

Is there a link between urinary microbiota and bladder cancer?

Didier Raoult¹

Received: 3 November 2016 / Accepted: 22 November 2016 / Published online: 24 December 2016
© Springer Science+Business Media Dordrecht 2016

Bladder cancers are more diagnosed in men than in women, in whom it may be from two to five times more common [1]. This difference in incidence has long been explained by a higher smoking rate among men compared to women, but the increase in smoking among women has not led, as with lung cancers, to a significant increase in female bladder cancer [1]. In an interesting way, the bladder's urines have been considered sterile by generations of researchers. Recent works have shown that in fact, most of the urines were not sterile and that it was simply a problem of culture techniques, such as short aerobic cultures and the small amount of urine analyzed (1 µl) that prevented the discovery of a more diverse microbial population. The works performed by molecular biology and then by culture helped to highlight the contrary: most of the urines contained a microbiota, which is different in men and women [2]. Among both are especially found *Firmicutes*, however among women are also found *Actinomyces*, including *Mycobacteria*, and *Bacteroidetes* [3]. Moreover, women are much more frequently subjected to urinary tract infections than men [4]. Finally, bladder cancer has been treated for a long time with injections of BCG. It is officially a vaccine to prevent tuberculosis, in the bladder [2], it is a mycobacterium and as such an *Actinomyces*. Controversial studies suggested also the

same potential for *Lactobacillus casei* [2]. Lactobacillii are *Firmicutes* found both in men and women's urinary microbiota [2]. A microbiota mainly consisting in *Actinomyces* can be one of the hypotheses for the lower incidence of bladder cancers in women, given that the *Actinomyces* may have a preventive effect just like the BCG which has an effect on the treatment and prevention of bladder cancer relapses. The existence of a urinary microbiota leads us to rethink the prevention and risk factors of bladder cancers.

References

1. Gram IT, Dandin S, Braaten T, Lund E, Weiderpass E. The hazards of death by smoking in middle-aged women. Eur J Epidemiol. 2013. doi:10.1007/s10654-013-9851-6.
2. Whiteside SA, Razvi H, Dave S, Reid G, Burton JP. The microbiome of the urinary tract—a role beyond infection. Nat Rev Urol. 2015. doi:10.1038/nrurol.2014.361.
3. Lewis DA, Brown R, Williams J, White P, Jacobson SK, Marchesi JR, Drake MJ. The human urinary microbiome; bacterial DNA in voided urine of asymptomatic adults. Front Cell Infect Microbiol. 2013. doi:10.3389/fcimb.2013.00041.
4. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. Am J Med. 2002;113:5–13.

✉ Didier Raoult
didier.raoult@gmail.com

¹ Aix Marseille University, INSERM, CNRS, IRD, URMITE, Marseille, France