state was established. The village of Giecz was one of four major economic, political, and religious centers in Wielkopolska at the time[4]. Only one of 85 subadult skeletons in the Giecz Collection exhibits bony changes consistent with scurvy.

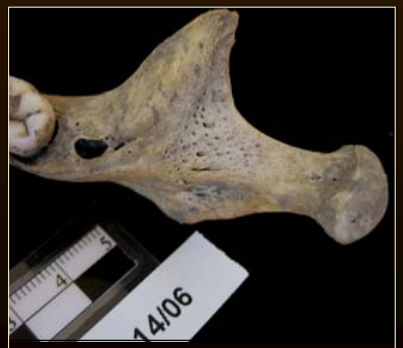

Figure 1. Abnormal porosity on medial right coronoid process of mandible

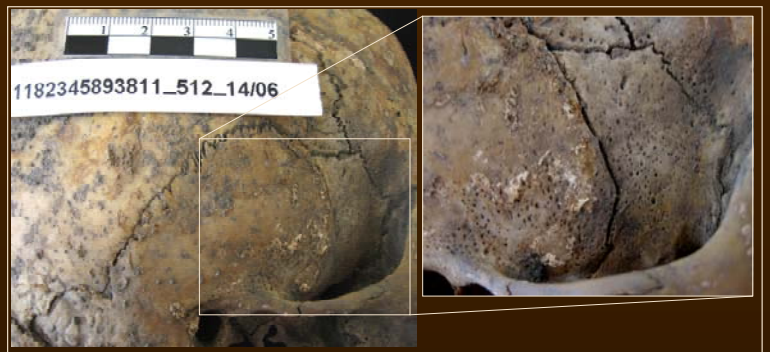

Figure 2. a) Right temporal region (above left). b) Detail of greater wing of right sphenoid (above right)

RESULTS: Case study

Grave 14/06 is the skeleton of a 5-6 year old child. The combination of skeletal lesions on this individual suggesting scurvy is present:

- Abnormal porosity is seen on the medial portion of both left and right coronoid processes of the mandible, insertion sites of the temporalis muscle, where the mechanical stress of chewing causes hemorrhage and associated porosity[5] (Figure 1).
- Abnormal porous lesions are observed bilaterally, extending along the superior aspect of the external auditory meatus, anteriorly across the temporal bone, and covering the greater wing of the sphenoid. Involvement of the nearest portion of the parietals and frontal bone is also noted (Figure 2). Ortner et al[5] suggest this particular lesion is the most diagnostic of scurvy and is linked to abrasion of the vascular supply to the temporalis muscle with chewing.
- Antemortem loss of the right and left first deciduous mandibular molars is observed with no plainly visible evidence of permanent tooth formation or eruption below. Associated alveolar resorption is also present (Figure 3). Clinical symptoms of scurvy include chronic bleeding of the gums and tooth loss due to the continued stress of chewing[6].
- Porotic hyperostosis is present bilaterally as discrete circular patches (approx. 2 cm in diameter), on the posterior-lateral parietals extending onto the occipital. Minor cribra orbitalia is also observed as slight pitting along the anterior portion of the left and right orbital roofs. Porotic hyperostosis is a well-known *non-specific* indicator of infection, but observed within this context, contributes to a diagnosis of scurvy.
- The scapular spinous processes have an irregular woven appearance and possible periostitis. It extends the full length of the spine but not into the infraspinous or supraspinous fossa of either scapulae. Woven bone formation is common in children with scurvy. The periosteum is not tightly attached to the bone and as swelling and bleeding increase, new bone formation is induced[2].
- However, there is no evidence of periostitis of long bones or abnormal porosity of the maxilla, zygomatic bones, or supraspinous fossae of the scapulae, all typical sites for scorbutic lesions to manifest[3].

DISCUSSION

Assuming the sample excavated from Giecz is representative, finding only 1 skeleton exhibiting signs of scurvy, suggests that scurvy was not a significant problem in this medieval Polish population. It is important to consider that almost 36% of the population died before reaching maturity, and of those immature individuals 34% died before reaching 2 years of age. Although most individuals from this subadult sample exhibit no skeletal evidence of pathological lesions, scorbutic changes can take as long as 10 months to appear on the skeleton[7]. It is also likely that acute conditions had a greater affect on immature individuals than chronic conditions, and that even if scurvy were present it may have been secondary to more serious conditions. Therefore, finding little evidence of scurvy in these skeletal remains does not imply near absence of the condition in the population. It is also possible that other nutritional deficiencies have inhibited the expression of scurvy, causing scorbutic lesions to appear with less severity. In addition, this child is beyond the age of rapid growth when hemorrhaging of weakly developed vessels would have been greatest[7], perhaps contributing to the seemingly mild expression of skeletal lesions.

Along with state formation in medieval Poland came increased sedentism, an increased reliance on agriculture, and an increase in population density at Giecz[4]. These changes are likely to have had a significant impact on the general health of the population. For these reasons it is imperative that indicators of health from the Giecz Collection be described and compared to spatially and temporally similar *and* different populations in order to begin to understand the history of scurvy and factors contributing to health in medieval Eastern Europe. To our knowledge, no other reports on prevalence of scurvy in medieval Poland have been published. Future research will attempt to establish the prevalence of scurvy among the skeletal remains at Giecz and provide data for broader temporal and geographic comparisons.

Figure 3. Antemortem mandibular tooth loss

REFERENCES CITED

1Anfelter heide A, Rodriguez-Martin C. 1998. The Cambridge Encyclopedia of Human Paleopathology. Cambridge: Cambridge University Press. 2Ortner DJ, Ericksen M. 1997. Bone changes in the human skull probably resulting from scurvy in infancy and childhood. Int J Osteoarchaeol 7:212-220. 3Brickley M, Ives R. 2006. Skeletal manifestations of infantile scurvy. Am J Phys Anthropol 129(2):163-172. 4Kwiatoñiak T. 2003. Giecz. In: Polcyn M, I Polcyn, T Gray, editor. Slavia Project Handbook. 7th ed. Lednicze: Slavia Foundation. p 43-45. 5Ortner DJ, Kimmerle EH, Diez M. 1999. Probable evidence of scurvy in subadults from archeological sites in Peru. Am J Phys Anthropol 108(3):321-331. 6Fain O. 2005. Musculoskeletal manifestations of scurvy. Joint Bone Spine 72(02):124-128. 7Ratanachu-Ek S, Suksawa P, Jeerathanyasuk Y, Wongtapradit L. 2003. Scurvy in pediatric patients: A review of 28 cases. J Med Assoc Thai (Suppl) 86:S734-740.

ACKNOWLEDGEMENTS

The Slavia Foundation: Teresa Krysztofiak, Marek Polcyn

The Ohio State University Department of Anthropology: Clark S Larsen