

Women and Diversity Interview



Gail Bishop, Ph.D.

Holden Chair of Cancer Biology
College of Medicine Distinguished Professor of Microbiology
Co-Director, Cancer Immunology & Immunotherapy Group
Associate Director for Basic Science Research
Professor of Microbiology
Professor of Internal Medicine
University of Iowa

Have you always been interested in scientific research?

I've always had considerable curiosity, but I didn't apply that to science until I took Biology in 9th grade – then I became fascinated. In college, I decided to major in Biology, but initially planned to become a medical technologist. Because my grades were strong, my advisor urged me to consider medical school, but that did not appeal to me. Then, by serendipity, I obtained a summer job in a leukemia research lab located in the basement of a medical center in my hometown of Milwaukee. I rapidly became hooked, and decided I wanted to work in the field of research on immune cells.

Can you give us a brief description of your current research and what most excites you about it now?

My long-term research area is understanding the molecular mechanisms of lymphocyte activation, in various aspects. Some years ago, I was drawn to the study of the TNF receptor superfamily of molecules, and then in turn to the family of TNFR-associated factors (TRAF molecules) that mediate signaling by this family. Along the way, we found that the function of various TRAFs is highly receptor and cell-type dependent. This is especially the case for TRAF3. In recent years, we have been studying a 'conditional knockout' TRAF3 mouse we produced. We've learned that in B lymphocytes, TRAF3 is a critical negative regulator of homeostatic survival, and it has since been discovered that loss-of-function mutations in TRAF3 are found in a significant proportion of B cell malignancies. Interestingly, TRAF3 plays this role only in B cells, not in other cell types. We are thus now eagerly pursuing the molecular mechanisms by which TRAF3 restrains survival in a B cell-specific manner, as this information will be very valuable for intervening in aberrantly-surviving B cells that can lead to recurrence and drug resistance in malignancies. In T cells, we made the surprising discovery that TRAF3 associates with the TCR complex, and plays important roles in promoting TCR-mediated activation. We are excited to discover exactly how it does this. Another area of current focus is how various TRAF molecules contribute to innate immune signaling by toll-like receptors, and how this information can be applied to design of a new type of 'cellular vaccination' for tumors that uses more easily manipulated B lymphocytes as an alternative to dendritic cells. Finally, we have recently begun a new project studying how the TNFR superfamily molecule CD40, which we have studied for many years in humoral immunity, contributes to maintenance of normal metabolism versus diet-induced obesity and metabolic dysregulation. Given the current epidemic of obesity-related diabetes, we are very interested in developing this new project.

During your graduate and post-doc years did you have mentor(s) that helped guide you along the way?

I had multiple mentors who were helpful to me, from undergraduate years onward. My two postdoctoral mentors, the late Dr. Geoffrey Haughton, and Dr. Jeffrey Frelinger, were both very encouraging, and Dr. Frelinger has been a source of advice, wisdom, and support throughout my career.

What was (were) the biggest challenge(s) you faced in pursuing your career?

For me, there were two major challenges. The first is that I grew up in a very traditional middle-class household. In my family, women were certainly not expected to pursue education beyond college, and it was tacitly assumed that as soon as I had children, I would become a full-time homemaker – both my mother and mother-in-law initially expressed alarm at my plan to earn a PhD. I didn't know any scientists growing up, and had no 'connections' or role models during my upbringing. Thus, I often lacked confidence in my abilities, and for many years assumed that everyone else must be MUCH smarter than I was. The second is that I married right after college graduation, and my husband was several years ahead of me, in his 3rd year of medical school. Initially, I worked to support us, as a lab technician. I didn't even realize you could be paid to go to graduate school! When I discovered this, and started graduate work, he 'matched' for a residency elsewhere, so I finished with an M.S. and re-started my PhD work in a new location. Then in my 3rd year of graduate school, because he had taken an Air Force scholarship to support his medical studies, he was pulled into the AF at a base 1000 miles away. We lived apart for a year, I then found a postdoc within a 2h drive of his base, and he was on-call every other weekend, so we did a LOT of driving, and endured much separation for years. Luckily, he has been highly supportive of my career, but the practical aspects are that I have had many more constraints in where I can go than many of my colleagues. I've also dealt with the pressures of this career, while raising two sons, with a spouse who has had many job-related demands on his time. But I truly have no regrets about my major choices – I think I have been very lucky in life.

