

## Professor Jian Ge: the road to the success of scientific research

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Professor Jian Ge (*Figure 1*) currently is member of standing committee of the Asia Pacific Glaucoma Society, Honorary Chairman of the Chinese Ophthalmologic Society, Vice chairman of the Chinese Eye Doctor Association, Former Chairman of the Chinese Glaucoma Society, Honorary Lifetime Director of State Key Laboratory of Ophthalmology, Chairman of Guangdong Eye Doctor Association, member of standing committee of the Evidence-Based Medicine Committee of the Chinese Doctor Association, Editor-in-Chief of *Eye Science* and *Molecular Vision*, Vice Editor-in-Chief of *Chinese Journal of Ophthalmology* and *Chinese Journal of Experimental Ophthalmology*.

Prof. Ge's research covers many aspects of ophthalmology and vision research, ranging from basic science to clinical fields. The followings have been involved: (I) mechanism of experimental myopia in rhesus monkeys; (II) gene screen and function in familial primary open angle glaucoma; (III) stem cell and regeneration, induced pluripotent stem (iPS) and tissue engineering in ophthalmology; (IV) wound healing and modulation of scar formation after glaucoma surgery; (V) new alternatives in the treatment of glaucoma, special interest in phaco, shunt, laser therapy. Prof. Ge get the big government funding, including The National Basic Research Program of China (973 Program) for the pathogenesis and management for irreversible blindness eye diseases, and the Key Project of National Natural Science funding for the stem cell and tissue engineering therapy for the irreversible blindness.

Prof. Ge has published over 340 academic papers, including over 147 papers in international peer-review [Science Citation Index (SCI)] journals, including *Stem Cells*, *The American Journal of Pathology (Am J Pathol)*, *Investigative Ophthalmology & Visual Science (IOVS)*, *International Journal of Cancer (Int J Cancer)*, *Ophthalmology*, *PloS One*, *Experimental Eye Research (Exp Eye Res)*, *Molecular Vision (Mol Vis)*, *Journal of Tissue Engineering (J Tissue Eng)*, *et al.*, on topics such as the role of amyloid beta in glaucoma, iPS induced into retina neurons and so on. Prof. Ge is the Chief Editor of text book *Ophthalmology*, *Ophthalmic Surgery* and *Clinical Glaucoma* published by China People's Medical Publishing House.

Created in 1985, the *Eye Science (ES)* is a peer-reviewed



**Figure 1** Professor Jian Ge.

journal published by Zhongshan Ophthalmic Center, sponsored by Sun Yat-sen University in Guangzhou, China. Since November 2015, this journal has been transferred to AME Publishing Company to be in charge of its publication. At this historically significant turning point, the science editor from AME is honor to interview Prof. Jian Ge, the Editor-in-Chief of *Eye Science* and invited him to share his unique views on the development of ophthalmology and his rich experiences on the management of glaucoma. Also, by recalling his professional careers, Prof. Ge proposed four “major keys” on the road to scientific success, which he believed to be useful for young medical staff. The *ES* is embracing a new beginning, and Prof. Ge is highly optimistic about the future of the journal. He hopes that the journal can be one of the best platforms to reflect the development of ophthalmology in China and maintains its high academic level.

**ES:** *Firstly, would you summarize and share the history and status quo of ophthalmology in China?*

**Prof. Ge:** The Ophthalmology Branch of Chinese Medical

Association was established after the founding of the People's Republic of China in 1949; since then up to 11 professional panels have been established. After 50 years of development, now there are about 35,000 ophthalmologists nationwide. Quite a few peer-reviewed journals including *Chinese Journal of Ophthalmology*, *Chinese Journal of Experimental Ophthalmology*, *Eye Science*, and *International Review of Ophthalmology* were created and the ophthalmology is now thriving across China. The most iconic contribution made by Chinese ophthalmologists to the global eye science was the successful isolation of *Chlamydia trachomatis* by Dr. Feifan Tang and Dr. Xiaolou Zhang, for the first time, in 1956. Since China's adoption of the reform and open-up policy, ophthalmology has become one of the fastest growing clinical disciplines in China. In clinical settings, the mainstream ophthalmological skills have been widely adopted by Chinese ophthalmologists; meanwhile, based on the rich experiences obtained from huge number of patients, the Chinese ophthalmologists have a louder voice in the international arena. Dr. Jialiang Zhao, Dr. Kanxing Zhao, Dr. Xiaoxin Li, and Dr. Ningli Wang have successively been elected as members of International Council of Ophthalmology. The clinical and basic research in the field of ophthalmology in China has also reached or approached the international level. In recent years, quite a few articles authored by Chinese ophthalmologists have been published in top medical sciences including *Nature*, *Nature Communication*, *Stem Cells*, and *Nature Genetics*. The Secretariat of the Asia Pacific Academy of Ophthalmology (APAO) has been permanently settled in the Zhongshan Ophthalmic Center. The voice of China in ophthalmology has gradually been heard globally.

