

## INNOVATORS &amp; IDEAS: RESEARCH LEADER

# Kim Q. Do: Antioxidants specifically targeted at mitochondria: A novel therapeutic approach to schizophrenia

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**Kim Q. Do was appointed senior lecturer at the University of Lausanne (CH) in 2000. Over the years, she became an associate professor of translational psychiatry in 2011 and attained the position of full professor in 2017. In 1999, she established the Unit for Research in Schizophrenia at the Center for Psychiatric Neuroscience within the Department of Psychiatry at Lausanne University Hospital. She served as the head of this unit from 1999 until 2022. Additionally, she was the Center for Psychiatric Neuroscience director from 2013 to 2019. She holds visiting professor positions at Harvard Medical School in Boston, USA, the Institute of Psychiatry, Psychology & Neuroscience at King's College London, UK, and the Swiss Federal Institute of Technology Lausanne (EPFL). Professor Do graciously consented to participate in the Genomic Press interview, offering insights into her unique personal and professional journeys.**

## Part 1: Kim Do – Life and Career

**Could you give us a glimpse into your personal history, emphasizing the pivotal moments that first kindled your passion for science?**

I was born and raised in Vietnam during the war, which exposed me to much suffering from a young age. This experience instilled in me a deep desire to alleviate the pains of others. My fascination with science and medicine began early on, and thanks to a scholarship, I was fortunate to pursue my studies in chemistry at the University of Neuchâtel, located in the French-speaking part of Switzerland. My time at the University of Neuchâtel began my passion for scientific research and laid the foundation for my subsequent career.

**We would like to know more about your career trajectory leading up to your most relevant leadership role. What defining moments channeled you toward that leadership responsibility?**

After completing my studies in chemistry, I embarked on a Ph.D. thesis in molecular biology at the Federal Institute of Technology in Zurich, Switzerland. This pivotal opportunity allowed me to explore the enkephalins field and synthesize stable analogs, merging my chemistry expertise with biology. It was during this time that my fascination with brain research took root. I subsequently joined the Brain Research Institute at the University of Zurich, the only institution in Switzerland devoted to basic neuroscience research. It was also where I met my future husband, Prof. Michel Cuénod, who shares my passion for neuroscience (figure 2).

During my time at the Institute, I contributed to establishing a neurochemistry laboratory and developed cutting-edge analytical methods to explore glutamate function, a then-emerging neurotransmitter candidate. However, a collaboration with Prof. Florian Holsboer from MPI Frankfurt truly redirected my focus. Access to cerebrospinal fluid samples from untreated schizophrenia patients led to a seminal observation regarding glutathione deficiency in schizophrenia. Driven by this discovery, I seized



**Figure 1.** Kim Q. Do, University of Lausanne, Switzerland.

the opportunity to establish a neurobiology laboratory at the Center for Psychiatric Neuroscience in Lausanne. Teaming up with clinicians dedicated to early psychosis detection and treatment, along with a group of talented and motivated students, postdocs, and collaborators in the field of basic neurobiology as well as with clinician-scientists, we achieved to create a bench-to-bed multidisciplinary approach. This translational approach was entirely innovative and represents the cornerstone of my professional career. I thus developed a research program aimed at a better understanding of the causes and mechanisms leading to schizophrenia phenotypes to identify markers for early diagnosis, new drug targets, and preventive and therapeutic measures.

**Please share with us what initially piqued your interest in your favorite research or professional focus area.**

One day, a mother in the audience approached me at a conference. Her thirteen-year-old grandson was showing the same “awkward behavior” that her son with schizophrenia had at the same age, and she asked me, “What can you advise me to do?”. That was a trigger, a “wake-up call” for me to adopt a more translational vision and to focus on bridging the realms of basic neuroscience with complex problems of clinical psychiatry. This encounter served as a catalyst, driving me to study causes





Figure 2. Kim Do on vacation with Michel Cuénod.

and mechanisms in preclinical models and validate these mechanisms in groups of patients. Consequently, I developed mechanism-based biomarkers to facilitate early intervention and novel treatment approaches.