Do you feel that being a woman in science came with advantages or disadvantages? What were they?

I'm afraid there were definitely more disadvantages, which is natural, as I think it is always more difficult to be in the minority in any group. When I started, there were significantly fewer women in the profession than now. Now we are at near parity in the training years, but there are still many fewer in more senior career phases. Thus, the culture of our profession has always tended to favor and reward traits and behaviors that come more easily to men, as they still dominate the profession. And remedying that is not as simple as women just taking on more 'male' ways of doing things, because society, including scientific society, often reacts negatively when they do so. I also believe that many people – both men and women – harbor innate gender biases about leadership ability, intellect, and competence that they can be completely unaware of, but have emerged in carefully-designed published studies. In many ways, this can be more difficult to push against than biases that are right out in the open. Although I am quite happy to be a woman, I honestly can't think of specific ways that this is advantageous to me as a scientist in the current culture.

What strategies do you use to maintain balance in your life?

I've relied upon a whole smorgasbord of strategies. The older I become, the more important this is to me, because I've lived long enough to lose people I love, and see others go through serious illnesses. Thus, the realization that life is short and precious has become more acute. One of the most important principles, I believe, is to prioritize and focus. Resist the feeling that you have to be constantly checking (and instantly responding to) e-mail, text messages, etc. – how can you concentrate on anything? We also can't be all things to all people, so we need to decide what activities are most important, and resist the urge to try to do

it all. The things I do to keep stress manageable, and maintain a sense of perspective, include initiating and maintaining friendships (really important!), pursuing enjoyable hobbies (for me, hiking, travel, making jewelry, and reading mystery novels), getting regular physical activity, and meditating (almost) every day. I also try to constantly remind myself about friends and colleagues who may be going through tough times, and think of how I could be supportive, helpful, and encouraging to them. Remembering that we all have troubles, and reminding ourselves that there are also many ways in which we are lucky, can help balance the stress of all those opportunities for rejection that abound in our profession.

What advice would you give to female graduate students that are interested in a career as an academic scientist?

This first point may seem unexpected, but in a recent conversation at a scientific meeting, a group of successful senior women colleagues **all** agreed on how crucial this is. If you choose to share your life with a partner, as many women do, choose wisely. Someone who is not threatened or upset by the long hours and commitment such a career requires, and is supportive of your goals, makes a HUGE difference. I have seen too many promising young women scientists relegated to unsatisfying positions for which they are overqualified, and/or overwhelmed by taking on all or almost all of the household responsibilities, because their partners were uncompromising and unsupportive. The next thing I would say is to be adaptable yourself. There is no perfect job, no absolutely ideal time to have children, no exact formula for a successful career. You will do best if you yourself take personal responsibility for your success. This doesn't mean never seeking help or advice – in fact, do this frequently! – but you must be resourceful and a self-starter to negotiate the many challenges this career brings. A high energy level and a good sense of humor are assets in this journey, and it is essential to develop strong time-management skills and excellent communication skills, both verbal and written. The latter are particularly important to an academic career. While presenting and publishing your work are important in all settings, they are crucial in academia. So as you begin new projects, think early in the process what you will need for a coherent, convincing, novel story that will be publishable in a strong journal, as this will allow you to prioritize and focus your work. Finally, I believe the most important characteristic to bring to this path is resilience, coupled with the willingness to continually learn from others and from your own experiences. There are many bumps in this road, but believe in yourself and stay focused upon what is truly important, and you can have a very rewarding life in biomedical research.