Prostate Adenocarcinoma

Abstract

Prostate cancer (PCa) is the second most common diagnosed malignancy and the fifth leading cause of cancer mortality in men. 85% of all cases are diagnosed in men aged over 65 years old.

The World Health Organization (WHO) prediction for incidence of prostate cancer is 2 293 818 new cases in 2040 (+79%).

Prostate adenocarcinoma is the most common type of cancer (Figure 1) to occur in the prostate, with an annual incidence of 1 276 106 new cases worldwide.

Two different forms are described: local intracapsular or extra capsular extension when malignant cells migrate towards seminal vesicles, lymph nodes and bones. Histologically, the majority of intracapsular tumors are located in the peripheral zone of the prostate, however, some do occur in the transitional or central zone.

There has been a significant increase in the rates of diagnosed prostate cancer since screening men became popular in the 1990s with Prostate Specific Antigen (PSA) testing and digital rectal exam.

The biopsy is an outpatient procedure which is most often conducted as a transrectal needle biopsy under TRUS guidance.

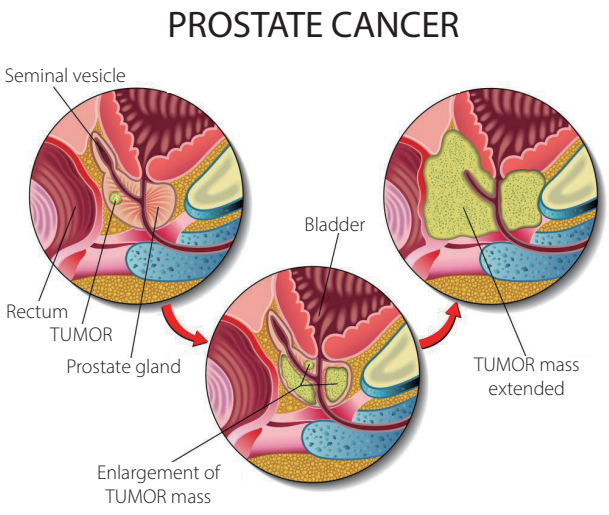

Figure 1

Due to the high false negative rates associated with this standard probabilistic procedure biopsies, Multiparametric MRI (mpMRI) has been shown to identify clinically significant prostate cancers which would have been otherwise missed by routine systematic biopsy.

Complications

- Abnormal PSA levels
- Abnormal digital rectal examination
- Urinary symptoms
- Erectile dysfunction
- Hematuria
- Hematospermia
- Metastatic disease (e.g. bone pain)

Possible treatments

- Surgical radical prostatectomy
- Radiotherapy (external beam radiation therapy)
- Brachytherapy (internal radiotherapy)
- HIFU
- Cryotherapy
- Chemotherapy
- Hormonal therapy

In Vitrea

MR application Olea Prostate option includes advanced multiparametric analysis. Conventional, diffusion and permeability maps are computed instantly and displayed in one simple click (Figure 2).

The fusion of T2w and diffusion images improves the visualization and the relevance of the pathological zone.

Lesion and prostate volumetry can also be computed through the semi-automatic 3D segmentation.

To optimize the diagnosis workflow, PI-RADS 2.0. report is included in the application, with a possible export to PACS (Figure 3).

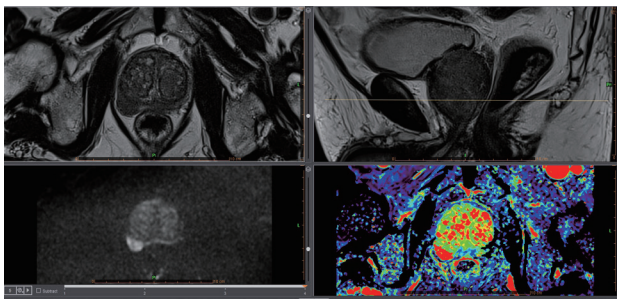

Figure 2

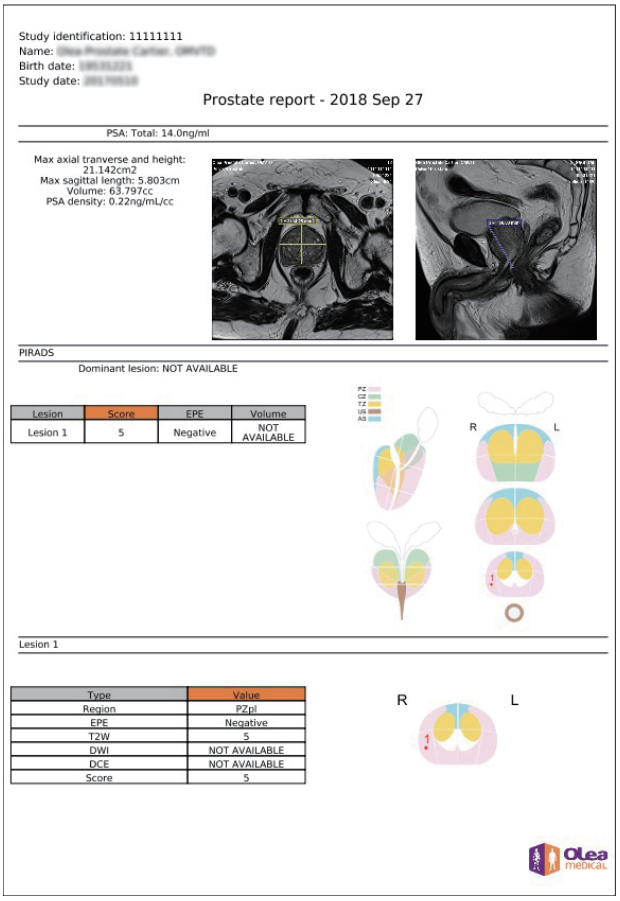

Figure 3

The IVIM plug-in makes it possible to calculate diffusion-weighted electronic b-values. Indeed, synthetic high b-values offer stronger diffusion-weighting and greater suppression of benign prostate tissue, thus potentially improving tumor detection (Figure 4).

Addition

The combination of MRI/US fusion-guided biopsy has been shown to be useful and highly effective for prostate cancer detection with targeted biopsies (Figure 5).

Radiomic machine learning tool is an emerging one, that can help to improve cancer diagnosis, with an automatic prostate segmentation, lesion detection and characterization.

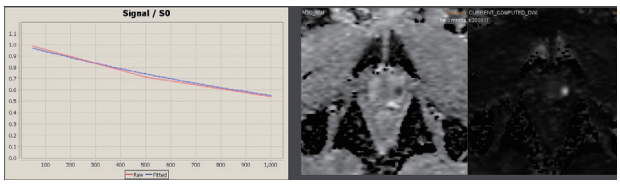

Figure 4

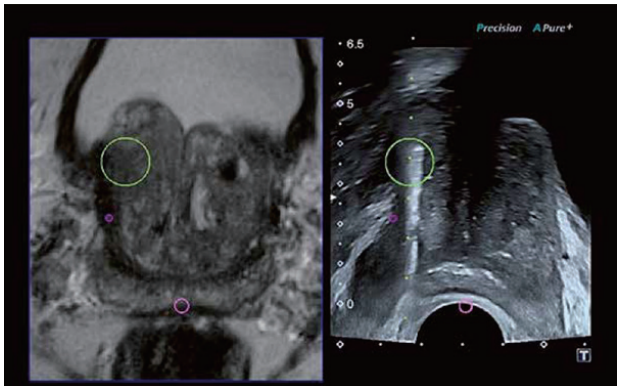

Figure 5

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