**What impact do you hope to achieve in your field by focusing on specific research topics?**

In the field of schizophrenia research, my focus is directed toward addressing the multifaceted challenges linked to the complexity and heterogeneity of the disease, from genetics and pathophysiology to clinical presentation and disease progression. Central to my mission is developing mechanism-based biomarkers that accurately capture circuitry dysfunction, facilitating early detection, improved patient stratification, and effective treatment monitoring. My research activities are thus focused on paving the way for precision medicine in psychiatry. Ultimately, I aim to make significant contributions to enhancing the prevention and treatment of psychosis at an individual level, catalyzing breakthroughs in our understanding of psychiatric illnesses and, consequently, patient care.

**Please tell us more about your current scholarly focal points within your chosen field of science.**

My primary focus is launching a clinical trial centered around an antioxidant targeted explicitly at mitochondria. These cellular powerhouses are crucial for ensuring the proper functioning of neurons, particularly parvalbumin interneurons (PVI), vital for cognitive, affective, and social activities and impaired in patients with schizophrenia. This trial represents the culmination of pioneering experimental work over the past 25 years. If successful, administering this specific antioxidant to patients with schizophrenia could significantly alleviate their symptoms and improve cognitive functions—areas where current antipsychotics often fall short. Enhanced cognition is essential for improving social and professional functioning and overall quality of life. Additionally, I am concentrating on studies aimed at identifying mechanism-based biomarkers to predict cognitive deficits in individuals at clinically high risk for psychosis. Furthermore, I seek to advance functional magnetic resonance spectroscopy to target neurometabolic alterations in psychiatric disorders.

**What habits and values did you develop during your academic studies or subsequent postdoctoral experiences that you uphold within your research environment?**

Throughout my academic career and postdoctoral experiences, I have always adhered to openness, fairness, and respect. I firmly believe in learning from one another, promoting teamwork, and nurturing motivation among team members. Additionally, I prioritize perseverance as a critical factor in overcoming challenges and achieving success in research endeavors. Creating an environment where everyone feels valued and supported is essential for fostering positive and productive collaborations.

**At Genomic Press, we prioritize fostering research endeavors based solely on their inherent merit, uninfluenced by geography or the researchers' personal or demographic traits. Are there particular cultural facets within the scientific community warrant transformative scrutiny, or is there a cause within science that deeply stirs your passions?**

Diversity is a cornerstone of my working environment, encompassing researchers from diverse disciplines, countries, and cultures. However, there is still room for progress in ensuring equal access to science, particularly for women and individuals from developing countries. Additionally, I am dedicated to promoting widespread exchange among researchers from various fields to foster synergies. Encouraging collaboration and inclusivity enhances the quality of research and contributes to a more equitable and innovative scientific community.

**What do you most enjoy in your capacity as an academic or research leader?**

One of the most rewarding aspects of my role is mentoring early career researchers in basic and clinical research. I find great satisfaction in nurturing a new generation of psychiatrists with clinical practice and neuroscience expertise. Breaking down the traditional barriers that once existed between basic scientists and clinicians is particularly gratifying, as it stimulates collaboration toward a common goal. Witnessing the synergy and innovation that arise from this interdisciplinary approach brings me great satisfaction and fulfillment as a research leader.

**Outside professional confines, how do you prefer to allocate your leisure moments, or conversely, in what manner would you envision spending these moments given a choice?**

In my leisure time, I prioritize activities that allow me to relax. I enjoy practicing meditation, walking, swimming, and cooking for my loved ones. These activities help me recharge and maintain balance in my life. Additionally, I have a passion for orchids and take pleasure in caring for them, as well as tending to my Japanese garden. Above all, spending quality time with my family and friends is essential to me.

**Part 2: Kim Do – Selected questions from the Proust Questionnaire<sup>1</sup>**

**What is your idea of perfect happiness?**

I do not believe in 'perfect happiness'; if it existed, it would likely be fleeting. Happiness and beauty are ephemeral, and one must recognize when to seize those moments. For me, perfect happiness lies in discovering inner peace.