According to the World Health Organization (WHO), if the uncorrected refractive error is also taken into consideration, the common blinding eye diseases include myopia, cataract, glaucoma, corneal disease, macular disease, trachoma, and river blindness. However, the latter two diseases are not prevalent in China. The common blinding eye disease ranks the third leading disease that seriously endangers the patients' quality of life, only after cancer and cardiovascular diseases.

Research advances in blinding eye diseases and visual impairment in China have attracted considerable interest from global colleagues. The clinical development of ophthalmology in China is featured by the drastic diversity of this discipline among different areas: the qualifications and skills of optometrists are distinctly different in various areas; the vast majority of ophthalmologic and optometric

resources are located in major cities; the ophthalmologic and optometric resources are extremely scarce in remote areas, communities, and rural areas. Even more alarmingly, the number of blind people in China has hit 5 million, accounting for 18% of all the blind people worldwide. Every year there are 450,000 newly diagnosed blind persons, among whom 50% are due to cataracts and the blindness are reversible. However, the cataract surgical rate (CSR), which is an indicator for assessing public health, is up to 5,500/1,000,000 in the United States but is only 1,400/1,000,000 in China in 2015. Obviously, there is still a large gap. China now has 2 million people requiring cataract surgery; meanwhile, there are 400,000 new cataract cases diagnosed annually. Sadly, these conditions are not due to the lack of relevant techniques or facilities; rather, qualified ophthalmologists who are able to perform cataract surgery are still urgently needed.

**ES:** *As a top expert in glaucoma management, could you describe the recent research advances in glaucoma in China? Which factors are obstructing the glaucoma treatment?*

**Prof. Ge:** In general, the notable research advances in glaucoma in China in the past decade have helped the Chinese ophthalmologists to catch up with their international colleagues. The ophthalmologists, in clinical settings or in laboratories, have committed to improving the level and quality of clinical diagnosis and treatment and grasping new techniques and new methods, so as to provide effective, feasible, and affordable medical services to glaucoma patients. Due to the large number of glaucoma patients, the Chinese eye doctors are more skillful in some medical maneuvers. Based on the prevalence of 1%, the number of patients with primary glaucoma is up to 14 million. It is a huge number, even if the number of secondary glaucoma patients is not taken into consideration.

Glaucoma is a lifelong disease. After the diagnosis is confirmed, the patients have to live with glaucoma. Unlike cataract, which can be cured after surgery, glaucoma cannot be cured; it can only be controlled.

While the Chinese ophthalmologists have good capabilities in diagnosing and treating glaucoma, most sophisticated devices and equipment in Chinese ophthalmology departments are imported from developed countries. This is a key factor that restricts China's leading role in this field. For instance, the phacoemulsification equipment as well as the devices required in glaucoma

surgery is introduced from western countries. In terms of scientific innovation, there is only champion and no place for the first or second runners-up. Lack of innovation is a major problem for Chinese ophthalmologists. For innovation, we do not lack ideas and vision; but we do lack ways to realize them. Innovation requires a whole set of system. First, there must be deep soil and sound system for innovation; second, there must be a good environment and unified consensus.

A nationwide recognition of innovation is the ladder of social progress. While supporting incentives is crucial, there should also be an atmosphere that allows or tolerates innovation failures. For example, in 2014, up to 1.5–2.0 million cataract surgeries were performed in China. Although the number of surgeries may exceed that in the United States, the phacoemulsification techniques and equipment were originally developed by United States companies and scientists. China is a big country. The Chinese scientists are obligated to bring more innovations to the world. The lack of innovations in medical equipment/devices directly impairs the development of ophthalmology research in China.

Furthermore, the incentives and motives in scientific research also have constituted an obstacle. The past decades have witnessed the dramatic advances in medical research in China, in particular the applications of medical technology. However, there also comes a long-standing issue of fraud and misconduct in Chinese academia. Some individuals conduct scientific research with an attempt to publish scientific articles in peer-reviewed journals, not for addressing a specific clinical problem or scientific issue.

