

Women in Metabolism: The Next Generation

The “Rosies” of *Cell Metabolism* persist as a new generation enters the stage. With inspiration from this issue’s cover art, we celebrate young and diverse scientists and the mentorship that has guided them throughout. Their stories come from different corners of the world but are tied together by a common thread of tenacity and perseverance.

A Journey of Hope



Annet Kirabo
Vanderbilt University Medical Center, USA

In Uganda, my family was considered poor by the poor. Education was not at the forefront of our minds, and boys were given first priority. When my younger brother started school, my dad sent me along. My mom often says, “If I had a chance, I would give it my all.” I worked hard and was always top in class. Because I experienced several premature deaths in the family from lack of healthcare, I wanted to be a medical doctor. Yet I had never seen a female doctor. I was the only girl who received the University Uganda Government Scholarship to study vet medicine.

I have been fortunate to have mentors who have empowered me to thrive educationally. While struggling with the fact that my dream of practicing human medicine was shattered, Dr. Lonzy introduced me to the idea of scientific research. I traveled to the United States for training opportunities not available in Uganda. With academic transcripts from a different education system, Dr. Gazal took a chance when he agreed to be my M.Sc. mentor. Drs. Sayeski and Baylis inspired my interest in cardiovascular disease. Dr. Harrison instilled in me the importance of team science and thinking in terms of the next impactful question.

As I start a career in academic research, I face unique challenges. It is reassuring that Vanderbilt is intentional about diversity and inclusion and setting up educational programs for cultural awareness in mentoring and unconscious bias. This creates an environment that nurtures resilience among diverse scientists.

The Beauty of Science



Yifat Merbi
Weizmann Institute of Science, Rehovot, Israel

As long as I can remember, I have had a naive yet profound appreciation for the beauty of nature and biology. I am fascinated by the complexity of biological systems, as different components can act in concert to achieve specific temporal and spatial responses at the cellular, tissue, and organismal levels. My lab is studying proteostasis control, how homeostasis of proteins is regulated in health and disease.

My path has taught me of three powers: (1) Passion—the driving force of discovery is the excitement of revealing a new piece of biology or understanding how a system works. (2) Persistence—all scientific endeavors entail dedicated effort and hard work. Failures are learning experiences rather than defeat. (3) Positive thinking—even with gaps in knowledge, further investigation will inform us and shall lead to the next finding. What links these three P’s is creativity; it allows each scientist to define his or her own interests and to utilize different toolkits to solve them. I believe these are the pillars required for achieving scientific rigor and significance and these are, fortunately, blind to gender.

Indeed, doing science is more of a lifestyle rather than a career. I have three wonderful children and an incredibly supportive partner whom I cannot imagine doing this without. We are in the midst of a scientific golden age with unmatched technological capabilities and an astounding pace of discovery. Opportunity is available for everyone; the time to do science is now.

Passion for Science



Carolin Daniel
Helmholtz Zentrum München, Munich, Germany

When I was in my early studies, we visited the Max Planck Institute for Physiological and Clinical Research and I was fascinated by its special library where one could literally spend days breathing in thoughts and inspiration of important minds. I came across *L’Histoire Naturelle* by Buffon (1749), and one of his quotes has accompanied me ever since: “...the study of nature calls for a mind with apparently opposite qualities: wide views that grasp at a glance, and the detailed care that focuses on a single point.” Since establishing my own lab 5 years ago, which focuses on regulatory T cell immunology in diabetes and obesity, I have highly benefited from a work environment at the Helmholtz Diabetes Center that embraces new and diverse ideas and is supportive of collaborations across disciplines together with complementary values and strengths. For me, one of the most exciting parts of science has always been the synergy from exchanging ideas, tools, and discoveries. I think that exciting discoveries often come at the interface between fields. In addition, I strongly believe that the combination of people in your lab is what will make the difference to support this spirit of synergy. I also learned that passion for science is contagious and a critical element of mutual motivation. What I enjoy most is the interaction with my students, seeing them succeed and supporting their scientific development—like in the quote “Creative synergy is better than my way or your way. It’s our way.”

