Current application and future perspectives of PSMA PET imaging in prostate cancer.

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As precision medicine evolves, the contribution of molecular imaging to the management of prostate cancer (PCa) patients, especially for Positron Emission Tomography (PET) imaging, is gaining importance. Highly successful approaches to measure the expression of the prostate specific membrane antigen (PSMA) have been introduced recently. PSMA, the glutamate carboxypeptidase II (GCP-II), is a membrane bound metallo-peptidase that is overexpressed in 90-100% of PCa cells. Due to its selective over-expression, PSMA is a reliable tissue marker for prostate cancer and is considered an ideal target for tumor specific imaging and therapy. A variety of PET and SPECT probes targeting this peptide receptor have been introduced. These are undergoing extensive clinical evaluations. Initial results attest to a high accuracy for disease detection compared conventional radiology (CT or MRI) and other nuclear medicine procedure (choline PET or fluciclovine PET). However, prospective evaluation of the impact on patient management for PSMA-ligand PET and its impact on patient outcome is currently missing. Finally, PSMA inhibitors can be radio-labeled with diagnostic (68Ga-PSMA-11), or therapeutic nuclides (177Lu/225Ac PSMA-617) to be used as theranostic agent. Initial results showed that PSMA-targeted radioligand therapy (RLT) can potentially delay disease progression in metastatic castrate-resistant PCa. This review aims to explore the current application of PSMA based imaging in prostate cancer, reporting about main advantages and limitations of this new theranostic procedure. The future perspectives and potential the applications of this agent will be also discussed.

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