

Research Article

From Nobel Prize in Physiology and Medicine, Talking About the Pain Basic Research

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Abstract

Background: The two winners of Nobel Prize, David Julius and Ardem Patapoutian in physiology and medicine studied the temperature and tactile transient receptor potential, revealing the inner mystery of temperature and tactile receptors, thus laying the general direction of pain clinic and basic research. This makes me Think about how our pain doctors in China can deeply study the pathogenesis of painful diseases based on their pain research results, and fundamentally cure many painful diseases. **Objective** The purpose of this article is to explore how to further study the pathogenesis of painful diseases, and to call on pain doctors to be dedicated spirit, believing that winning the Nobel Prize is possible in the future. **Methods:** Based on the development status of pain research in China, this paper analyzes the achievements and shortcomings of Chinese basic and clinical research of pain in recent years, so as to point out the direction of future research. **Results:** Since the establishment of pain departments in almost all hospitals in China in 2007 and the renaming of many pain departments to Painology in 2015, China's scientific research in pain studies has achieved significant progress. Numerous clinical studies have led globally, particularly in the treatment of clinical diseases such as trigeminal neuralgia and herpes zoster-related pain, and in terms of treatment methods, both radiofrequency thermocoagulation and trigeminal nerve root balloon compression have all gained extensive experiences. However, the disadvantage is the lack of basic research and the failure to study the pathogenesis in depth, so that many diseases cannot be cured radically. Many research papers are for the purpose of degree and promotion, and after publication, they are shelved and rarely translated into clinical treatment. **Conclusion:** The authors call on clinicians to go to the laboratory, to start with clinical phenomena, and to engage in pathogenesis research in the laboratory with dedicative spirit, so as to cure pain diseases. It is possible for clinicians to win the Nobel Prize.

Keywords

Nobel Prize, Shortcoming of research, Pain Mechanism, Clinic to Laboratory, Dedicative Spirit

1. Introduction

The winners of Nobel Prize, David Julius and Ardem Patapoutian in physiology and medicine studied the temperature and tactile transient receptor potential, revealing the inner mystery of temperature and tactile receptors, David Julius uses capsaicin to identify the receptors that respond to

hot or cold stimuli on nerve endings in the skin. Ardem Patapoutian, by using pressure-sensitive cells, discovered a new type of receptor that responds to mechanical stimulation of the skin and internal organs. The two scholars further investigate the classifications, structural characteristics, func-

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tion and regulatory mechanisms of the receptors, which extends our knowledge about heat, cold, mechanical stimulation and pain. thus laying the general direction of pain clinic and basic research [1-3]. So you know that drugs acting on ion channels will open up new prospects for the treatment of sensory and abnormal pain, cardiovascular, lymphatic system, urinary system and other systems regulation or disease treatment. This is a great recovery in the pain basic research, which will lead the pain clinic treatment to a high level.

2. Achievements and Shortcomings of Pain Research in China

2.1. Reviewing History, Making New Contributions

China historically invented the compass, papermaking, printing, and gunpowder, making significant contributions to the advancement of world science. Particularly, the invention of traditional Chinese medicine holds a prominent position in the history of global medicine and has played a crucial role in treating pain diseases. Before introducing Western anesthesia, China also made important innovations in the fields of anesthesia, pain relief, and resuscitation [4]. Now that poverty and backwardness have become part of history in China, we should make greater contributions to scientific research and create more new inventions and discoveries in modern pain medicine.

2.2. Current Status of Pain Research

Since 2007, the Pain Department was set up in almost every hospital according to the medical policy of the Chinese Ministry of Health, and then we changed the term of pain medicine into Painology in 2015 [5]. Later Liu XL suggested the new term of Painologist and Department of Painology to replace pain doctor and department of management [6]. After that the Chinese pain clinicians has created a lot of achievements in clinic. Numerous clinical studies have led globally, particularly in the treatment of clinical diseases such as in the treatment of trigeminal neuralgia and herpes zoster-related pain [7], and in terms of treatment methods, both radiofrequency thermocoagulation and trigeminal nerve root balloon compression have all gained extensive experiences [8]. However, the disadvantage is lack of basic research with no innovations and the failure to study the pathogenesis in depth, so that many diseases cannot be cured radically. Taking the trigeminal neuralgia treatment as an example, while balloon compression therapy disrupts nerve conduction by damaging trigeminal nerve roots to achieve effective pain relief, it often leads to recurrence and lacks lasting efficacy. This approach merely addresses symptoms rather than targeting the root cause of the condition, resulting in temporary relief that frequently returns [9]. If we can identify the true pathogenesis of

trigeminal neuralgia and implement fundamental treatment to address its root cause, this condition could be completely cured with permanent remission. This represents the basic research direction we should strive for in medical research.

2.3. Pain Mechanism Research Is the Basis of Pain Treatment

Fan BF [10] and Zhang DY [11], the Chairman and the former Chairman of CMABPM, recalled the developmental course of the Chinese painology in their 2021 New Year's message point out that after nearly four decades of development, the field of pain medicine has established a preliminary independent theoretical framework, technical standards, and disciplinary management system. The talent cultivation system is gradually maturing. However, academic standards require further enhancement, pain science research needs deeper exploration, and significant efforts should be directed toward chronic pain treatment and mechanism studies. Pain medicine departments should become the primary force in researching chronic pain-related diseases. Then they emphasized that the basic pain research should be strengthened. I appeal that we must turn the research direction, put the research focus on the basic pain science. Pain specialists must go to laboratory research from clinical practice, not only clinic. By investigating pathological mechanisms through experimental studies, they can uncover the basic causes of pain disease to develop targeted therapies that achieve lasting recovery. I strongly urge pain physicians to expand beyond clinical treatment into fundamental research, challenging the outdated notion that clinicians should focus solely on treatment, then from the clinical studies to mechanistic research. And hope that Chinese pain scientific researchers can have new discoveries, create new research fields, and make innovative contributions to the world pain medicine.

