• Special Report •

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Global collaboration of eye research

—personal experience

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Great discoveries and improvements invariably involve the cooperation of many minds.

—Alexander Graham Bell

The hardest problems of pure and applied science can only be solved by the open collaboration of the worldwide scientific community.

—Kenneth G Wilson

On December 9, 2023, I was privileged to be honored and participate in the *Dr. Chi Chao Chan Symposium on Global Collaboration of Eye Research* as the Global Eye Genetic Consortium (GEGC) session, which was held in the 16th Congress of the Asia-Pacific Vitreo-Retina Society (APVRS) in Hong Kong. Along with my talk on "Global collaboration of eye research: personal experience", other prominent international speakers provided their own perspectives on opportunities for networking, collaboration, and exchange of ideas with global leaders and experts in ophthalmic practice, research, and education:

● Dr. Gyan "John" Prakash, Associate Director for International Program, National Eye Institute (NEI), National Institutes of Health (NIH), USA, "Overview of global collaboration of eye research"

● Prof. Calvin Pang, S.H. Ho Research Professor and Director of The Chinese University Hong Kong (CUHK) Ophthalmic Research Centre, Hong Kong, China, "Global collaboration in eye genetics"

● Dr. Emily Chew, NIH Distinguished Investigator and Director, Division of Epidemiology and Clinical Application (DECA), NEI, NIH, USA, "Navigating the challenge of leading large multicenter clinical studies"

● Dr. Michael Chiang, Director, NEI, NIH, USA, "Ocular imaging standards to support collaboration"

● Prof. Mingguang He, Chair Professor, Experimental Ophthalmology, Hong Kong Polytechnic University, Hong Kong, China, "Light therapy for myopia control: a technology from China to global"

● Dr. Kapil Bharti, Scientific Director and Head, Ocular and Stem Cell Translation Section, NEI, NIH, USA, "Stem cell derived RPE in improving macular sensitivity in AMD"

● Dr. Wei Li, Senior Investigator and Head, Retinal Neurophysiology Section, NEI, NIH, USA, "Through a clear lens: a case of vision research collaboration".

Receiving a lifetime achievement award from the GEGC (Figures 1 and 2) was a true honor, especially given the symposium's focus on advancing science through true collaboration, a focal point of mine throughout my career. I was delighted by the ample opportunities for attendees connect with each other, thereby continuing the theme of fostering collaboration and professional development.

Figure 1 Dr. Gyan Prakash (GEGC Patron and Past President) presents the GEGC-APVRS Award plaque to me. Prof. Sankara Natarajan (GEGC Vice President; Aditya Jyot Foundation for Twinkling Little Eyes and Aditya Jyot Eye Hospital, Mumbai, India), Dr. Michael Chiang (NEI Director), and my family are on the stage, from left to right: Prof. Natarajan, Dr. Prakash, Dr. Chiang, myself, Henry Eng (my son), Dylan Eng (my grandson), Emily Eng (my granddaughter), Dr. Chung Eng (my husband), and Jaclyn Eng (my daughter-in-law).

Figure 2 My colleagues and friends from USA (NEI) and China (mainly Zhongshan Ophthalmic Center, ZOC) celebrate my honor on the stage, from left to right, first row: Prof. Natarajan (Aditya Jyot Eye Hospital), Dr. Parkash (NEI), Dr. Kapil Bharti (NEI), myself, Dr. Emily Chew (NEI), Prof. Xiaoling Liang (ZOC), Prof. Haotian Lin (Director, ZOC), Prof. Lingyi Liang (Vice Director, ZOC), Prof. Xiaoyan Ding (ZOC); second row: Prof. Kang Zhang (Macau University of Science and Technology), Dr. Wei Li (NEI) who is behind me, Dr. Chiang (NEI), Prof. Mingguang He (The Hong Kong Polytech University School of Optometry), Prof. Junwen Zeng (ZOC) who is behind Prof. L. Liang; third row: Prof. Peiquan Zhao (Shanghai Jiao Tong University School of Medicine), behind Dr. W. Li.