Experience of a Young Female Scientist in France



Amélie Bonnefond
Institut Pasteur de Lille, University of Lille, France

Even in France, a country that purportedly promotes gender equality, being a young female scientist is not easy. Since childhood, I have been passionate and addicted to work. My will to become a scientist made perfect sense to me, although I have always been aware of the harshness of the career in France. The Law Sauvadet, which passed in spring 2012, stipulates that short-term contract employees must be offered a permanent position after 3–6 years of training (including PhD/postdoc); otherwise, they are fired. Consequently, the highly competitive interviews for the few available permanent positions are extremely stressful. After my first rejection, a female HR manager told me that my biggest mistake was to “have put on make-up that made [me] too pretty.” The following year, she gave me three rules: “no make-up, dirty hair, and ugly clothes,” in order to look “less arrogant.” My second try had, unfortunately, the same taste. One of the interview panelists, a female, told my boss that I should go to the United States, have two children, and come back when I am a (real) woman. She also said that the panel did not believe that I had written all the papers listed in my resume. Eventually, I landed an Inserm position, just in time, as I was let go from my postdoc fellowship in accordance with Sauvadet. For sure, I am not the only woman who has had to tackle these superficial issues that leave a bitter taste and reduce one’s passion. Nevertheless, we persist and we succeed.

The Power of Curiosity



Maria Eugenia Soriano
University of Padova, Italy

Science is both stimulating and discouraging, a continuous roller coaster ride. The feeling that the next experiment will be the last one to finally answer the question—but unexpectedly, the tube breaks or the microscope does not turn on! Who has not experienced this in their laboratory life? You curse—and maybe leave the lab to find solace in a drink—but the surprising thing is that the day after, you wake up excited to repeat the experiment. This tenacity and perseverance are part of a scientist and the result of unlimited curiosity. In my scientific career, three factors have been crucial to achieving my goals: following my dreams, an insatiable curiosity, and the support of mentors. During my PhD, I was so enthusiastic about my research that I never questioned my future as a scientist. The first moments of hesitation came after receiving my doctorate, when I had my first child. I was far from my family, most of my salary went straight to the babysitter, and very often I was continuing experiments at night while my children were sleeping. Motherhood is a very difficult moment from a personal and professional point of view, but the passion and curiosity can overcome difficulties. Having a family is compatible with doing research, but the support of the institution and the scientific mentor is essential. I have been fortunate to have had great mentors and I have learned the importance of taking risks and pushing myself into the unknown.

Multitasking Life



Marta Artal Sanz
University Pablo de Olavide/CSIC, Seville, Spain

Being a group leader in academic research is one of the most rewarding, but at the same time one of the most challenging, careers one could choose. It requires a unique combination of scientific savviness. One must read, think, focus, be creative, perform experiments, write manuscripts and project proposals, communicate with the scientific and non-scientific world, and have excellent management skills. Sometimes, teaching duties might become exhausting.

This all-around excellence expected from scientists, together with the everlasting uncertainty of not knowing where the money will come from next year, could refrain otherwise brilliant minds from pursuing a scientific career. It is often suggested that science is a vocation and therefore it is only for people who are willing and able to suffer the consequences. But perhaps we should recognize that this multitasking might result in inefficient use of money and discouragement of brilliant minds. This may be especially true for women, who, more often than not, still carry the main responsibility for raising their children.

For me, the excitement of discovery and sharing with an enthusiastic scientific community provides enough satisfaction and motivation to keep going. But although a lot has changed over the years, more support for women who have the additional task of bringing up kids, more financial stability, and more administrative support would allow a much stronger focus on the crux of the matter: research and discovery!

Enjoy the Ride!



Francesca Amati
University of Lausanne, Switzerland

I never would have imagined I would one day become a scientist, nor did I believe in gender disparities. Now I am discovering the academic world in part thrilled by ecstasy and in part learning the reality of culture, conventions, and prejudices.

After medical school, my priorities were centered on patients, and I embraced the clinical career. What made me change? An article in the *NEJM*, a supportive mentor, and the desire to try a different culture for a short time. I left my home country for what was supposed to be a 2-year master's degree. And then, like Alice in Wonderland, I discovered a world that took me by surprise and has driven my life passionately until today: translational research.

It certainly didn't happen overnight. It took the support of professors and mentors who believed in me. Brilliant fellow students, post-docs, and staff who were willing to share their "how to..." use a pipet, run an imaging magnet, etc. Six years later, I was back in my home country with a PhD and my first grant to become an independent investigator.

