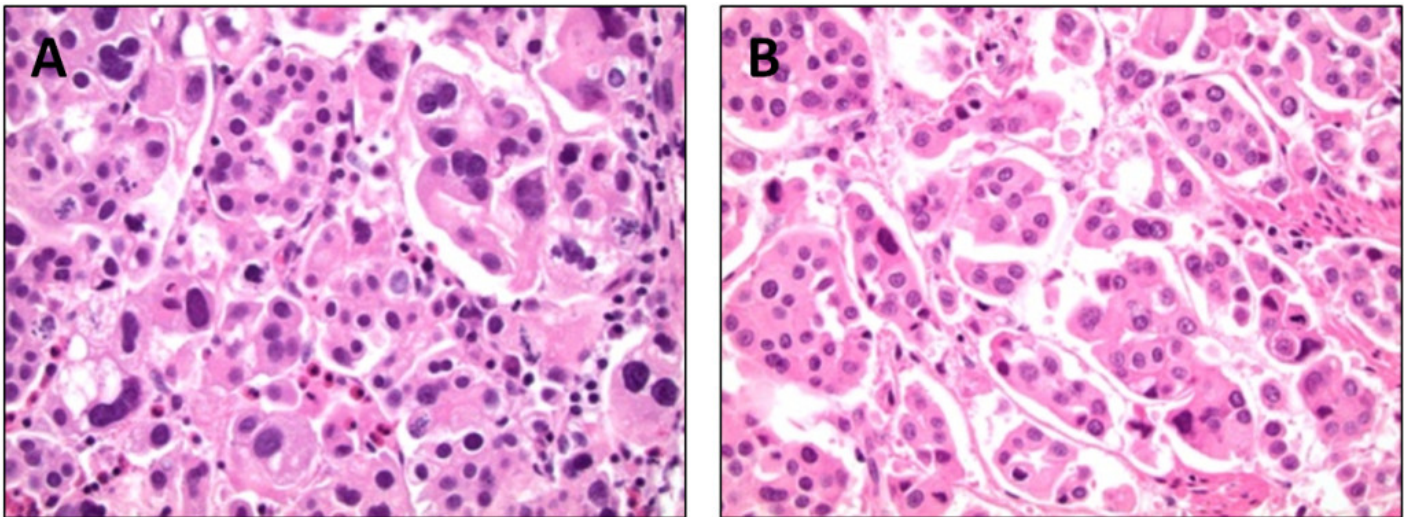


How does bladder chemotherapy given before surgery change bladder cancer cells?

It is estimated that there will be 74,000 new cases of bladder cancer diagnosed in the United States and approximately 16,000 deaths due to bladder cancer in 2015 alone, according to statistics from the American Cancer Society. When bladder cancer has invaded into the bladder's muscle wall, the cancer is typically treated with surgical removal of the bladder. However, surgery alone carries relatively high failure rates for permanently treating the cancer.

In recent years, drugs to treat cancer that are given prior to removal of the bladder (*neoadjuvant chemotherapy*), has been increasingly recommended. The goal is to shrink the tumor in the bladder and in lymph nodes prior to removal in order to improve the odds that all cancer will be successfully treated. Use of neoadjuvant chemotherapy has shown a modest improvement in patient survival compared to only surgical removal of the bladder. There are several downsides to receiving the drugs before surgery. Not all patients will respond to the drugs and the treatment is also expensive, has side effects, and may delay surgery allowing the tumor to progress.



(A) Before the bladder cancer drugs were given, the bladder tumor had a high number of cells that were dividing.

(B) After the bladder cancer drugs were given, there were less cells in the bladder tumor that were dividing.

The changes that neoadjuvant chemotherapy causes in bladder cancer are poorly understood. Shen et al. looked at the tumor before and after drug treatment using a microscope and compared features of the tumor. They studied 90 patients with muscle-invasive bladder cancer whom were diagnosed via biopsy and then subsequently treated with surgical removal of the bladder at The

Ohio State University Wexner Medical Center from between 2007-2010. Of these patients, 46 received neoadjuvant chemotherapy prior to surgery while 44 did not.

The first feature of the tumor that was studied was amount of classic bladder cancer versus other patterns of bladder cancer (“*variant*” patterns). Classic bladder cancer is termed “*urothelial*”. There are numerous other non-urothelial variant patterns of bladder cancer (example: squamous, small cell, micropapillary, etc). Interestingly, Shen et al. found that the amount of variant patterns increased after neoadjuvant chemotherapy. Amount of variant patterns before giving neoadjuvant chemotherapy did not predict response to neoadjuvant chemotherapy.

The second feature of the tumor that was studied was the number of tumor cells that were dividing (*mitotic rate*). Shen et al. found that neoadjuvant chemotherapy decreased the number of tumor cells that were dividing. Cells that are dividing are more susceptible to cancer drugs and decreasing the number of cells that are dividing is likely to be one of the ways that these drugs improve survival. The number of cells that were dividing before giving neoadjuvant chemotherapy did not predict response to neoadjuvant chemotherapy.

Helen M. Shen, B.S. and Debra L. Zynger, M.D.

*Department of Pathology
The Ohio State University Wexner Medical Center
Columbus, OH, USA*

Publication

[Do amount of variant differentiation and mitotic rate in bladder cancer change with neoadjuvant chemotherapy?](#)

Shen HM, D'Souza AM, Green IF, Pohar KS, Mortazavi A, Zynger DL
Hum Pathol. 2015 Sep