The term "collaboration" in academic research is usually thought to mean an equal partnership between two academic faculty members who are pursuing mutually interesting and beneficial research [The Office of Research Integrity (.gov) https://ori.hhs.gov>topics>colscience>tutorial_1]. Collaboration and communication are important in science and research because they allow scientists to work together, share ideas, and learn from each other's research, which ultimately leads to scientific advancement. From personal experience, I know that collaboration speeds the pace and efficiency of research, yielding new insights and discoveries and most importantly, strengthens the relationship between collaborators and future co-authors.

Research collaboration often results from scientific meetings[1]. These in-person and real-time touchpoints are phenomenal opportunities to connect, collaborate, debate, decide, and learn. A meeting provides the attending scientists and researchers an opportunity to connect and discover if they have similar interests in working toward a shared goal. Meanwhile, the attendees may schedule further collaborative meetings to discuss their ideas and even their preliminary data. These meetings are the birthplace of many advances in research that results in improved eye health, as well as the prevention and treatment of eye diseases.

Today, however, many collaborations involve researchers of differing stature, funding status, and types of organizations [The Office of Research Integrity (.gov) https://ori.hhs.gov>topics>colscience>totorial_1]. Modern research is increasingly complex and demands a widening range of skills. Collaboration is also often associated with costs[2]. Some costs are financial, some are measured in time, and the management of collaboration while understanding cultural and moral differences among the collaborators, particularly international or global collaboration, can be tricky. These cross-border partnerships will undoubtedly involve policymakers, administrators, and funding agencies. Nevertheless, despite these obstacles, research collaboration leads toward better data and better health.

After studied in two medical schools of Zhongshan Medical College (1961-1967, Medical Doctor) in China, and Johns Hopkins University (B.A., 1972; M.D., 1975) in USA, I completed an Ophthalmology residency at Stanford Medical Center in 1969, and a post-doctoral fellowship in Ophthalmic Pathology at the Wilmer Eye Institute, Johns Hopkins Hospital for three years[3]. In 1982, I began my career as a post-doctoral fellow (Uveitis, my second post-doctoral fellowship) at NEI/NIH, a unique national and international resource in the effort to understand, prevent, and cure disease. NIH has close interaction with foreign scientists in the conduct of collaborative research. My most early memorable global collaboration of eye research was assisting my mother, Prof. Wenshu (Winifred) Mao[3-4], who successfully hosted the first International Ophthalmologic Conference in China (IOCC), which was held in Guangzhou on November 11-14, 1985. The purpose of the conference was to provide a forum for Chinese and international clinicians and scientists involved with the

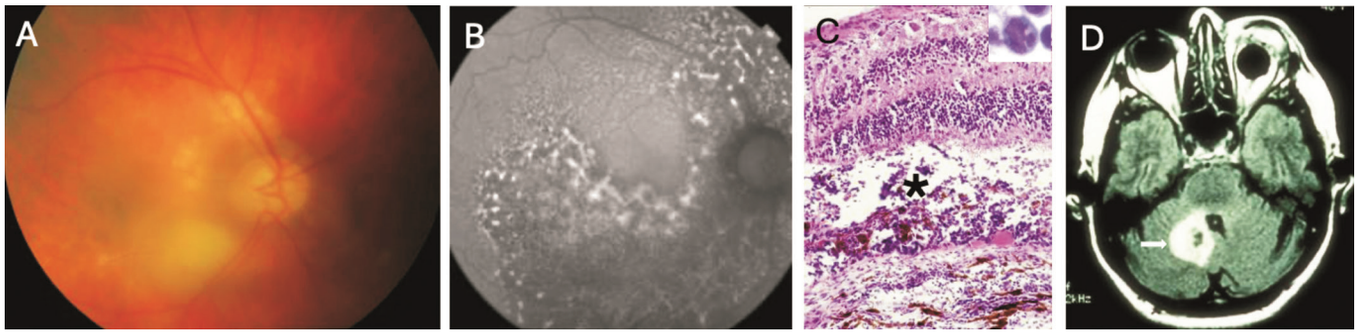

Figure 3 Vitreoretinal lymphoma A: Fundus showing vitreous haze and multiple retinal VRL infiltrates. B: Auto-fluorescence photograph illustrating multiple lesions outlining VRL. C: Histopathology photograph illustrating VRL cells (asterisk) located between the neuroretina and remaining RPE/Bruch membrane. Inset, cytology of a VRL cell. D: CT scan showing a lymphoma lesion (arrow) in the brain. VRL: Vitreoretinal lymphoma; RPE: Retinal pigment epithelium.