My lab is still young, but here are some key elements that may serve other young investigators:

- Accept winding roads
- Stay true to your priorities
- Surround yourself with good people of different disciplines
- Recognize creativity when it comes in the middle of the night
- Welcome with enthusiasm each result and new encounter
- Don't be afraid of tears and sweat
- Do your best with courage and determination
- Enjoy every part of the ride with thankfulness!

Be Brave

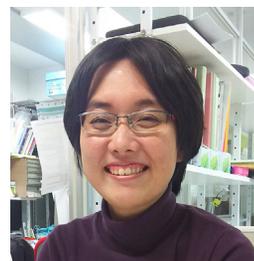


Lydia Lynch
Harvard Medical School, USA and Trinity College Dublin, Ireland

A career in science isn't always easy; the passion keeps you going but also fuels the "addiction." Being a mother of three and a scientist is a balancing act because of the guilt of not giving everything enough attention. However, while it's busy, I've never felt it was a disadvantage. I had my first daughter during high school, my son during my PhD, and my second daughter during my postdoc. I feel science is well suited for working mothers because of the flexibility. There is guilt about sometimes working long hours, but I can only hope that seeing passion and hard work will be helpful to my children in following their dreams, too.

My advice to young scientists is to be brave. Don't be afraid to ask the question that's important to you and go after it fearlessly. Search for excellence in choosing your training environment—then you will strive for it in yourself. My mentor, Prof. Michael Brenner, was a key inspiration in my career. He is an amazing, rigorous scientist and thought leader who is never afraid of new ideas and technology and is very generous with advice. He once told me that success is not about everything always working out, but what you do when it doesn't. After rejection or failure, take some time to be disappointed, then pick yourself back up and keep going. It might be cliché, but determination and resilience are key to succeed in science. And most important—be yourself. In a world where people can sometimes be secretive or guarded, be open and share ideas; for me, it's led to new ideas and collaborations critical to my research question.

Put KIAI into It!



Kyoko Miura
Hokkaido University, Institute for Genetic Medicine, Japan

In 2004, I joined Prof. Shinya Yamanaka's laboratory as a graduate student. Two years later, surprisingly, iPSCs were generated in the Yamanaka lab. Shinya is a very rigorous and honest researcher, and I learned a lot of things from him. He always said to us, "Vision and hard work!" and "Propose a radically novel idea—but validate extremely carefully." His words were written into my heart. In 2010, I received my PhD for research on the safety of iPSCs. Thinking about the next step, I was strongly attracted by the long-lived rodent, the naked mole rat (NMR). Prof. Hideyuki Okano kindly gave me a chance to start NMR research as a young PI in his laboratory. His broad and deep knowledge always helped me. We called him "Walking PubMed" with a feeling of awe. He had always said, "To grab victory in research, you must put KIAI into it!" KIAI is a Japanese word that means "strong guts and spirit." KIAI was also written into my heart. Now I have my own laboratory and continue to study NMRs. I am fighting to balance work and family with the strong help of my husband and my lab members. It is hard, but the developmental process of my son supplies me with fresh inspiration. For young researchers, good relationships with their mentor and peers are critical for the development of their careers. I think it is very important to think positively and to be honest, which will lead to good relationships and opportunities.

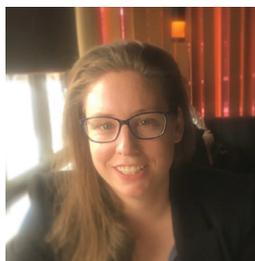
Stay Focused

Huafeng Zhang
University of Science and Technology of China

After obtaining my PhD from Tokyo University, I was fortunate to join Dr. Gregg Semenza for postdoc training. Gregg is a true example of focusing on something that really matters to him—the impact of his efforts exemplified by a recent Lasker Award. Under Gregg's supervision, I was able to accomplish multiple highly cited papers as a postdoc. This positive experience influenced me so much that I decided to focus my future career on the mechanisms of cancer metabolism. I was motivated to have my own impact in the field.

