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Application analysis of Diffusion magnetic resonance imaging in the diagnosis of prostate cancer

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Abstract. The surrounding environment of human survival was polluted and damaged to a great extent, and the living habits and eating habits were changing, which caused a rise in the incidence of serious diseases. Cancer was one of the major diseases. The diagnosis of cancer was of great importance. This study was mainly focused on the new technique of magnetic resonance diffusion imaging in the diagnosis of prostate cancer. The theories were summarized and perfected, and were applied to the actual case study, which can provide theoretical basis and scientific support for the application and popularization of cancer diagnosis technology.

Key words. Magnetic resonance imaging, diffusion imaging, prostate, diagnostic techniques.

1. Introduction

With the development of the times, people's living standard has been improved and all kinds of new technologies were emerging. The emergence of new technology brought more convenience to people, but also brought a lot of trouble. The destruction of the environment was a threat to human health because of the pollution of the environment. Among them, cancer has begun to have an increasing trend year by year in today's era [1]. For example, the leakage of nuclear material caused skin cancer and other cancers. The combustion of various fuels created a greenhouse effect, which caused the atmosphere to become empty, thereby increasing the amount of ultraviolet radiation, which led to an increase in the incidence of skin cancer. In recent years, the pollution caused by industrial pollution haze around caused lung cancer and other cancers has been an outbreak of the trend. Cancer was known as a malignant tumor, including more than 100 types of cancer. The tumor cells in the body were activated under the influence of some external factors, thus forming the rapidly growing tumor cells. There was a great difference between tumor cells

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and other cells, and it was a kind of apoptosis gene [2]. Because of the rapid growth rate and the lack of apoptosis, tumor cells can cause damage to the surrounding tissues and organs. With the increase of tumor cells, they caused the related tissue and cell swelling, resulting in tissue and organ stress. Malignant tumor cells will be separated from the original tissue into the body environment, and they spread from the original tissue to other tissues or organs in the internal environment through the tissue fluid circulation, which caused the whole body damage, and even cause human death [3].

This study focused on prostate cancer as the main research object. Prostate cancer was one of the most common malignant tumors in male patients. According to statistics, prostate cancer was after lung cancer in all the incidence of cancer [4]. There were many factors that led to prostate cancer, which were affected by many factors, such as the body's own heredity and so on. With the improvement of people's living standard in recent years, more and more people eat more pickled foods, and because of the bad habit of smoking in men's living habits, the incidence of prostate cancer has been rising in recent years. Because of the continuous improvement of medical technology, people's medical detection technology has been used in the monitoring of tumor. Therefore, the current data showed that the incidence of prostate cancer in men was increasing with the development of the age [5]. The increasing incidence of prostate cancer has begun to attract the attention of many scholars. A number of disease detection techniques and theories have been used to detect prostate cancer. Moreover, there was a lot of theoretical analysis on the mechanism of related diseases. Through the analysis of the relevant data, we can determine the pathogenesis and the related gene expression level. On the basis of a large amount of data, the pathogenesis can be analyzed to determine and activated genes in cancer cells, which provided a theoretical basis for the treatment of prostate cancer, and provided scientific support for the supplement and improvement of the theory. This study was mainly to study the diagnostic methods of prostate cancer, and many methods are used in the diagnosis of prostate cancer. The method of magnetic resonance diffusion imaging was selected and the related theory and application were analyzed in this paper so as to provide theoretical basis for the improvement of the theory, and to provide theoretical support for the application and analysis of other prostate cancer diagnosis methods.

2. State of the art

2.1. Research status of prostate cancer at home and abroad

Prostate cancer was one of the most common malignant tumors in men, and it showed a rising trend with age. The overall incidence of prostate cancer increased year by year due to changes in people's eating habits and living habits in recent years [6]. There were a lot of studies on the research of prostate cancer, and the research mainly focuses on the data analysis of the incidence of cancer, the pathogenesis of prostate cancer and the detection of related control genes. Based on the pathogenesis of the relevant treatment methods, and with the improvement of human health, the

detection of prostate cancer technology has begun to be used. This study was based on the previous scholars for the relevant theoretical research and summary. Prostate cancer showed a growing trend with age. With the increase of the pathogenesis of prostate cancer in recent years, the early diagnosis of prostate cancer has been greatly developed, and the incidence of prostate cancer was increasing year by year in recent years. However, due to the application of the new technology, the recovery rate of prostate cancer after surgery has also been a certain upward trend, especially in the era of emerging disease diagnosis technology. The recovery rate of patients with prostate cancer was increasing for the effective diagnosis and prevention of prostate cancer.