study and therapy of patients with the normal functioning of the eye and the pathophysiology of visual disorders. The conference also celebrated the inauguration of the Zhongshan Ophthalmic Center, the 20th anniversary of the Eye Hospital of Sun Yat-sen University of Medical Sciences, and honored my father, Prof. Eugene Chan[3,5] for his valuable contributions and accomplishments in the establishment of the ophthalmological programs in China for 50 years (1935–1985). Approximately 700 ophthalmologists including over 200 from outside mainland China and vision researchers from 22 countries/regions. The presidents of the World Ophthalmology Congress, the American Academy of Ophthalmology, the Asia-Pacific Academy of Ophthalmology, the European Ophthalmology Society, the Japanese Ophthalmology Society, the Russian Ophthalmology Society, attended the conference. The IOCC provided the first opportunity for many ophthalmologists from mainland China to attend an international meeting, present their findings, and exchange with other colleagues from all over the world[3]. IOCC opened the door for China for future global collaborations on eye research.

During the Association for Research in Vision and Ophthalmology (ARVO) meeting in 2014, I joined the Asia Eye Genetics Consortium, which later was renamed GEGC. The GEGC promotes and enhances collaboration on eye genetic research with developing countries of Asia, Africa, and South America. It actively organizes sessions at local and international ophthalmology meetings around the globe. Dr. Gyan Prakash (GEGC Patron and Past President) and Prof. Takeshi Iwata (GEGC President) edited a book series published in the *Essentials in Ophthalmology*, Springer. The book is titled "*Advances in Vision Research*" and has now published IV volumes. Prof. Xiaoxin Li of China, her two colleagues: Lyu-Zhen Huang, Peng Zhou, and myself co-authored a Chapter entitled *Genetics and pathology of inflammatory components on AMD* in Volume I[6].

One of my most favorite research subjects that demonstrated fruitful global collaboration was vitreoretinal lymphoma (VRL)-the most common intraocular lymphoma, formally known as primary vitreoretinal lymphoma, primary intraocular lymphoma, and reticular cell sarcoma[7-9]. There were two international VRL meetings in which I participated and co-authored two articles[7,10]. VRL is a non-Hodgkin lymphoma of the central nervous system (CNS) involving the eye initially or secondarily[7-10]. Most of the VRL are large B-cell lymphoma; T-cell lymphoma is exceptionally rare[11]. VRL cells often locate in the vitreous and between the neuroretina and retinal pigment epithelium (RPE; Figure 3). This special location of the tumor cells could partly result from the co-expressions of B-cell chemokines in the RPE cells and B-cell chemokine receptors in malignant B-cells[12]. VRL is a rare but fatal disease with a slightly rising incidence. According to *StatPearl-NCBI* 2022, up to 90% of VRL patients may ultimately develop CNS lymphoma, with a 5-year survival rate of 30% when un-treated. VRL is considered a masquerade syndrome mimicking chronic uveitis (Figure 3).

Timely and accurate diagnosis of VRL improves patient outcome. Clinical history and examination, cytology and pathology are essential and the gold standard for the diagnosis of VRL[7-8,13]. Monoclonality is detected in VRL cells by immunohistochemistry, flow cytometry, and/or molecular analysis. In contrast, the infiltrating lymphocytes are polyclonal[13-15]. Detection of immunoglobin H (*IgH*) and T-cell receptor (*TCR*) gene rearrangements are reliable biomarkers for B- and T-cell VRL, respectively. The sensitivity and specificity of these molecular markers can be as high as >95%[15]. However, the technique for the detection requires microdissection to identify the VRL cells using a microscope, requiring these cells to be gently scraped manually or by laser capture[13-14]. The dissected VRL cells are then transferred to a microcentrifuge tube for *IgH* and/or *TCR* gene analyses. Microdissection is time consuming, labor intensive, has low throughput and yield and requires deep expertise[16].

