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Biopharming *Carica papaya* compounds with anti-Proteus activity: The potential for the treatment and prevention of rheumatoid arthritis

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Introduction. Previous studies have reported field grown *Carica papaya* leaves to have antibacterial activity. However, *Carica papaya* has not been studied for the ability to block the bacterial triggers of autoimmune inflammatory diseases. Furthermore, studies into the bioactivity of the roots are lacking.

Aims. The current study was undertaken to test the ability of *Carica papaya* root extracts for the ability to block the microbial triggers of autoimmune inflammatory diseases and to use metabolomics fingerprint analysis to detect anti-inflammatory compounds.

Methods. *Carica papaya* roots were grown *in vitro* under controlled/standardised conditions. The roots were extracted with solvents of varying polarity and investigated for the ability to inhibit the growth of several bacterial triggers of autoimmune inflammatory disorders. The most promising extract was further analysed by RP-HPLC coupled to high accuracy TOF mass spectroscopy.

Results. The *Carica papaya* root extracts displayed potent inhibitory activity against the bacterial trigger of rheumatoid arthritis (*P. mirabilis*). However, no inhibition of the growth of the bacterial triggers of any other autoimmune disease was noted. The ethyl acetate, chloroform and hexane extracts were the most potent *P. mirabilis* inhibitors. Subsequent analysis of the *Carica papaya* root extracts by RP-HPLC coupled to high resolution TOF mass spectroscopy enabled the putative identification of a high proportion of the compounds present in the most potent ethyl acetate extract.

Discussion. The growth inhibitory bioactivity of *Carica papaya* root extracts against *Proteus* spp. indicates their potential in blocking the onset of rheumatoid arthritis.