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Introduction

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We are facing tremendous dilemmas in the field of prostate cancer detection and treatment. Of all prostate cancers diagnosed, many do not need treatment while others are lethal, even when found and treated in a localized clinical stage. The main challenge today is not so much *how* to treat, but *whom* to treat.

Can we reliably identify patients who do not need aggressive treatment? Do we have the right tools at hand to identify lethal prostate cancer? As clinicians, we rely on clinical factors such as prostate-specific antigen (PSA), clinical stage and biopsy Gleason score. Based upon those, patients can be classified using risk stratification models of whom the D'Amico risk groups are amongst the most frequently used. Such models are convenient for physicians, as treatment guidelines are built around them. Nevertheless, these risk stratification models fail to provide accurate risk predictions. Improved, individual risk predictions can be achieved using nomograms. However, no matter how refined these tools are, they only provide statistical estimations with a certain degree of uncertainty. What we really need is individualized patient care using patient-specific tools.

Ways to overcome these hurdles have emerged in the last couple of years.

Imaging modalities have improved tremendously. Multiparametric magnetic resonance imaging (MRI) not only delivers extremely detailed anatomical images, but also provides tissue-specific information by using magnetic resonance (MR) spectroscopy, dynamic contrast enhanced (DCE) MRI and diffusion weighted (DW) MRI. These modalities help us to discern benign from malignant tissues. Furthermore, our understanding of prostate cancer biology has improved tremendously. Based upon this knowledge, novel positron emission tomography (PET) tracers like ^{18}F-FDHT, probing the androgen (AR) signaling axis, have been developed. The role of MRI and PET will be discussed in detail in the papers by Heijmink and Fox.

Besides imaging, even more individualized information can be gained from the tumor itself. Serum PSA still is the most important biomarker for the detection and follow-up of prostate cancer. PSA based screening can reduce disease specific mortality but coinciding unnecessary testing and over diagnosis warrant further research for more specific biomarkers. Attractive, because non-invasive, are urine-based tests. Numerous, very interesting candidate tumor markers have been identified and are presently being tested. The prostate cancer antigen 3 (PCA3) test, the TMPRSS2–ERG fusion gene and their combination have been subject of many studies showing encouraging results. Finally, most of the information can be derived from the cancer tissue itself. On one side, correct tissue handling and reporting after biopsy taking or surgical removal is vital, as outcome prediction and thus tumor marker validation is fully dependent on this. On the other side, careful tissue collection and internal quality control of the tissues is of extreme importance in the development of tumor marker development. Those issues will be further elaborated in the contributions by Roobol, Berney and Montironi.

Better identification of those patients who do not need treatment and those who harbor a potentially lethal form of prostate cancer have a far-reaching impact on global healthcare. Undoubtedly, further development of modern imaging modalities and tumor markers are key in this process and will change the face of prostate cancer management forever. Truly individualized prostate cancer care is on the horizon.

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