Interleukin-10 (IL-10) is a multi-cell-derived, multifunctional, and pleiotropic cytokine. It is produced mainly by type 2 helper T (Th2)-cell, as well as by macrophages, monocytes, and B-cells. Since 1993, three years after the discovery of IL-10, high IL-10 levels have been measured in various subtypes of lymphomas, including diffuse large B-cell lymphoma, both Hodgkin's and non-Hodgkin's lymphomas, and peripheral T-cell lymphoma. IL-6 is a cytokine representing inflammation. We first reported high IL-10 levels and a ratio of IL-10/IL-6 greater than one in the vitreous of VRL eyes in 1995 and 1997, respectively[17-18]. These findings have been repeated and reported in both vitreous and aqueous by other investigators worldwide[19-26]. Analysis of intraocular cytokines IL-10 and IL-6 with a logistic regression model trained by machine learning in Python was also calculated with high sensitivity and specificity in heling to differentiate VRL from uveitis[27]. A systematic literature review from January 2000 to June 2023 was conducted and revealed that an IL-10/IL-6 ratio greater or equal to one from vitreous samples may provide the highest sensitivity in identifying VRL patients among other diagnostic modalities including flow cytometry and detection of an *IgH* gene rearrangement[28]. In summary, IL-10 levels and IL-10/IL-6 ratios in ocular fluids are helpful and useful indices for the differential diagnosis and management of VRL and uveitis[7,15,22,25,29]. However, the diagnosis of VRL should not be made only based on ocular IL-10 levels if there is no other evidence of disease.

B cells can detect antigen-specific signals through the B-cell antigen receptor (BCR) and damage- or pathogen-associated signals by the expression of Toll-like receptors (TLRs). Myeloid differentiation primary-response gene 88 (*MYD88*) is the key signaling adaptor molecule for both IL-1 receptors (IL-1Rs) and TLR-derived signals. *MYD88* (*L265P*) mutation detected in roughly 70%-80% of VRL cases is another relevant molecular biomarker for VRL diagnosis[22-23,30-32]. However, this mutation may not be specific for all VRL, due to it is present only in B- and not T-cell lymphomas[28]. Nevertheless, *MYD88* gene mutation is an ancillary indication for diagnosing VRL and is highly recommended as an additional tool if testing is available[22].

Body fluid molecular hallmarks with the new emerging techniques are being studied at every step of cancer diagnosis and management[33]. Liquid biopsy can use a small amount of fluid; the analysis involves modern technology: next generation sequencing (NGS), cell-free DNA (cfDNA), and circulating tumor DNA (ctDNA). In recent years, cfDNA sequencing from the aqueous humor, vitreous fluid, or cerebrospinal fluid (CSF) of VRL patients has been evaluated for identifying genomic mutations[32,34-39]. The data reveal high sensitivity and specificity. The combination of less invasive biopsy and cfDNA sequencing analysis will be a promising adjunct for the evaluation of the diagnosis and prognosis evaluation of VRL cases.

VRL, like other rare diseases, brings many national and international ophthalmologists, neurologists, hematologists, researchers, and scientists to work together. For my VRL research, I am indebted to my mentors (Dr. Robert B. Nussenblatt of NEI and Dr. W. Richard Green of Wilmer Eye Institute, Johns Hopkins University), colleagues, staff, fellows, and students of NEI, also colleagues and collaborators of the National Cancer Institute (NCI), as well as colleagues/collaborators from outside NIH in the USA and other countries from around the world (Australia, Belgium, Canada, China, France, Germany, Israel, Italy, Japan, Netherlands, Philippines, Singapore, Switzerland, United Kingdom). I am obliged to all VRL patients and their families. There is a well-known proverb "It takes a village to raise a child". I believe "It requires global collaboration to diagnose, treat, and cure VRL".