**ES:** *In terms of scientific research, you must have much to say since you have published many academic works and gained excellent achievements in ophthalmology in the past three decades. Is there any suggestion you would like to share with young scientists?*

**Prof. Ge:** First of all, you must learn to be adaptive, as “survival of the fittest” proposed by Charles Darwin in his Theory of Evolution. The current evaluation system in China requires every scholar to publish a certain number of scientific articles. You have to adapt this system. Before it is corrected or changed, complaining, anger, or even ignoring is useless. During the adaptation, you must learn how to effectively and efficiently utilize the currently available resources to conduct scientific research.

Second, and more importantly, you must grasp the

essential scientific research methodologies. The general laws and visions of science have no Chinese characteristics. No matter whether you have a master or doctor degree, you must be aware of the basic scientific ideas and know how to think in a more scientific way. Scientific research is conducted according to uniform rules. It begins by topic selection (how and why choose a specific topic), followed by data collection and analysis. Such rules apply to both clinical studies and translational research.

Third, you must learn to be accountable. Once you decide to pursue your scientific career by a doctorate, you should stop complaining and study and work hard.

Fourth, keep learning. Learning is not a task of master and doctorate candidates but also daily work of all medical staff. In this rapidly changing society, you must keep learning, or you’ll fall behind. You may forget the knowledge you learned in college very soon, whereas mastering the basic framework and learning methods is essential. For instance, how to inquire into the essence of information from complicated phenomena? How to settle complex problems with simple and effective solutions? The keys to these questions will reflect your learning ability.

Fifth, value the power of culture. Culture can refer to a civilization but can also to the fineness of manner and expression. At least, you should act as a well-educated individual. The so-called “well-educated” does not equal to the high academic degree you hold. In fact, an individual with a master or doctor degree does not necessarily have a “culture”, and a person with low education background is not necessarily “uneducated”. A well-educated person must learn how to communicate with other people in an appropriate manner in addition to professional knowledge. This is particularly true for clinicians because they need to communicate with patients frequently. In recent years, although the Chinese doctors are benefiting from the constantly increasing incomes, the physician-patient relationship has become problematic. The “educated” and education level are not in proportion with the income. However, they can affect the social environment and education atmosphere and thus affect the scientific research.

In addition, adequate research funding is very important. There is a saying that goes, “science is a rich man’s game”. Only when the basic needs are met can a people be involved in philosophical and scientific research.

Of course, the institution you are working for is also very important. Such a platform must be able to meet the essential requirements of your research and provide you high-level staff and equipment.

Finally, the scientific acumen and efforts are particularly important. Clinical and scientific intuition and inspiration can help you discern contradictions from the labyrinth. Science is not arising from genius. According to Edison, “1% genius plus 99% hard work make success”.

**ES:** *Dr. Yaozhen Chen (Eugene Chan) once wrote in the inaugural statement on the first issue of the Eye Science, “The Eye Science is created to help Chinese ophthalmologists to communicate with their international colleagues and introduce the up-to-dated scientific findings in ophthalmology. It will serve as a friendship bridge between Chinese ophthalmologists and their international colleagues.” How do you think about its role as a bridge?*

**Prof. Ge:** The *Eye Science* was founded in 1985, not long after China adopted the reform and opening-up policy. Thanks to the tireless efforts of Dr. Yaozhen Chen, this new journal shed new light on ophthalmology in China after decades of isolation. As I know, and as documented in literature, Dr. Chen is also the founder of Zhongshan Ophthalmic Center. He obtained a doctorate in chemistry and an MD degree in the United States and has been the only Chinese doctor who had received complete ophthalmology residency training in John Hopkins Hospital. He was trained at Johns Hopkins Hospital from 1924 to 1934. Dr. Chen’s father, Lianxiang Chen, was also a talented scholar; he graduated from Harvard University’s Department of Chemistry. During the Anti-Japanese war, Dr. Yaozhen Chen migrated from Cheeloo University to West China University and returned to Guangzhou in 1950s. In October 1965, Dr. Chen and his colleagues established the Eye Hospital of Zhongshan Medical College. At that time, there were only two eye hospitals in China: one in Tianjin, and the other in Guangzhou. The Guangzhou Eye Hospital was specially approved by the central government and also the first eye hospital affiliated to a medical college. In 1983, based on the American experiences, the Eye Hospital was renamed “Zhongshan Ophthalmic Center of Sun Yat-sen University of Medical Sciences,” consisting of the Eye Hospital, Eye Research Institute, and Office of Prevention and Treatment for Blindness (Preventive Ophthalmology). In 1982, I was the only graduate student in the eye hospital, and Dr. Chen was my mentor’s mentor. Dr. Chen was one of the main founders of modern ophthalmology in China. He and his wife Dr. Wenshu Mao were known as China’s Curies in history of Chinese ophthalmology.

