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COMMENTRY

MicroRNAs and Prostate Cancer Detection: A Continous Quest

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SUMMARY

Prostate cancer is one of the deadliest male malignancy in the worldwide. It has been estimated that 1.1 million cases of prostate cancer were diagnosed in 2012 and within coming 10 years, the prostate cancer cases will be increased by 15 per cent in men. The multifaceted molecular anomaly of prostate cancer has confronted it from being dated owing to the orchestrated carcinogenic functions of negative regulators which work in a network. An as yet blurred view of therapeutic interventions of prostate cancer has been acknowledged, resulting from the addition of substantial fraction of information. Prostate-specific antigen (PSA) screening is currently known as a method for early detection of prostate cancer but its validity as prostate cancer biomarker is still controversial. Information obtained from the sequencing data of prostate cancer tissue biopsy, it has been described that non-coding RNAs such as microRNAs are good source of information to detect the prostate cancer. This information can be used to detect, predict metastatic state and even the state of prostate cancer progression. In this commentary, the role of microRNAs has been discussed in prostate cancer detection.

Keywords: MicroRNAs, Prostate cancer, Prostate-specific antigen, Metastatic state

MicroRNAs are small non-coding RNAs which are found in almost all living organisms and are involved in the regulation of genes and a number of molecular mechanisms such as RNA silencing etc. It has been reported that miRNA expression is very tissue and cancer specific (1). So, it can be inferred that because of their specificity in tissues and type of cancer, they are very good source of information to diagnose, classify, predict stage and finally to propose for a therapeutic targets for cancers, especially for incurable hormone refractory prostate cancer (HRPC). Scientific reports have conceived the theory that miRNAs have potential clinical values to detect cancer and propos a therapeutic strategy (2, 3).

The miRNA signatures can be used to distinguish normal and cancer tissues precisely and also to explain other cancer characteristics such as stages of cancer etc. microRNAs have been considered as a powerful tool in comparison with the mRNA isolated from the tissue and has been shown that 1 of 17 carcinomas could be distinguished by mRNA profile patterns, in contrary to microRNAs which can help to identify 12 of 17 carcinomas (1). Carcinogenesis can be defined as a complicated integration of alterations of multiple signal transduction pathways, so it is necessary that we

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should study microRNAs expression profile while diagnosing cancer very accurately as the simple mRNAs are not enough to justify the accuracy of tissue specific tumor. Thus to improve the accuracy of clinical diagnosis of cancer, we should study the expression patterns of hundreds of miRNAs (3).

Work has been done to verify the claim of microRNAs are significant in diagnosis, prognosis and classification of PCa, i.e. it has been studied that miR-21 expression was much higher in AI PCa cells as compared to the AD PCa cells (4). Therefore, detecting the expression level of miR-21 can be used to discriminate different stages of human PCa. Additionally, optimized high-through put miRNA expression profiling has revealed the possible of microRNAs, novel biomarkers to detect PCa (5). Mitchell et al. (6) have found that microRNAs are stable molecules both in plasma and serum of cancer patients and can be considered a potential biomarkers for blood-based cancer diagnosis. It has been proposed that PCa tissues released microRNAs in blood circulation and they are maintained at very constant level in blood. The sera of PCa metastatic patients revealed that the expression levels of miR-125b and miR-141 have 6.35-fold and 65-fold increase, respectively (7).

Prostate Specific Antigen (PSA)

As we have discussed earlier that PSA is a controversial tool for early diagnosis of PCs, but it has been studied that PSA detection could be useful when PSA threshold is changed and its detection is frequently repeated. PSA screening could be an associated tool along with the modern and very accurate cancer screening molecular markers such as microRNAs (8). There is a long history of research on prostate-specific antigen (PSA) to made it an integral part of prostate cancer management but its authenticity as an recommended prostate cancer marker is still remained controversial (9). Scientists also attempted to improve the PSA based screening methods but still the answer is unclear on recommending the PSA as prostate cancer diagnosis (10).

Androgen Receptor (AR)

Expression of androgen receptor (AR) has been found in prostate cancer (PCa) cells and the necessity of androgens for PCa cells survival has been documented. Due to the increased expression in PCa cells at the start of PCa metastasis, androgen suppression therapy show remarkable response in prostate cancer therapy but with the passage of time and continuation of hormonal therapy, results in very low response. Androgen receptor (AR) is an important factor playing central role in the normal growth and development of the prostate gland. Researches have reported the role of AR in prostate carcinogenesis (11-13).

Others Non-Invasive Approaches

Developments also have been seen in some non-invasive approaches to detect prostate cancer at early stage such as an advanced MRI technique known as restriction spectrum imaging (RSI) MRI, multi-parametric (mp) MRI (14, 15) as well as multi-parametric (mp) ultrasound (16) etc. These approaches still are not cheap and radiation based which are not highly recommended as a technique for early detection and screening of cancer.

It can be concluded from some controversial literature that blood based micro-RNAs could be the accurate and precise screening method to detect prostate cancer allying with PSA as biomarkers as a combination based early screening approach.

Conflict of Interest

I declare, there is no any conflict of interest regarding this commentary with any person or organization.

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