It certainly was a great honor for me to receive this special symposium. I value and thank all that have joined me in this unforgettable journey, including my caring and compassionate family!

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Conflicts of Interest: None.

REFERENCES

1 Kwok E, Porter M, Korf I, Pasin G, German JB, Lemay DG. The collaborative effect of scientific meetings: a study of the International Milk Genomics Consortium. *PLoS One* 2018;13(8):e0201637.

2 Katz JS, Martin BR. What is research collaboration? *Res Policy* 1997;26(1):1-18.

3 Ly LV, Jager MJ. Three generations of eminent American Chinese: lives intertwined with history. *Asia Pac J Ophthalmol (Phila)* 2012;1(3): 129-134.

4 Kupfer C. Wenshu (Winifred) Mao, MD, 1910-1988. *Arch Ophthalmol* 1989;107(4):498.

5 Kupfer C. Professor Chen Yao-Zhen (Eugene Chan), M.D. 1899-1986. *Am J Ophthalmol* 1986;102(2):286-287.

6 Li X, Huang L, Zhou P, Chan CC. Chapter 15. Genetics and pathology of inflammatory components on AMD. In *Advances in Vision Research: Volume I. Genetic Eye Research in Asia and the Pacific*. Prakash G, Iwata T (eds); Springer 2017;193-208.

7 Chan CC, Rubenstein JL, Coupland SE, *et al*. Primary vitreoretinal lymphoma: a report from an International Primary Central Nervous System Lymphoma Collaborative Group symposium. *Oncologist* 2011;16(11):1589-1599.

8 Chan CC, Sen HN. Current concepts in diagnosing and managing primary vitreoretinal (intraocular) lymphoma. *Discov Med* 2013;15(81): 93-100.

9 Coupland SE, Chan CC, Smith J. Pathophysiology of retinal lymphoma. *Ocul Immunol Inflamm* 2009;17(4):227-237.

10 Nussenblatt RB, Chan CC, Wilson WH, Hochman J, Gottesman M; CNS and Ocular Lymphoma Workshop Group. International Central Nervous System and Ocular Lymphoma Workshop: recommendations for the future. *Ocul Immunol Inflamm* 2006;14(3):139-144.

11 Chaput F, Amer R, Baglivo E, *et al*. Intraocular T-cell lymphoma: clinical presentation, diagnosis, treatment, and outcome. *Ocul Immunol Inflamm* 2017;25(5):639-648.

12 Chan CC, Shen D, Hackett JJ, Buggage RR, Tuaillon N. Expression of chemokine receptors, CXCR4 and CXCR5, and chemokines, BLC and SDF-1, in the eyes of patients with primary intraocular lymphoma. *Ophthalmology* 2003;110(2):421-426.

13 Chan CC. Molecular pathology of primary intraocular lymphoma. *Trans Am Ophthalmol Soc* 2003;101:275-292.

14 Shen DF, Zhuang Z, LeHoang P, Böni R, Zheng S, Nussenblatt RB, Chan CC. Utility of microdissection and polymerase chain reaction for the detection of immunoglobulin gene rearrangement and translocation in primary intraocular lymphoma. *Ophthalmology* 1998;105(9):1664-1669.

15 Wang Y, Shen D, Wang VM, Sen HN, Chan CC. Molecular biomarkers for the diagnosis of primary vitreoretinal lymphoma. *Int J Mol Sci* 2011;12(9):5684-5697.

16 Walsh EM, Halushka MK. A comparison of tissue dissection techniques for diagnostic, prognostic, and theragnostic analysis of human disease. *Pathobiology* 2023;90(3):199-208.

17 Chan CC, Whitcup SM, Solomon D, Nussenblatt RB. Interleukin-10 in the vitreous of patients with primary intraocular lymphoma. *Am J Ophthalmol* 1995;120(5):671-673.