2.2. Research status of prostate cancer diagnosis technology at home and abroad

At present, the clinical diagnosis of prostate cancer mainly included the extraction of the serum of the examiner and the corresponding prostate cancer specific antigen. The results could be used to determine whether the examiner had prostate cancer. The rectal cavity of the examiner was examined by ultrasonography, and the patient's condition was determined by the results of the examination. The possibility of prostate cancer was analyzed based on the results of microscopic examination in some hospitals. The following will summarize several common methods:

(1) Some specific antigens which were used in the diagnosis of prostate cancer were commonly used in the early diagnosis of prostate cancer. This specific antigen was a glycoprotein that was synthesized from prostate gland cells. The secretion of some lesions in the prostate gland will continue to rise because of prostate cancer. However, due to the low expression level of tumor cells and the degree of specificity was relatively low, only the antigen with high specificity can be identified and combined with it so as to enhance the possibility of fusion between antigen and antibody. In view of these characteristics, the advantage of specific antigen recognition ability can be played to identify the relevant regional lesions of secretion, which can make the fusion and lesions secretions better, and the fluorescence quantitative analysis was performed by fusion results. The final outcome of the quantitative analysis of fluorescence was used to determine whether prostate cancer had occurred. This method can effectively reduce the subjective factors in the diagnosis process, and the objective result analysis can make the diagnosis result more credible and convincing [7].

(2) The method of rectal cavity examination mainly determined the physiological and biochemical indexes of the chamber. The physiological and biochemical components in the tissue fluid were classified and the content was determined through the extraction of some internal environment tissue fluid, and some of the physiological and biochemical indexes related to prostate cancer were compared with the normal concentration. Through the comparison of the results, the relevant mathematical model was used for a comprehensive analysis [8]. According to the results of the final data analysis, the incidence of prostate cancer and the health of the body were evaluated so as to achieve the purpose of diagnosis of prostate cancer. This method had a more objective credibility. However, when the physiological and biochemical

indexes were measured, it may have a certain degree of impact on the final results due to the influence of physiological and biochemical parameters on the extraction and determination of the relevant steps, which may lead to bias in the results of the analysis.

(3) Rectal examination. The doctors examined the rectum by means of a microscope and conducted prediction and diagnosis of prostate cancer incidence by number and size of lesions. This method was easy to operate. Although the disease can be predicted and diagnosed according to the related lesions, the diagnosis of prostate cancer was influenced by the subjective consciousness of the doctors by using this method, which may have some influence on the diagnosis results.

(4) Application of other technologies. Now, with the development of medical technology, more and more new technologies have begun to be applied in the diagnosis of prostate cancer. A combination of imaging theory and prostate cancer diagnosis techniques has led to the widespread use of imaging diagnostic techniques (Fig. 1). Imaging technology was based on the principle that it can be quickly formed according to the density and the formation of the tissue, which played an important role in the diagnosis of prostate cancer and other diseases [9]. Compared with the CT technology, the imaging results are more authentic and reliable, which can be used in the diagnosis of prostate cancer.

Fig. 1. Magnetic resonance diffusion imaging in the diagnosis of diseases

3. Methodology

3.1. Magnetic resonance diffusion imaging technology concept and application status analysis

Magnetic resonance imaging technique can be used to scan the related lesions, and the image data was generated by the chemical fluorescence signal during the scanning process. We can measure the size of the tumor by affecting the data, and we can also study and analyze the different stages of the lesions through the data of the image data so as to determine the development process of the lesions, and ultimately determined the location of the lesions. It can be seen that the research and application of magnetic resonance technology was of epoch-making significance in the diagnosis of prostate cancer. However, the study of prostate cancer in China started late and it cannot form a more systematic research system. Therefore, the diagnosis technology of prostate cancer was still in the basic research stage. For the application of magnetic resonance diffusion imaging in the diagnosis of prostate cancer, we had a relatively low awareness of prostate cancer because of the late prostate cancer. When prostate cancer was detected, the patient has entered the advanced stage of cancer, which delayed the best treatment period and indirectly affected the level of treatment of patients so that cannot be better for the patient's recovery and rehabilitation [10]. In order to solve these problems, this paper made a further summary and analysis of the concept of magnetic resonance diffusion imaging, and clearly related to the theory and operation process so as to lay a foundation for the implementation of relevant theory and application in the diagnosis of prostate cancer in China disease areas, which also provided technical support for combination with other diagnostic methods.