**What is your greatest fear?**

Failing to find my own path.

**Which living person do you most admire?**

I admire more than a single person: the Ukrainian people, individuals who contribute to breaking the glass ceiling for women, and those who help

<sup>1</sup>In the late nineteenth century, various questionnaires were a popular diversion designed to discover new things about old friends. What is now known as the 35-question Proust Questionnaire became famous after Marcel Proust's answers to these questions were found and published posthumously. Proust answered the questions twice, at ages 14 and 20. In 2003 Proust's handwritten answers were auctioned off for \$130,000. Multiple other historical and contemporary figures have answered the Proust Questionnaire, including among others Karl Marx, Oscar Wilde, Arthur Conan Doyle, Fernando Pessoa, Stéphane Mallarmé, Paul Cézanne, Vladimir Nabokov, Kazuo Ishiguro, Catherine Deneuve, Sophia Loren, Gina Lollobrigida, Gloria Steinem, Pelé, Valentino, Yoko Ono, Elton John, Martin Scorsese, Pedro Almodóvar, Richard Branson, Jimmy Carter, David Chang, Spike Lee, Hugh Jackman, and Zendaya. The Proust Questionnaire is often used to interview celebrities: the idea is that by answering these questions, an individual will reveal his or her true nature. We have condensed the Proust Questionnaire by reducing the number of questions and slightly rewording some. These curated questions provide insights into the individual's inner world, ranging from notions of happiness and fear to aspirations and inspirations.



to alleviate the suffering of people affected by psychiatric diseases and their families.

**What is your greatest extravagance?**

Eating and drinking to the point of being unable to walk; my mother had to carry me on her back to reach home.

**What are you most proud of?**

I take immense pride in my daughter, who has become remarkable and compassionate. Additionally, I aspire to be proud to contribute to enhancing our patients' lives through our research results. Developing knowledge not only aids in improving their well-being but also serves to destigmatize psychiatric illnesses.

**What is your greatest regret?**

My parents passed away before witnessing my professional accomplishments.

**What is the quality you most admire in people?**

I value justice, integrity, and dedication to a noble cause. Additionally, I appreciate traits like tolerance and respect extended to all living beings, including animals and plants.

**What do you consider the most overrated virtue?**

Heroism!

**What is your favorite occupation (or activity)?**

I enjoy cooking, wine tasting, and taking care of my orchids. With over 30,000 species, each surpassing the other in beauty, orchids are a captivating mirror reflecting the many facets of the human soul.

**Where would you most like to live?**

At home, near a lake or the sea. I also like traveling.

**What is your most treasured possession?**

Possessions do not carry inherent value; the true treasure lies in sharing and communal experiences.

**What is your most marked characteristic?**

Resilience.

**Among your talents, which one(s) give(s) you a competitive edge?**

My empathy and ability to think outside the box, often described as 'exotic,' contribute significantly to my edge.

**What do you consider your most outstanding achievement?**

Integrating Eastern and Western perspectives, fostering global thinking, and delving into the essence and core of an issue, both in life and science.

**If you could change one thing about yourself, what would it be?**

Enhance my spatial orientation skills and temper my emotional outbursts.

**What do you most value in your friends?**

Loyalty and honesty

**Who are your favorite writers?**

Haruki Murakami for his thought-provoking and imaginative novels. In "Norwegian Wood" or "Kafka on the Shore," I like how he explores the complexities of human relationships and the mysteries of existence, and François Cheng for his insights into the human experience and the quest for wisdom.

**Who are your heroes of fiction?**


A 'hero' is not a concept. One cannot find a hero in just one person. Everyone has their yin and yang, their part in the light and their part in the dark.

**Who are your heroes in real life?**

Same as above.

**What aphorism or motto best encapsulates your life philosophy?**

Break down barriers between disciplines and forge connections among people.

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