18 Whitcup SM, Stark-Vancs V, Wittes RE, Solomon D, Podgor MJ, Nussenblatt RB, Chan CC. Association of interleukin 10 in the vitreous and cerebrospinal fluid and primary central nervous system lymphoma. *Arch Ophthalmol* 1997;115(9):1157-1160.

19 Cassoux N, Giron A, Bodaghi B, Tran TH, Baudet S, Davy F, Chan CC, Lehoang P, Merle-Béral H. IL-10 measurement in aqueous humor for screening patients with suspicion of primary intraocular lymphoma. *Invest Ophthalmol Vis Sci* 2007;48(7):3253-3259.

20 Frenkel S, Pe'er J, Kaufman R, Maly B, Habot-Wilner Z. The importance of cytokines analysis in the diagnosis of vitreoretinal lymphoma. *Acta Ophthalmol* 2020;98(6):e668-e673.

21 Soussain C, Malaise D, Cassoux N. Primary vitreoretinal lymphoma: a diagnostic and management challenge. *Blood* 2021;138(17):1519-1534.

22 Carbonell D, Mahajan S, Chee SP, *et al*. Consensus recommendations for the diagnosis of vitreoretinal lymphoma. *Ocul Immunol Inflamm* 2021;29(3):507-520.

23 Takase H, Arai A, Iwasaki Y, Imai A, Nagao T, Kawagishi M, Ishida T, Mochizuki M. Challenges in the diagnosis and management of vitreoretinal lymphoma - Clinical and basic approaches. *Prog Retin Eye Res* 2022;90:101053.

24 Zhang X, Zhang Y, Guan W, *et al*. Development of diagnostic recommendations for vitreoretinal lymphoma. *Ocul Immunol Inflamm* 2023:1-8.

25 Liu S, Jiang T, Gu J, *et al*. Prognosis, risk factors, and clinical features of intraocular recurrence in primary vitreoretinal lymphoma. *Ophthalmol Retina* 2024;8(4):317-324.

26 International Vitreoretinal B-Cell Lymphoma Registry Investigator Group. Presentation, diagnostic testing and initial treatment of vitreoretinal lymphoma. *Ophthalmol Retina* 2024;8(1):72-80.

27 Kuo DE, Wei MM, Knickelbein JE, Armbrust KR, Yeung IYL, Lee AY, Chan CC, Sen HN. Logistic regression classification of primary vitreoretinal lymphoma versus uveitis by interleukin 6 and interleukin 10 levels. *Ophthalmology* 2020;127(7):956-962.

28 Huang RS, Mihalache A, Popovic MM, Cruz-Pimentel M, Pandya BU, Muni RH, Kertes PJ. Diagnostic methods for primary vitreoretinal lymphoma: a systematic review. *Surv Ophthalmol* 2023:S0039-S6257(23)00170-4.

29 Singh AD. Ocular therapy of vitreoretinal lymphoma: local therapy has palliative effect. *Ophthalmol Retina* 2024;8(4):315-316.

30 Bonzheim I, Giese S, Deuter C, *et al*. High frequency of MYD88 mutations in vitreoretinal B-cell lymphoma: a valuable tool to improve diagnostic yield of vitreous aspirates. *Blood* 2015;126(1):76-79.

31 Raja H, Salomão DR, Viswanatha DS, Pulido JS. Prevalence of MYD88 L265P mutation in histologically proven, diffuse large B-cell vitreoretinal lymphoma. *Retina* 2016;36(3):624-628.

32 Bonzheim I, Sander P, Salmerón-Villalobos J, *et al*. The molecular hallmarks of primary and secondary vitreoretinal lymphoma. *Blood Adv* 2022;6(5):1598-1607.

33 Dao J, Conway PJ, Subramani B, Meyyappan D, Russell S, Mahadevan D. Using cfDNA and ctDNA as oncologic markers: a path to clinical validation. *Int J Mol Sci* 2023;24(17):13219.

34 Gu J, Jiang T, Liu S, Ping B, Li R, Chen W, Wang L, Huang X, Xu G, Chang Q. Cell-free DNA sequencing of intraocular fluid as liquid biopsy in the diagnosis of vitreoretinal lymphoma. *Front Oncol* 2022;12:932674.

