

High-resolution records of past and modern Pb exposure: Laser-ablation ICPMS profiles from tooth enamel

W. MÜLLER¹, K. W. ALT², L. BONDIOLI³, B. GULSON⁴

¹ Royal Holloway, University of London, Egham, U.K.
w.mueller@gl.rhul.ac.uk

² Institut für Anthropologie, Johannes Gutenberg Universität,
D-55099 Mainz, Germany

³ Sezione di Antropologia, Museo Nazionale Preistorico
Etnografico 'L. Pigorini', I-00144 Rome, Italy

⁴ Graduate School of the Environment, Macquarie University,
Sydney NSW, Australia

We present compositional and isotopic profiles of past and modern tooth enamel aimed at reconstructing *in-vivo* Pb exposure at high spatial and time resolution. Focus is on dental enamel because of its sequential mineralization preserving time-series information, and due to its resistance to *post-mortem* diagenetic alteration. Examples include medieval Pb-Ag miners from SW Germany (Black Forest), the port of ancient Rome (Isola Sacra) for an assessment of the 'Pb poisoning hypothesis', and a modern Pb-Zn smelter village in NE NSW. (Sub-)ppb levels of U, LREEs, Y in soil-buried enamel resembling modern enamel are utilized as indicators for the preservation of pristine *in-vivo* concentrations. This facilitates the identification of *in-vivo inter-tooth* and particularly *intra-tooth* Pb concentration variations, which range from below 0.1 ppm up to 150 ppm, and exceed three orders of magnitude even for the same individual. Of particular interest is the identification of sharp Pb peaks recorded in enamel, whose existence may prove more potentially damaging to health than lower average Pb concentrations. Their identification may also improve existing blood-Pb and tooth-Pb calibrations for modern Pb exposure reconstruction. By analyzing several teeth of an individual together with detailed tooth histology (e.g. relative to the neo-natal line), detailed life time trajectories can be established together with – as will be shown – isotopic proxies of mobility (Sr, O).