

A PERSONAL REFLECTION ON MY PH.D. ADVISOR DR. BRITTON CHANCE

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Accepted 17 May 2011

This article briefly reflects some of my interactions with Dr. Britton Chance (BC), from a perspective of his graduate student.

Keywords: Britton Chance; reflection.

The first time I heard BC's name was in 1996. When I asked Professor Linda Powers, who was visiting Peking University in China, on her advice for my future Ph.D. directions, she said: "you should pursue some frontier research." To her, "frontier" means Britton Chance.

I could not agree more with her. The six years I spent with Brit at Penn has been an unforgettable life adventure. Brit is, in many aspects, a true legend. It was under his guidance that I grew both intellectually and personally. I was educated in many fields, including life science, physical science, and engineering, and obtained a wider perspective in scientific research. Brit's abundant knowledge exhilarated every discussion, projecting new ideas and keeping the research in progress.

BC was a wonderful mentor. Whenever help was needed, he was always accessible. I still remember he sat beside me in front of an old-fashioned oscilloscope until 9 pm to solve a circuit problem. And he was always glad to discuss questions or problems with students and provided really good ideas, suggestions, and directions. His teaching is solid and comprehensive, and he always tried his best to provide the needed resources for his students.

Immediately after I received the admission to Penn Bioengineering program in 1997, he wrote a letter to me. He suggested me to ask Professor Qingming Luo (who just finished his postdoctoral studies with BC and returned to China) for some books and papers that I should read to prepare for my doctoral study. It turned out that the books suggested by Professor Luo on Optoelectronics helped me a lot during my initial transition to BC's lab. During my Ph.D. proposal research on phased-array optical imaging, BC financed my trip to Baltimore to learn how to use software to simulate phased-array photon migration from Professor Kyung Kang. Also, he always encouraged me to take the physics courses and seminars taught by Professor Arjun Yodh to learn more about the photon migration theory. In BC's group meeting on every Saturday, he invited his friend Ken Simons (retired from RCA lab) to teach us circuits and electronics. It was BC who created a rare environment where research can be actively discussed, knowledge can be freely shared, and new ideas can be constantly ignited.

Working with BC opened up the doors of the biomedical applications of light, including cancer

detection^{1–3} and brain imaging,^{4,5} to me. I was fortunate to work on many collaborative projects with researchers from different disciplines, which brought in new ideas and tools. During our discussion with BC, the most frequent word I heard from him was “Why not?” To him, there seemed no bounds in exploring the excitement of research. Under his influence, I enjoyed research more and more as well and gradually set my future career path to academia. The primary focus of my thesis work was to develop a sensitive fluorescence imaging system for fast and accurate detection and localization of molecular-specific contrast agents. Those contrast agents have different uptakes in tumor and normal tissues due to the biological changes caused by the tumor growth, especially in the cellular and molecular level, thereby providing enhanced contrasts to detect tumors. Under the guidance of BC, I developed the frequency-domain fluorescence imaging system¹ and demonstrated tumor detection using the glucose transporter–specific contrast agents on animal models *in vivo*.^{2,3} Without BC’s advice and help, I could not have accomplished my thesis so smoothly and successfully.

After graduation, I moved to MIT for my postdoctoral studies. I still kept in frequent touch with BC on some joint papers⁶ and proposals. Often he invited me back to Penn for seminars and exchanging research ideas. One time after his discussion with Greg Weinstein at Penn, he had an idea of using optical coherence tomography,⁷ a technology I was working on during my postdoctorate for gastrointestinal cancer detection,⁸ to image vocal cord cancer. He then called me up and invited me to Penn to discuss a potential project with Greg and other colleagues. His passion for research always propelled new ideas into fruitful action.

After I started my independent research lab at the University of Maryland in 2007, I still frequently turned to BC for suggestions and advice. And he always answered my questions immediately, no matter how simple or complicated it was. His suggestions were very critical in shaping my research ideas and directions, especially at the beginning of my academic career. The last time I saw BC was November 2008, in Wuhan, China. We discussed a lot on research and he even shared with me his grant proposal on metabolometer and discussed the potential collaboration with me on developing an endoscopic version of his metabolometer. He also carefully read some of my research proposals and

brought up many insightful questions and suggestions. In October 2010, after exchanging several emails with him on research questions, I asked him about his travel plan. He replied briefly: “Dear Yu, I come to NCKU Tainan November 17, BC.”

But on the morning of November 16, we heard the news that BC had left us. To most of us, we felt as if he had just gone to a place much farther than Tainan, a place where he can continue pursuing his beloved research, innovation, and discovery. His legend, spirit, and teaching will stay with us and will be passed down to our future generations to motivate us to make the world better.

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