Prostate cancer: emerging pharmacotherapeutic modalities

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INTRODUCTION

Prostate cancer is the most common cancer in the world.1 Prostate cancer patients have many options within the realms of surgery or different kind of therapies.2 In the late 80s and early 90s great attention was given to screening asymptomatic men by measuring concentration of prostate specific antigen (PSA), which eventually led to a significant increase in the detection of clinically insignificant tumors.3 Though the exact pathogenesis is not clear, epidemiological evidence supports a relationship between prostate cancer and serum levels of testosterone.3 With some other factors like old age, family history, ethnicity, diet and some elements exposure2, Although lot of controversies, strategies are regarding prevention of prostate cancer by early detection with decreasing the mortality.5

With the gradual increase in number of prostate cancer patients and with the availability of limited data on optimal treatments, it is necessary to consider the risks and benefits associated with each therapeutic option.7,8 The aim of Chemoprevention is to decrease the incidence of the prostate cancer, simultaneously with less adverse events, lowering the cost of treatment and mortality.3 The death rate in prostate cancer patients continues to decline, mainly due to early detection and early treatment, with improved salvage therapies.8 Curative treatments such as pharmacotherapies are effective for prostate cancer.9,12 A range of agents have been suggested to cure/prevent prostate cancer with so many studies in progress.5 In this review article we are focusing on the advances in different pharmacotherapeutic modalities i.e. Chemoprevention, Prostate-Specific Antigen, Hormone Therapy, Anti-Inflammatory Drugs, SERM, Vaccines, Cryotherapy, Watchful Waiting, Radiotherapy and Androgen Deprivation Therapy etc. and new possibilities with strategies to provide maximal benefits while effectively balancing risks for the prostate cancer treatment.

ABSTRACT

Prostate cancer is the most common cancer in the world due to factors like old age, family history, ethnicity, diet and some elements exposure, with lot of controversies regarding prevention of prostate cancer. Though the exact pathogenesis is not clear, epidemiological evidence supports a relationship between prostate cancer and hormone levels. In this review article we are focusing on the advances in different pharmacotherapeutic modalities i.e. Chemoprevention, Prostate-Specific Antigen, Hormone Therapy, Anti-Inflammatory Drugs, SERM, Vaccines, Cryotherapy, Watchful Waiting, Radiotherapy and Androgen Deprivation Therapy etc. and new possibilities with strategies to provide maximal benefits while effectively balancing risks for the prostate cancer treatment.

Keywords: Prostate Cancer, Pharmacotherapy, Modalities, Chemoprevention

WE NEED

With reference not even in prostate cancer only but in all type of cancers, we desired to minimize morbidity and mortality due to prostate cancer.15 But the most debatable matter is about to the appropriate therapy of early-stage prostate cancer with several options as surgery, radiation, or expectant management. As per research results till now the only pharmacotherapy as an option for the treatment of advanced prostate cancer.14
GENERAL APPROACH AGAINST

By confirming the disease prostate cancer by different diagnostic options such as PSA, DRE and finally by biopsy, assigning with Gleason score, strategies against the prostate cancer are made with reference to the cancer stage, the Gleason score, the presence of symptoms, and the life expectancy of the patient, treatments applied primarily. Treatment is by different treatment options available likely to surgery, radiotherapy, pharmacotherapy etc.15-16

CHEMOPREVENTION

Carcinogenesis induced by genetic and epigenetic changes with multistep molecular process. It can disturb the balance of cell controlling pathways and processes. With reference to literature chemoprevention can be defined as the use of natural or synthetic agents that reverse, inhibit or prevent the development of cancer in cancer-free individuals.3,17 This approach used targeting the healthy individuals under developing cancer, using agents with low adverse events.16 Large number of agents used for prostate cancer treatment either in primary prevention (prior to diagnosis) or in secondary prevention (recurrence or progression of metastatic disease).18-19

PROSTATE-SPECIFIC ANTIGEN

Widespread use of prostate-specific antigen (PSA) testing has lead to a migration in stage and grade of prostate cancer, with most men presenting with localized disease.15,20 Persons with early treatment for prostate cancer may show good results with significant proportion experience disease recurrence.21 General consideration regarding the PSA progression is the earliest evidence of persistent or recurrent disease after primary therapy of curative intent.3,11,13,22,23 It is still a challenging issue of predicting outcome after PSA progression.24 However, variety of prognosis available and not all patients with PSA progression proceed to clinical progression.25