However, you need to be independent to have your own impact, and thus, you naturally choose to have a lab of your own, regardless of your gender. It turned out to be a good decision for me to seek a PI position in China as its rapid economic growth and scientific development have attracted many talents to come back. With my own lab and the talented young people working with me, I have explored the new and uncharted territories of cancer metabolism. I find what I am doing fascinating, which I believe is the primary basis of my focus.

There are always distractions to keep you from being focused. In China, miscellaneous funding opportunities and various title competitions exist among scientists. It's not practical for a young PI to simply shy away from all these opportunities. However, you should never allow yourself to be carried away. For me, "stay focused" means that you always try your best to excel in your own research and let other stuff take care of itself.

Do It So Long as It's Fun

Stephanie Simonds
Biomedicine Discovery Institute, Monash University, Australia

I am beginning to develop an independent research program at the same university that awarded me my PhD, examining the physiology of diseases that develop in obesity. I would suggest this to others: craft your own career. Feel no obligation to mimic the career of your mentors or peers. Pursue questions that you find interesting using techniques that you find stimulating. Drive your own research and read the old literature, if only to see how far we've come. If you doubt something, test it for yourself. Adapt to and adopt new technologies; in doing so, your skillset will never be redundant. Seek honest advice, and try your best to accept it. Surround yourself with people whose talents differ from and complement your own. The more that you differ from collaborators and mentors, the more you have to offer. To do this effectively requires some self-examination and the recognition of your strengths and weaknesses. My main strength is my work ethic, while my biggest weakness is my dyslexia. The two are inexorably linked. I have to work harder than my peers and, invariably, have needed to employ unconventional techniques in order to absorb information and communicate with effect. I now surround myself with collaborators that are stronger in my weakest areas, and to them I contribute hard work and creativity, which are tough to beat, especially in science. To paraphrase Margaret Thatcher, in this business hard work doesn't always get you to the top, but you're going nowhere without it.

Finding, Rather than Seeking

Melina Clausnitzer
Beth Israel Deaconess Medical Center, HMS, USA

The beauty of math has always intrigued me. My high school thesis was on complex systems based on which even simple deterministic systems can produce completely unpredictable results. But growing up on a farm in the German Alps, I was not *seeking* to become a scientist; I slowly *found* my way. Because of the conservative context I grew up in, females did not study math. I set out to study nutritional science instead, which inspired me to study genetic variation in the context of metabolic diseases. Building on my interest in math, I then wrote my PhD thesis on computational foundations of disease genomics and its application to the dissection of metabolic risk loci.

Seeking a goal is concrete and defined. Finding implies flexibility to embark on different paths and dedication to unravel the very truth. If you find rather than seek, you will grow to be empathic with your own personal and professional growth and, importantly, also to your peers. Starting a faculty position at Harvard simultaneously with my first pregnancy and later a medical emergency of my husband meant that we had to strike a balance between often opposing interests and needs. It made me realize how important a strong social net is in the equation—a net of "finders," empathic and supportive of others.

Today, when my baby son claps his hands with joy, or a student comes to me with breakthrough results, I continue to be inspired to manage both my professional and personal life as a finder, not a seeker.

**Inclusive Science Empowers the
Superhero within Us All**



Claudio J. Villanueva
University of Utah School of Medicine, USA

Being a scientist gives me superpowers that no one else has. Sometimes I get to be the first to peer into nature and develop a deeper mechanistic understanding of the world around us. Making new discoveries drives my passion for research and is something I like to nurture in my trainees. However, we face several challenges in academia: we still don't have equal gender representation, and Pacific Islander, Native American, Latino, and Black faculty continue to be underrepresented. It is imperative that we change our current trajectory; the United States is becoming more diverse, yet we are leaving talented trainees behind. The success of our scientific enterprise requires diverse points of view. This is why we must ensure that science is available to all. Creating

an inclusive environment will produce better science, make us more competitive in the global economy, and make us stronger as a nation. We must continue working together to reach true diversity in the scientific workforce, where students from all walks of life can be mentored to become future leaders in science. The artwork for the cover image in this issue of *Cell Metabolism* was chosen to highlight a minority female scientist in a position of power. My hope is that this image will resonate with the women of color whom I often mentor. I challenge our leaders in metabolism research to make inclusion and diversity an openly explicit part of the mission of their careers. We can't afford to lose more superheroes.