Periprostatic adipose tissue from obese prostate cancer patients promotes tumor and endothelial cell proliferation: a functional and MR imaging pilot study.

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Abstract

BACKGROUND: Obesity, particularly visceral adiposity, confers a worse prognosis for prostate cancer (PCa) patients, and increasing periprostatic adipose (PPA) tissue thickness or density is positively associated with more aggressive disease. However, the cellular mechanism of this activity remains unclear. Therefore, in this pilot study, we assessed the functional activity of PPA tissue secretions and established a biochemical profile of PPA as compared to subcutaneous adipose (SQA) tissues from lean, overweight and obese PCa patients.

METHODS: Adipose tissues were collected from PCa patients undergoing surgical prostate removal. Tissues were analyzed by histologic and magnetic resonance (MR) techniques. Explant tissue culture secretions were used in proliferation assays on PCa and endothelial cells.

RESULTS: PPA secretions obtained from obese patients were significantly more pro-proliferative in both PCa and endothelial cells as compared to PPA obtained from lean or overweight men and SQA tissues. Consistent with this, PPA microvessel density was increased, and the T2 relaxation time was decreased, compared to SQA tissues, and we observed a modest, inverse correlation between the T2 and tumor stage. Moreover, the ratio of unsaturated to saturated fatty acids, obtained using MR spectroscopy, showed a modest, inverse correlation with Gleason score.

CONCLUSIONS: These pilot data show that PPA stimulates PCa cell proliferation and angiogenesis and that obesity intensifies this activity, thus generating a mechanistic hypothesis to explain the worse prognosis observed in obese PCa patients. Our pilot study also shows that MR technology may be useful in further elucidating the relationship between obesity and PCa progression.

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