

Acute Inflammatory Proteins Constitute the Organic Matrix of Prostatic Corpora Amylacea and Calculi in Men with Prostate Cancer

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Abstract

Corpora amylacea are a frequent microscopic finding in radical prostatectomy specimens from men undergoing treatment for prostate cancer. Although often observed histologically to be associated with inflammation, the contribution of corpora amylacea to prostatitis-related symptoms of unknown etiology or to prostate carcinogenesis remains unclear. Prostatic calculi, which potentially represent calcified forms of corpora amylacea, are less common, but can cause urological disease including urinary retention and prostatitis. We conducted a comprehensive compositional analysis of corpora amylacea and prostatic calculi to gain insight into their biogenesis. Infrared spectroscopy analysis of calculi collected from 23 patients confirmed a prevalence of calcium phosphate in the form of hydroxyapatite. This result sets prostatic calculi apart from most urinary stones which are largely composed of calcium oxalate. Tandem mass spectrometry-based proteomic analysis of corpora amylacea and calculi revealed that lactoferrin is the predominant protein component, a result that was confirmed by Western blot analysis. Other proteins identified, including calprotectin, myeloperoxidase, and α -defensins, are proteins contained in neutrophil granules. Immunohistochemistry (IHC) suggested the source of lactoferrin as prostate-infiltrating neutrophils as well as inflamed prostate epithelium; however, IHC for calprotectin suggested prostate-infiltrating neutrophils as a major source of the protein, as it was absent from other prostate compartments. This study represents the first definitive analysis of the protein composition of prostatic corpora amylacea and calculi and implicates a role for acute inflammation in their biogenesis - an intriguing finding given the prevalence of corpora amylacea in prostatectomy specimens and the hypothesized role for inflammation in prostate carcinogenesis.