HORMONE THERAPY

With lack of evidences regarding the use of the hormone therapy against prostate cancer, Iversen and colleagues in a randomized controlled trial showed no significant improved survival.26 Today, neither the researchers nor the urologists recommend the use of hormone therapies as primary therapy for prostate cancer patients.27,28 Beside the above drawback as primary therapy, hormone therapy can be used in combination with other therapies with good results against the prostate cancer for example – in combination with radical prostatectomy29; radiation therapy30,31,32 and with other treatment modalities for prostate cancer.31,34

ANTI-INFLAMMATORY DRUGS

In prostate cancer prevention non-steroidal anti-inflammatory drugs play very important role to prevent the synthesis of endogenous prostaglandins by inhibition of the cyclo-oxygenase (COX) enzyme.35-36 Few non-steroidal anti-inflammatory drugs (NSAIDs) such as aspirin, sulindac and ibuprofen already have been reported to show anti-prostate cancer activity.

SERM

With great importance in prostate cancer prevention Selective Estrogen – Receptor Modulators (SERM) stimulated by the estrogens in the pathogenesis of prostate cancer through promotion of cell growth.37

VACCINES

With recent development in number of approaches against the prostate cancer prevention as well as treatment, few vaccines are also promising to immunize for the prostate cancer in clinical trials. Trials on vaccines offer great promise for prevention of prostate cancer in the near future.3,38 Out of the many treatment approaches against recurrent prostate cancer that no longer responds to hormonal agents, immunotherapy is particularly promising, due to several unique characteristics of both the disease and the treatment.39 For better response and treatment the vaccines can also be used in combination with other therapeutic approaches like radiotherapy, chemotherapy, hormonal therapy etc.

CRYOTHERAPY

Cryotherapy is a relatively new procedure for the treatment of localised prostate cancer. Under anaesthesia, probes are inserted into the prostate tumour that freezes the tissue, thereby killing tumour cells. This procedure is carried out on a day-patient basis and generally patients are allowed home the following day. The main complications associated with cryotherapy include impotence (inability to maintain an erection), incontinence, and tissue sloughing (making urination difficult). Studies report that cryotherapy has potential clinical benefits for many patients with no evidence of cancer postoperatively; however, the quality of the available evidence is poor.40

WATCHFUL WAITING

Watchful waiting is also known as “active surveillance” approach. The main objective of watchful waiting is to use two different approaches for the prostate cancer management. Literature showed it as patient monitoring for symptoms and clinical progression only, and intervening with androgen deprivation therapy upon symptomatic progression.24,41
RADIOThERAPY AND ANDROGEN DEPRIVATION THERAPY

Many studies have been showed the better clinical disease-free survival of the patients with advanced prostate cancer using radiotherapy (RT) in combination with androgen deprivation therapy (ADT) versus RT alone. According to one study from the USA, mostly the persons with advance prostate cancer receive external beam RT in combination with long-term ADT.

FUTURE MODALITIES

It is very difficult to state in favors of single future pharmacotherapy out of all pharmacotherapeutic modalities present for the prostate cancer treatment. This is because of greater possibilities of improvement in each individual pharmacotherapeutic modality. So on the basis of all above, we can say, there is a need to improve each and every pharmacotherapeutic modality for the treatment of the prostate cancer. Pharmacotherapy can be a future modality by improvements by research as well as by clinical studies for the treatment of the prostate cancer.

CONCLUSION

With increase and advances in the different therapies mortality from prostate cancer decreases over the past decade. Beside these advances substantially shorten the survival time with a challenge in maintaining the quality of life for survivors. We have described some of the recent advances in the field of prostate cancer treatment, and also tried to highlight few of the many new technologies on behalf of the novel treatment of prostate cancer as pharmacotherapy. With new modalities for treatment of prostate cancer, we are better than ever before able to characterize and treat the prostate cancer and we are learning how to apply these modalities to improved treatment and more effectively. These advances will hopefully contribute to improved treatment with new and novel modality.

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