They are immortal, and their cause has been carried on. Dr. Chen represented the first generation; my mentor, Dr. Wenbing Zhou, was the second generation. The representatives of the third and fourth generations were Dr. Shaozhen Li and Dr. Jiaqi Chen, respectively. I belonged to the fifth generation, and Dr. Yizhi Liu was the sixth generation.

In 1985, Dr. Chen and his wife Wenshu Mao organized the first international conference on ophthalmology in China, which was attended by over 400 famous eye doctors all around the world. Notably, thanks to the efforts of Dr. Chen, the first flight of the ORBIS Flying Eye Hospital (ORBIS International) chose Guangzhou; during its month-long stay at Guangzhou Baiyun Airport, the ORBIS International brought advanced ophthalmic technology to Chinese patients and physicians.

Thus, Guangzhou can be regarded as the origin of Chinese modern ophthalmology.

The founding of the *Eye Science* further promoted the international academic exchanges. We used to make the *Eye Science* freely interchangeable with more than 30 peer-reviewed journals worldwide; by doing so, we saved a lot of subscription fees and meanwhile promoted academic exchanges with ophthalmologists both at home and abroad and expanded the influence of Sun Yat-sen Medical University.

**ES:** *As one of the current Editors-in-Chief of Eye Science, do you have any expectations for the future of this journal?*

**Prof. Ge:** I think the *Eye Science* is one of the best Chinese journals in the field of ophthalmology. Chinese and foreign ophthalmologists can use this platform to learn the information and development of ophthalmology in China. The journal must maintain its high-level academic features and timely report and introduce the recent updates in clinical practices, teaching, and scientific research in this field, helping more international colleagues learn the status quo of ophthalmology in China.

Today, the *Acta Ophthalmologica*, *Archives of Ophthalmology*, and *Journal of Cataract & Refractive Surgery* have published their simplified Chinese editions. Since the international colleagues are so interested in distributing their knowledge in China, we must work harder. In addition, using columns such as editorial, special comments, focus, and even controversy, many international top journals invite Chinese authors to submit leading articles to them, so as to share opinions and experiences among international colleagues.



The top journals including *Science*, *Nature*, and *Cell* have done very well in this regard.

In addition, the *Eye Science* should also have more detailed topics; for instance, basic research, clinical studies, translational studies, and case discussions can be presented in a more integrated manner, so that more physicians and scholars can benefit from them.

**ES:** *You and your team have won many grants and honorable titles including the 973 Program-supported projects, the “Senior Research Scientist” award (by the World Glaucoma Association), and the “De Ocampo” Award (by The Asia-Pacific Academy of Ophthalmology). Behind these achievements, there must have been many memorable stories and success factors. Could you share them with us?*

**Prof. Ge:** These awards were granted not only to me but also to the whole team in our center. I have many personal interests. In addition to the daily clinical work, I am also interested in scientific research, humanities and even literature. Especially, I have never changed my research interests. I often tell my students, “You are quite clever in learning new knowledge and new skills; however, the biggest difference between you and I is that you do not have wide interests. Interests need to be fostered, and interests often mean chances.”

Second, my persistence paid off. Most of my accomplishments came as the result of sheer dogged determination. No matter in the office or lab, I always take the time to collect data relevant with my clinical work. Sometimes I work overtime at night; of course, it’s not a painful overtime; rather, this is due to my interest.

Third, I have keen interests in discipline frontier. This helps me to grasp the disciplinary development direction and take a lead in this field. I am always tracking the cutting-edge scientific research and promising clinical studies.

Fourth, I have a stable long-term research direction. My

main research interests include the optic nerve protection and stem cell replacement therapy in glaucoma patients and the pathogenesis of myopia.

Globally, Zhongshan Ophthalmic Center is one of the institutions using Rhesus monkey models for myopia research. We not only explore the pathogenesis of juvenile myopia but also provide interventions for this condition. Our work has been supported by many national and provincial/ministerial research funds. For instance, I obtained the first 973 Program (i.e., National Key Basic Research Program)-supported grant for ophthalmological study in 2007. The central government allocated 27 million RMB to us to support our efforts in carrying out research on blinding eye diseases by engaging top ophthalmologists nationwide and worldwide.

In addition, China’s first conference on basic research in ophthalmology was held in Guangzhou. I was the then vice chairman of Chinese Ophthalmological Society and was commissioned by the chairman to hold this important meeting. The meeting was based on the experiences of our colleagues in the United States, where two major meetings in ophthalmology are held annually: the American Academy of Ophthalmology (AAO) annual meeting, which mainly focuses on clinical practices; and the Association for Research in Vision and Ophthalmology (ARVO) annual meeting, which covers more basic research.

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### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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