3.2. The research process of this study

This experiment was mainly based on the analysis of some relevant information and summary. Information needed to query included not only the domestic and foreign research related to the diagnosis of prostate cancer in technology to query Chinese HowNet system database, and included the relevant aspects of the data. In addition to the data query of the relevant theory, this study also selected the data of the medical records of a hospital to carry on the statistics and analysis of prostate cancer related data. The statistical indicators included the relevant methods used in the early diagnosis of prostate cancer and the related physiological and biochemical indexes and the evaluation criteria [11]. In addition to the data collection and statistics, the article also interviewed some well-known doctors and experts and scholars in order to document their experience with many years and knowledge of the technical aspects of the diagnosis and treatment of prostate cancer. Based on this, some suggestions were put forward to supplement the deficiencies of the above theory so as to better realize the integrity and credibility of the theory and data [12]. The collection process of hospital related cases was as follows:

(1) Collection of clinical data information. This study was conducted to analyze the data of patients with prostate cancer who were admitted to the hospital from

2015 to 2016. Through the inquiry and statistics of all the cases, the examiner's almanac was removed in all of the patients with prostate cancer who were admitted to the hospital and the choice of the examiner was checked, and the statistical analysis of the number of cases and the proportion of the various inspection methods were conducted.

(2) Physical fitness standards for the subjects. Based on the statistical results of the above data, the reasons for the selection of the diagnostic methods were analyzed. On the basis of voluntary examination, a group of people with no heart disease and normal liver and kidney function were selected as the subjects of this study. There were no other diagnostic methods for the diagnosis of the disease, and there was no fracture in the near future (the fixation of the fracture will produce some deviation to the scanning result).

(3) Scanning and analysis of magnetic resonance diffusion imaging. The subjects should be informed of the emptying of the body in advance, and there was no food intake in the application of magnetic resonance diffusion imaging (MRI). Participants needed to keep on lying state table scan in the trial process. Relieve respiratory rhythm can reduce the tension caused by the experimental process. The experimenter should be informed in time to stop the experiment to ensure the safety of the subjects in case of any discomfort and condition. We used a dual gradient whole-body MRI system in this experiment. The operating parameters of the instrument were shown in Table 1.

Table 1. Display of operation parameters of whole body magnetic resonance imaging instrument

Scanning parameters	TR (ms)	TE (ms)	View (FOV cm)	Encouraging times (NEX)	Matrix	Thick layer (mm)	Zeng interval
Numerical value	5250	71–83	28	2.0	128×128	3.5	0.5

Prostate cancer inspection process is shown in Fig. 2.

3.3. Data processing

All the data obtained were conducted statistical processing and the software used included Excel 2007 and SPSS 22. Excel 2007 was mainly used for data statistics and simple data analysis, and SPSS 22 software was used to analyze and deal with the correlation and significance of all the data.

4. Result analysis and discussion

4.1. The concept of magnetic resonance diffusion imaging and its application

People's eating habits and unhealthy living habits caused that the incidence of some diseases of human being was increasing year by year in the current era [13].

