MOLECULAR, ISOTOPIC AND GENETIC COMPOSITION OF HUMAN GALLSTONES: A GEOMEDICAL STUDY

S.H. Kose[1], M.J.L Coolen[1], K. Grice[1], M. Ballal[2]

[1]WA-OIGC, Curtin University, Perth, Australia
[2]Fiona Stanley Hospital, Perth, Australia/St John of God-Murdoch Hospital, Perth, Australia

Abstract

Bacteria in the greater environment are seen to be responsible for a variety of concretions i.e. stromatolites, oolites and calcium carbonate concretions. The structure and shape of their concretionary product is closely linked to the nutrients available in their immediate environment. Their environments can be ascertained by studying the molecular and isotopic structure of their fabricated products. It is believed that doing a similar study on human gallstones – as a possible by-product of bacterial metabolism, may yield similar information as to why gallstones form and the reason for their various morphologies/shapes. Long standing debates about the likelihood of biogenic or abiogenic processes developing various concretions in the natural environment are a regular point of contention when dealing with biomineralisation. The most notable of these debates centres on oolites, calcium carbonate nodules and, more recently, calcifications and lipid concretions in the human body. Although the current research has edged towards a more biogenic view with the former two topics, those involving the human body are only at the beginning of such debates. The objective of this study is to identify possible analogues between the human microbiome and the environment that lead to biomineralisation/concretionary structures within these systems. We will aim to investigate whether particular bacterial species are implicated in the crystallisation/accretion of gallstones in the gallbladder. We will compare these results with oolites; calcium concretions found abundantly in various environmental contexts where bacterial precipitation of the calcium oxalate matrix is well understood. We hope this novel approach will reveal clues to the mechanisms behind lithogenesis of gallstones in the human body.