# Nano-targeting treatment for prostate cancer

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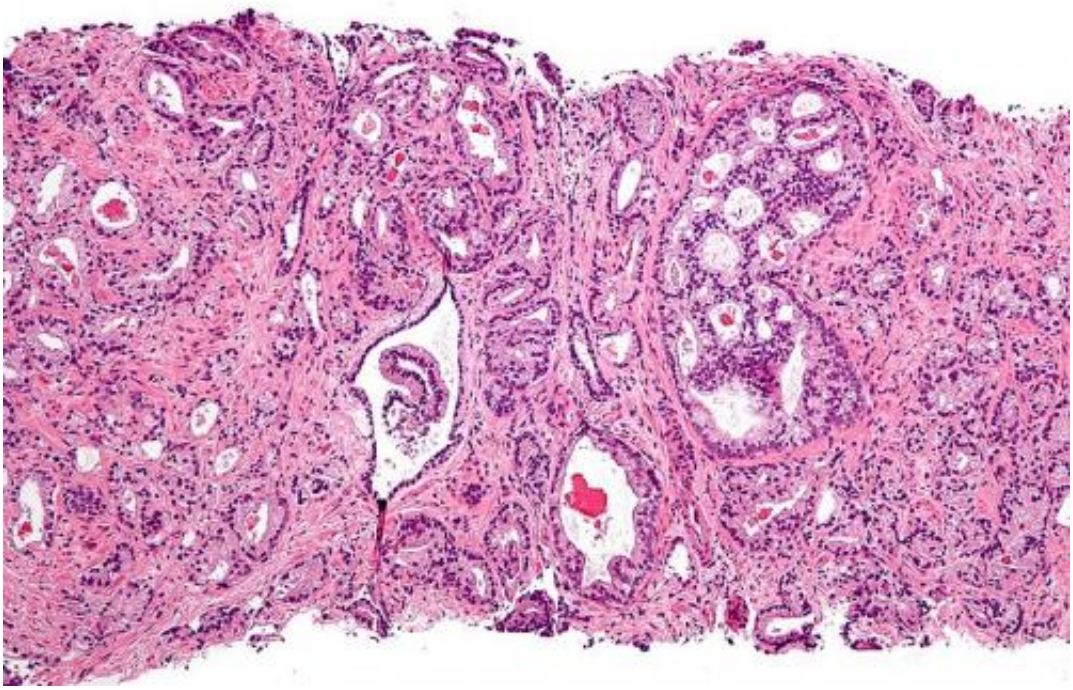

Micrograph showing prostatic acinar adenocarcinoma (the most common form of prostate cancer) Credit: Wikipedia, CC BY-SA 3.0

Metastatic or castrate-resistant prostate cancer can spread to the bone in certain patients. While several new treatments are available, they can have a difficult time reaching the bone and can result in missing the metastatic lesions. New research presented today at the 2017 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition seeks to address this challenge with the development of a bone-targeted nanoparticle (NP) that delivers the chemotherapy drug

cabazitaxel directly to the bone.

Jamboor K Vishwanatha, Ph.D. and his team from University of North Texas Health Science Center engineered the NP formulation to bind to the chemical structure of the bone and were effective at reducing tumor size, maintaining bone structure, and decreasing pain. In the study, "Efficient Bone Microenvironment Nano-targeting for Improved Therapy for Bone Metastatic Prostate Cancer," bone tumors were established for one week in mice (starting n=6 per group) then treated weekly with either saline, free cabazitaxel, non-targeted NPs, or targeted NPs.

"A significant and troubling issue for prostate cancer patients is when the cancer spreads to the bone, resulting in difficult-to-treat and painful lesions," said the study's primary author Andrew Gdowski, D.O. "A key focus for our research was to reduce tumor size and pain."

The targeted NPs had a strong burst release of cabazitaxel within the first 8 hours and sustained release of up to 72 hours. The targeted NPs also had a fourfold increase in binding to bone at six hours and an eightfold increase at 72 hours when compared to the non-targeted NPs. Mice (n=6) treated with targeted NPs had no bone lesions on x-ray, with 100 percent in the saline and cabazitaxel groups and 33 percent in the non-targeted NP group with bone lesions.

Vishwanatha and his team also demonstrated a reduction in pain for the targeted NP group. In the von Frey assay, (indicate functional pain status in these mice) the group treated with targeted NPs had a significant reduction in relative response indicating they were experiencing less pain.

Lead team member Amalendu Ranjan, Ph.D. noted, "What is exciting is not only that these targeted nanoparticles work well to decrease tumor

size but that we were able to maintain the bone structure and reduce pain, which is an ongoing challenge when treating these patients."

The next stage of the research will be to perform additional pre-clinical validation studies and work on streamlining the production method for large-scale NP production.

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