

Activity: Can You Identify Disease in Bone?

Introduction

Many things can leave marks on or in the skeleton - labor, activity, trauma, and even disease. However, not all illnesses affect the skeleton. The diseases that leave marks tend to be conditions that have lasted months or years.

Diseased bone forms abnormally or loses tissue, leaving holes or lesions. How a disease affects the bone and where on the skeleton these changes appear are clues to determining what specific disease processes were at work.

Cancer

Changes in bone can be characteristic of a specific condition. For example, certain cancers can cause bone loss and lytic destruction (cell damage). The hip bone in Figure 1 shows lytic destruction from metastasized uterine cancer. Figure 2 shows a cranium with bone destruction from metastasized breast cancer.



Figure 1. Hip bone showing destruction from uterine cancer. Smithsonian photo



Figure 2. Skull showing the effect of metastasized breast cancer. Smithsonian photo

Tuberculosis

Tuberculosis is another disease that can cause characteristic bone destruction and abnormal bone formation. In the cases below, tuberculosis is evident in the spinal columns of two individuals.



Figure 3. Spinal column bone destruction from tuberculosis. Smithsonian photos

Other Chronic Infections

Bony changes associated with infectious disease are usually less severe than with cancer or tuberculosis and appear as areas of abnormal bone with a plaque-like layer covering the normal bone surface. This plaque-like layer of abnormal bone is often caused by chronic infection.



Figure 4. Plaque on surface of bone caused by chronic infection. Smithsonian photo.

Teeth

Teeth also reveal evidence of disease. Tooth decay (cavities), or caries, can lead to an infection and the formation of an abscess in the jaw. Cavities in teeth allow bacteria to enter into the tooth's pulp chamber. The bacteria can then travel to the bloodstream and spread the infection other areas of the body.



Figure 5. Tooth decay. Smithsonian photo.

The Case of the Skeleton in the Cellar

Spinal Degeneration

Notes from the forensic report of the skeleton in the cellar: *Vertebrae four through 12 exhibit abnormal porosity defined by enlarged holes in the center of the vertebrae; destruction is most noted in the seventh thoracic vertebra which has erosion of the endplate margins and roughened, irregular bone in the anterior midline.*



Figure 6. Vertebrae of skeleton in the cellar showing abnormal porosity and erosion. Smithsonian photo.

Tooth Decay and Abscesses

Notes from the forensic report of the skeleton in the cellar: 19 teeth showed varying degrees of carious destruction; 2 mandibular teeth and 5 maxillary were abscessing at time of death; crowns of the maxillary 1st and 2nd premolars and the left mandibular 1st molar were completely destroyed by caries; carious lesions were evident on incisors, molars, canines, and premolars.



Figure 7. Upper and lower tooth rows from the skeleton in the cellar. Smithsonian photo.



Figure 8. Front teeth of the skeleton in the cellar. Smithsonian photo.



This page is part of the [Smithsonian's The Secret in the Cellar Webcomic](#), an educational resource from the [Written in Bone](#) exhibition, February 2009 – 2014.