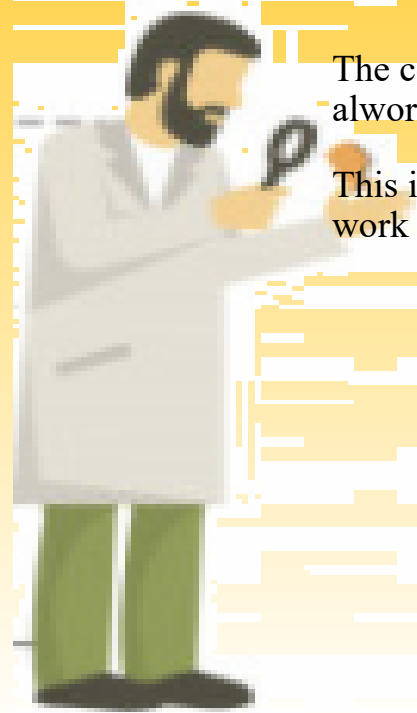


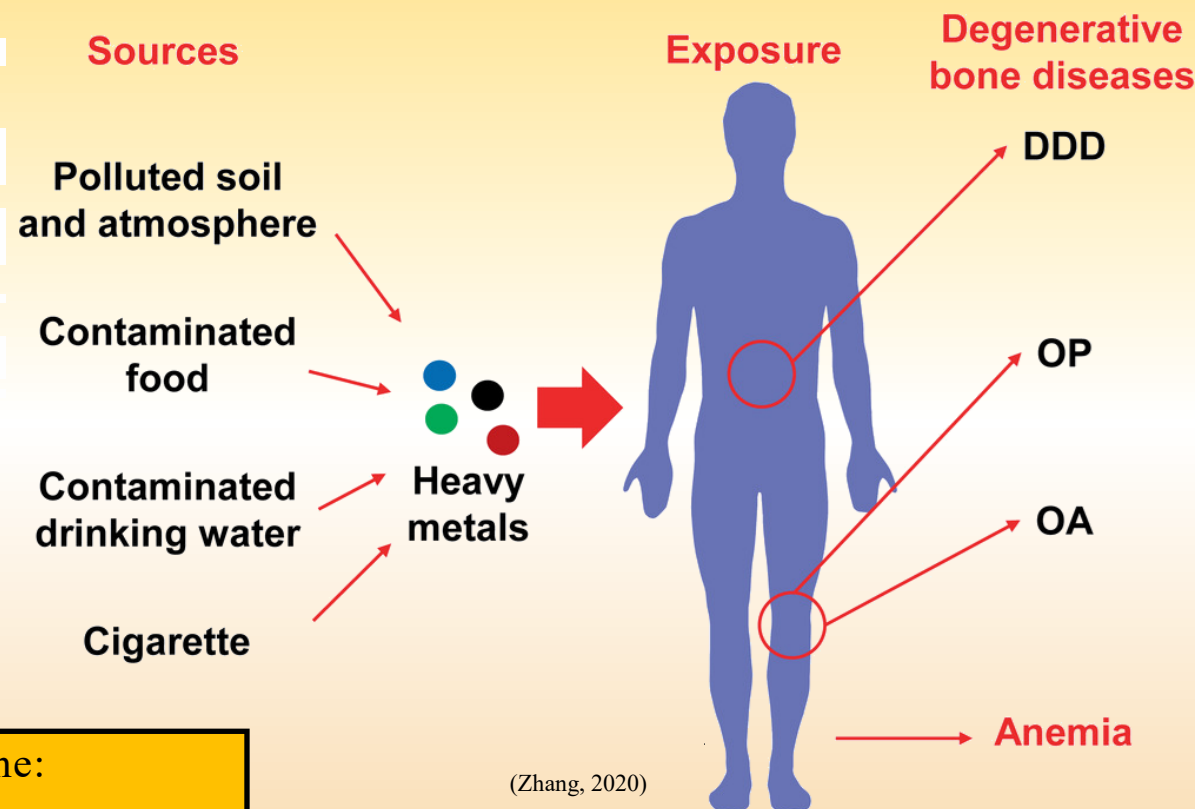
Finding if the appearance of metalwork coincides with increased levels of toxic metals in bone

What do bones tell us?



The composition of bone can tell us about advances in human metalworking technology.

This infographic explores the association between mining, metalwork and the percentage of toxic metals found in bone.



The composition of bone:

- 70% - inorganic matter
- 25% organic protein collagen
- 2% Essential trace elements
- 3% Non-essential trace elements
- These non-essential trace elements include toxic metals and materials that can be absorbed by the body into bone through food, drink and air quality.
- Movement into the bronze and iron age is presented in the increase of these toxic elements

Health impacts of toxic metal absorption

In comparison to most aspects of the human body, bone retains a greater amount of heavy metals. Whilst the capacity may change over time, this absorption of metal can be a great indicator of the living conditions for the individual's life span.. This is observed through the positive and negative effects of the bone metabolism these metals have on the main structure and composition of the bone

- ♦ This negative effect can be seen through the movement of certain metals to the edge of the main bone mass. This is due to heavy metals inhibiting bone growth, thus the higher the concentration of the metals the individual lived with.
- ♦ The positive heavy metals such as Mn can be seen throughout the bone, furthering bone growth and retaining a stable level from maturity
- ♦ The most common metals discovered within contaminated areas are Cadmium, Zinc, Copper, nickel, mercury, chromium, lead, titanium and metallic arsenic.

Metal concentrations prior to the Bronze Age

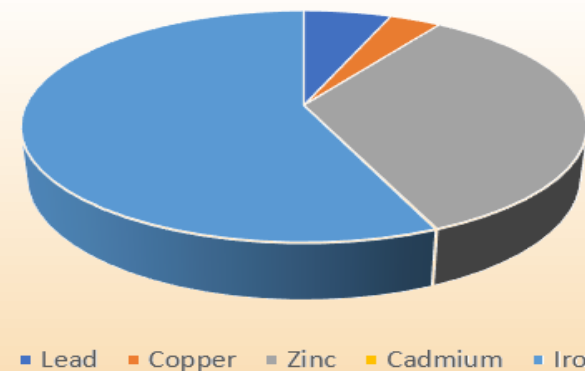


Image One

Metal concentrations from the Bronze Age to 13th century

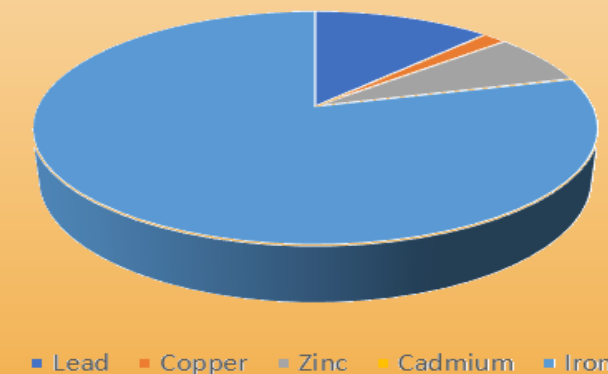


Image Two

Archaeological Connection

The development and change of metal concentrations over periods of history can be observed through previous examples of the absorption of these into the bone. According to the data seen in Image One and Two, from Martinez-Garcia's 2005 'Heavy metals in human bones in different historical epochs' which presents a clear increase in the metal percentage between the Neolithic Period, the increased copper content of the Byzantine and the shift into the Iron Age, developments of Rome with increased amounts of lead. Suggesting overall that there is a correlation between the succession of metalworking and technological development as represented in bone metal concentrations like those seen to the left.

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