Further studies on the mechanism of this study demonstrates that bacteria have a Ten samples were obtained from 5 Bacterial presence on the intimal surface was The presence and growth of bacteria in Ten NZW rabbits were made atherosclerotic by For each group, five samples were incubated in Bacteria have been reported present in human SD. (Fig. 2). Am J Card 21:307 2006; 28:1 The same was repeated for normal control 3 Arterial samples with atherosclerosis had Arterial tissue was sampled from the aortas Using analysis with Box-crystals will enhance bacterial growth atherosclerotic plaques (3). Both gram positive (Staphylococcus aureus) and gram negative (Pseudomonas aeruginosa) bacteria have been shown to interact with cholesterol crystals. • Bacteria have been reported present in human atherosclerotic plaques (3). In this study we investigate if arteries with atherosclerotic plaque rich in cholesterol crystals will enhance bacterial growth compared to normal non-atherosclerotic arteries in a rabbit model.

Background

In previous reports we demonstrated that cholesterol occupies greater space when crystallizing from a liquid to a solid state forming sharp tipped crystals that can tear fibrous membranes (1,2). Similar findings have been noted in human coronary arteries of patients dying with acute myocardial infarction (Fig. 1).

Methods

- Ten NZW rabbits were made atherosclerotic by balloon de-endothelialization and feeding a cholesterol enriched diet for six months.
- Arterial tissue was sampled from the aortas after euthanasia and placed in a washer ring to expose only the intimal surface to a broth solution with Staphylococcus aureus (Fig. 2).
- The same was repeated for normal control rabbits fed normal rabbit chow without intimal injury.
- Ten samples were obtained from 5 atherosclerotic rabbits and 5 normal controls.
- For each group, five samples were incubated in broth for 1 h and another five samples were incubated for 3 h. Bacterial colony counts were measured at each time interval.
- Bacterial presence on the intimal surface was examined by scanning electron microscopy (SEM) from additional arterial samples exposed to bacteria.

Results

- Arterial samples with atherosclerosis had significantly higher bacterial count compared with the normal controls (Fig. 3).
- Using analysis with Box-Cox transformation of bacterial count there was a significantly higher bacterial count present in atherosclerotic arteries compared with normal controls (p<0.0001), (Fig. 4).
- By SEM Staphylococcus aureus bacteria were found attached to cholesterol crystals in the atherosclerotic arteries and appeared to be dissolving them (Fig. 5).

Conclusion

- This study demonstrates that bacteria have a high affinity to cholesterol crystals in arterial tissues rich in cholesterol crystals.
- The presence and growth of bacteria in atherosclerotic plaques have the potential of destabilizing the plaque leading it to rupture.
- Further studies on the mechanism of interaction between bacteria and cholesterol crystals need to be performed. However, a plausible explanation for our findings may be related to bacteria utilizing cholesterol as a source of nutrition.

References