3. Results

3.1. Clinicians Should Engage in Basic Research

That reminds me, Do clinicians need to do basic research in the laboratory? I think it is very necessary, particularly in the affiliated hospital of medical university. Because in addition to medical tasks, the affiliated hospitals of medical universities also have teaching and scientific research tasks. These hospitals must engage in scientific research and produce achievements. Under the guidance of senior pain doctors, graduate students can conduct basic research on pain mechanisms in the laboratory together with their tutors, realizing that it is possible to conduct research from clinic to laboratory and pain doctors to laboratory.

That makes me to think again, can clinicians go to the laboratory to research? I used to think that it was impossible for a clinician to win the highest national award or the Nobel

Prize, because the clinician is to treat the patient only, who will be a good doctor if he can cure the patient completely. How can the clinicians have inventions and win awards? But the development trend of modern medicine has broken this one-sided view. Because pain doctors know best about the whole process of the painful diseases, know the rules of pain onset, and know the mechanism of the pain diseases and where to start to carry out experimental research, so they are qualified and capable to carry out the clinical and basic research on pain.

3.2. From Clinical Subjects to Laboratory Research

Now the proposal is from clinic to laboratory, means that from the clinical phenomena, then to the laboratory to do in-depth research, changed the past research method from the laboratory topic, and then to the clinical verification. Does the clinicians have ability admitting to the laboratory? The answer is definite. At present, many medical schools are training doctoral or master's degree students, many hospitals affiliated to the university have fully equipped laboratory and animal laboratory which can produce many high-quality papers every year, a large number of dissertations including basic research papers, published in domestic and foreign journals. But unfortunately, most of these papers are for promotion, for degree, the paper will completed its task after publication, so put them on the shelf. Unlike the two Nobel Prize winners who worked on a topic for a few decades ceaselessly and have achieved good results finally.

3.3. Carry Out Research on Subtypes of Painology

Pain specialists are the frontline physicians in diagnosing and managing pain disorders. With their deep expertise in analgesics, they play a pivotal role in cancer pain management. Core techniques in pain medicine, including minimally invasive approaches like nerve blocks, nerve ablation, nerve modulation and patient controlled analgesia have proven highly effective for refractory cancer pain [12]. As advances in diagnostic and therapeutic technologies, pain science has branched into specialized fields such as pain internal medicine, pain surgery, and pain imaging. This specialization facilitates fundamental research into pain mechanisms, significantly enhancing clinical diagnosis and treatment capabilities for pain-related diseases [13].

3.4. Clinicians Are Capable to Do Basic Research

Looking back at the development history of pain medicine in China, it began with the National Academic Conference on Pain Treatment of CMA hosted by me in Chengde in 1988 [14], and was later led by Academician Han Jisheng to hold

the "First International Conference on Pain between East and West" in Beijing. And he initiated the establishment of the Chinese Association for the Study of Pain (CASP) [11]. Through 40 years of development spanning two generations, the China Pain Medicine has achieved world-renowned accomplishments, establishing a mature discipline of pain and cultivating a large number of erudite pain specialists [15]. They are fully capable of independently conducting fundamental mechanism research on pain in laboratories, and it is entirely capable for them to win the Nobel Prize inspired by their dedication to science.

4. Discussion

4.1. A Clinician Should Have the Spirit of Dedication to Science

Do the clinicians have time to enter the laboratory? The answer is also definite. Doctors are scientific workers and should have the dedication of scientists. As long as it is not an attitude "come to work and go home after work", they will have enough time to work in the laboratory. Many scientists work like this style, they can 24 h stay in the laboratory to do research. Now we should emphasize the elimination of interference, work on a topic for decades in a persevering way, achievements will be made finally.

4.2. Clinicians Can Win a Nobel Prize if They Work Hard

Can the pain clinicians win the Nobel Prize? This idea sounds a little arrogant, but carefully think of that trigeminal neuralgia, postherpetic neuralgia and a variety of painful diseases have millions of patients in the world, pain doctors one by one to treat them, even if they can be cured completely, it is impossible to cure all the patients. If the pain doctors can deeply study from the pathogenesis, how the pain is ignited (firing), and how the transient receptor potential is initiated, then the pain diseases will be controlled from the source of the pain onset. If he could do that, he should like the Chinese Nobel Prize winner Youyou Tu in 2015, who found dihydroartemisinin in 1972 that has cured millions of malaria patients, also win the Nobel Prize. Is this possible? I think it is possible if he makes such unremitting efforts.

5. Conclusion

In summary, Think of that two American scientists have won the 2021 Nobel Prize in physiology and medicine award. This paper points out the progress of Chinese pain clinician and the shortcoming of the Chinese pain research work, particularly in basic mechanism, The author calls on clinicians to go to the laboratory, to start with clinical phenomena, and to engage in pathogenesis research in the laboratory for revealing the

principle of the molecular biological mechanism of painful diseases,. I appeal that the painologist should have the dedicative spirit to do the basic research in the clinic and laboratory, so as to cure the refractory pain diseases radically. I consider that it is possible for clinicians to win the Nobel Prize finally.

Abbreviations

CMABPM	Chinese Medical Association, Branch of Pain Medicine
CMA	Chinese Medical Association

Author Contributions

Li Sheng Zhang is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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