35 Wang X, Su W, Gao Y, *et al*. A pilot study of the use of dynamic analysis of cell-free DNA from aqueous humor and vitreous fluid for the diagnosis and treatment monitoring of vitreoretinal lymphomas. *Haematologica* 2022;107(9):2154-2162.

36 Zhuang Z, Zhang Y, Zhang X, Zhang M, Zou D, Zhang L, Jia C, Zhang W. Circulating cell-free DNA and IL-10 from cerebrospinal fluids aid primary vitreoretinal lymphoma diagnosis. *Front Oncol* 2022;12:955080.

37 Chen X, Hu Y, Su W, *et al*. Diagnostic value of genetic mutation analysis and mutation profiling of cell-free DNA in intraocular fluid for vitreoretinal lymphoma. *Cancer Commun* 2022;42(11):1217-1221.

38 Demirci H, Rao RC, Elner VM, Demirci FY, Axenov L, Betz B, Behdad A, Brown N. Aqueous humor-derived MYD88 L265P mutation analysis in vitreoretinal lymphoma: a potential less invasive method for diagnosis and treatment response assessment. *Ophthalmol Retina* 2023;7(2):189-195.

39 Brown NA, Rao RC, Betz BL. Cell-free DNA extraction of vitreous and aqueous humor specimens for diagnosis and monitoring of vitreoretinal lymphoma. *J Vis Exp* 2024(203).

Commentary

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It is a great honor and privilege for me to have been associated with Prof. Chi-Chao Chan. She has been a distinguished colleagues, great friend, and mentor, and my "go to person" on many international programs that we have created and nurtured together. Her fascinating and inspiring journey involving the education, training, affiliations, professional career at National Institutes of Health-National Eye Institute in Bethesda, MD, USA, and mentoring of two generations of hundreds of researchers and clinicians, is truly exemplary. She has not only led her own journey with great zeal, politeness, and hard work but also has become a symbol of success to inspire hundreds of very successful professionals who are now shaping the future of eye research and patient care. Prof. Chan's most amicable nature and attitude of nurture have brought many professionals under her wings to learn the real lessons of life. Her hard work will have multigenerational effect on the international relations. Prof. Chan has truly shown that bringing the international community working with the US based scientists brings real benefits in growing the scientific knowledge, learning from each other for the benefit of humankind, and having the best practices in clinical care and scientific research. She has shown with her elegant work that the international scientific community working together is in a much better position to fight the eye diseases and support the prevention of global blindness.

Commentary

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Dr. Chan describes her journey though decades of unique, and yet, universal experiences, starting from her life in China. Her analysis of her personal travels through world changes, challenges, and successes, and working from initial isolation to worldwide collaboration, is an important contribution to younger colleagues who may not have had such experiences.

I had the pleasure of being in the Zhongshan Ophthalmic Center for the first International Ophthalmic Conference in China in 1985. Her father Professor Eugene Chan, a renowned leader of ophthalmology in China and her mother Professor Winifred Mao were both her parents and mentors. They were true international leaders. The basic research throughout the ophthalmic world was just coming into wide-spread international being. The traumas of WWII, and the Chinese Revolution were now history, and modern science was just evolving. I had the opportunity as a young leader to witness this and play a part in national and international ophthalmic organizations. These organizations had meetings that stimulated international travel and new ophthalmic friendships. Over time the clinical dimensions of ophthalmology as well as the basic sciences of our specialty developed their own subspecialty societies and meetings. It was in these close relationships that international ophthalmology evolved both socially and professionally.

National societies often invited international speakers which further spread the intellectual and social ophthalmic relations. One example is my inviting Pran Nagpal from India to bring three Indian Ophthalmologists to the AAO in late 1980s. To see the All-India Ophthalmological Society meetings today, it is a dramatic transformation. This is but a single example of the internationalization of our specialty.

I can only imagine the further global collaboration of eye research and clinical developments in the decades ahead. Those of you who are young have an exciting and even majestic opportunity for global connections, collaborations, and friendships.