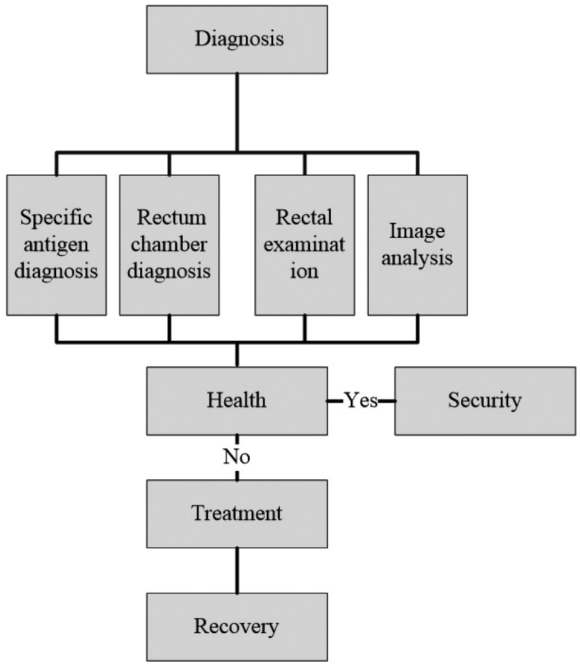

Fig. 2. Summary of prostate cancer diagnosis and treatment process

Human life production caused serious pollution of the living environment, and their genetic causes made that cancer has become a threat to human health and was the main form of disease. And there were experts counted that lung cancer was the first cancer incidence in the outbreak of cancer. Prostate cancer was the most common form of cancer that has the highest incidence except lung cancer for men. Because of some of the characteristics of cancer cells, the treatment of cancer has not been able to prevent the spread of cancer cells from cancer so that the treatment of cancer has shown poor results. The disease still needed to be taken from its source for cancer, and the diagnosis of cancer also played an important role in the treatment of cancer. The disease can be found earlier through the diagnosis and the earlier findings for the treatment of late cancer was also better [14]. The diagnosis of cancer has remained on the basis of technology for a long time. However, it has been proved by practice that the basic diagnostic techniques had some disadvantages, so the reliability of diagnosis results was not high. This study was focused on the diagnosis and application of diffusion tensor imaging (DWI) in the diagnosis of prostate cancer. Diffusion magnetic resonance imaging (MRI) was mainly used to scan the blood flow of the lesion tissue through the relevant data query and statistics, and its velocity and other changes were analyzed to generate a kind of image data finally. We can diagnose the presence of prostate cancer by analyzing the image data. The method had the advantages of high sensitivity, and overcame the problems of the traditional influence of imaging detection technology such as the signal intensity was too strong or too weak. At the same time, the advantages of non-invasive and non-

ionizing radiation accelerated the application and popularization of this technique in diagnosis [15].

4.2. Application of magnetic resonance diffusion imaging in the diagnosis of prostate cancer

62 patients with prostate cancer were examined by magnetic resonance diffusion imaging. It can be seen that a total of 35 patients with prostate cancer were found and a total of 27 cases with hyperplasia. The results checked are shown in Table 2.

Table 2. Analysis of magnetic resonance diffusion imaging

	Incidence of disease	Number of cases	Place of occurrence	Number of cases
Magnetic resonance diffusion imaging	Prostatic cancer, Benign prostatic hyperplasia, Incidence of disease prostatic cancer	35	Peripheral zone	19
			Central gland	12
			Peripheral and central gland involvement	4
			Extracapsular spread	5
			Distant metastasis	2
	Benign prostatic hyperplasia	27		27
	Total	62		62

4.3. Analysis of ADC and MRS values in prostate cancer

In order to better determine the incidence and the incidence of prostate cancer in all subjects, the present study was performed to investigate the actual situation of the lesion. The ADC value and MRS value of the lesions were analyzed by magnetic resonance diffusion imaging software. SPSS 22 was used to analyze all the data. The results of data analysis were shown in Table 3 and Table 4. The results showed that there was a significant difference between the ADC value and MRS value in the cancer and non-cancerous regions ($P<0.001$), which passed to test and the t values were higher. Thus the results were of great reliability. Therefore, magnetic resonance diffusion imaging can be applied to the diagnosis of prostate cancer, and its application had a greater degree of credibility.

Table 3. ADC value of cancer and non-cancer

Partition	Number of cases	Average value	T value	P value
Cancer area	35	0.47±0.17	15.833	0.000
Non-cancerous area	27	1.09±0.25	-	-

Table 4. MRS value of cancer and non-cancer

Partition	Number of cases	Average value	T value	P value
Cancer area	35	1.64±0.63	11.826	0.000
Non-cancerous area	27	0.61±0.28	-	-

5. Conclusion

With the continuous improvement of the production and living standards, the surrounding environment of human being has been affected to a great extent. And because of the impact of different physical fitness, unhealthy habits and eating habits even caused a number of disease incidence increased. Taking the prostate cancer as a research object, the concept and definition of magnetic resonance diffusion imaging diagnostic techniques were summarized in this study and a clear theory of MR diffusion imaging was established finally. And the study made this technique used in the application of prostate cancer diagnosed, which provided a theoretical basis and scientific support for the popularization and application of new technology in the diagnosis of prostate cancer, and laid a theoretical foundation for the introduction of new diagnostic techniques in other cancers.

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