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Personal Perspectives on Mentoring

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Graphical abstract

In Homer's book, the Odysseus, Ménsur/Méntôr, was a loyal friend and adviser to Odusseús (Ulysses), King of Ithaca. When Ulysses left his kingdom to participate in the Trojan War, he entrusted Méntôr with the education of his son, Telemachus. Méntôr guided him as a teacher, counselor, and protector, in a relationship based on affection and trust. This character of Greek mythology became famous only at the beginning of the 18th century in the context of the didactic French novel entitled "Les Aventures de Télémaque" (*The adventure of Telemachus*). The book was written in 1699 by Francois de Fénelon, the Archbishop of Cambrai when he was assigned the responsibility of tutoring the young Dauphin of France, Duke of Burgundy.¹ "Mentor" was the name of the main hero. He was portrayed as a wise teacher providing insightful lessons and innovative views to the prince in preparation to his future duties as a ruler. Since then, the name *mentor* (same spelling in

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Conflicts of interest

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English and French) got extended to a generic designation of a person who embodies the qualities of the hero's depicted in the "Odyssey" and the "Adventure of Telemachus," namely, serving as a teacher as well as a wise, experienced, and trusted advisor to a younger person in the context of career and personal training and guidance to reach his potential.

In the present era, mentoring programs have flourished in all disciplines and key role of mentor–mentee relationships for empowering all aspects of professional development is increasingly recognized.^{2,3} This is reflected in the new section of *Gastroenterology* "Mentoring, Education and Training Corner" implemented by J. Del Valle few years ago.⁴ Several excellent viewpoints previously written by distinguished gastroenterologists and basic scientists provided insight to the characteristics and attributes of successful mentor–mentee relationships.^{5,6} These articles also outlined relevant perspectives on key features of mentoring based on personal experiences in their career development as clinical investigators, educators, physician scientists, and scientists in the exciting field of gastroenterology.^{6–10}

I had also the privilege to witness the importance of mentoring linkage in my training, which has shaped my career as a basic scientist in neurogastroenterology. It started at the University Claude Bernard in Lyon (France), where I did my undergraduate studies. Several courses put emphasis on homeostatic mechanisms and one of them was related to the biology of stress. The teaching was based on the concept put forward by Selye that identified the "hypothalamic pituitary adrenal (HPA) axis, the immune system and the gut at the center of the bodily responses to various demands."¹¹ When I moved to Montreal in 1970 with my husband, I searched for a relevant laboratory to pursue a PhD, keeping in mind that the thematic of endocrinology related to stress had raised a strong appeal since my undergraduate years. Unexpectedly, and to my delight, I found that Professor Hans Selye was conducting his influential research on stress at the University of Montreal. He was the founding member and director of the Institute of Experimental Medicine and Surgery and had developed a related PhD program. I was accepted in this program soon after my arrival in Montreal and the 5 years that I spent under Dr Selye's tutelage, first as a PhD student, and then 1 year as a postdoc, had the greatest impact in the pursuit of my research thematic.

Professor Selye embodies several aspects of an inspiring mentor. First, a key element that he strongly advocated is to pursue training or interactions with prominent leaders in a field of medicine that raises your research interest. He himself was trained by famous endocrinologist leaders in Europe and Canada, including J.B. Collip, who discovered insulin. As Dr Selye became a pioneer figure in his own field of biology of stress and neuroendocrinology,¹¹ he attracted a cadre of PhD students and visiting scientists. This provided stimulating interactions between members at his institute and subsequently collaborations and lifetime friendship with former trainees/visitors. Dr Selye's mentorship impacted his students by his talent of communication to express his visionary concepts, relentless drive for creativity, and lifetime dedication to science. In addition, he gave his mentees the resources and technical support needed to achieve their research projects. In return, we were under pressing high expectations of efficiency, turning our findings into articles (he published >1500 peer-reviewed articles and 32 single author books).¹² Importantly as a mentor, he was also vigilant to guide his students to ascertain whether their

findings were of high significance and could lead to a new field of the broadest impact. He served as a sounding board for research ideas. His daily emphasis was on the importance of originality in medical research and setting up high standards. These guidelines impacted several of his pupils. Among them, the 1977 Nobel Prize Laureate, Roger Guillemin, MD, PhD, is a famous example. In 1950, Selye referred to “a first mediator” in the brain that triggers the bodily adaptive response to stress. Roger Guillemin, MD, then a PhD student with Selye from 1949 to 1953, stated “It is from the questions raised by Hans Selye that I devoted my life as a physiologist and eventually isolated the first of these hypothalamic factors controlling pituitary functions as proposed by Selye in his questions regarding the mechanism of the organism response to stress.”¹³ Indeed, after completing his PhD, Guillemin was recruited by Baylor College, where he demonstrated the existence of the hypothalamic factor that elicited the adrenocorticotrophic hormone release from the rat pituitary. He named it corticotropinreleasing factor (CRF), in keeping with its adrenocorticotrophic releasing property and the fact that the molecular structure was not yet known.¹³ After being recruited by the Salk Institute, he then identified several key hypothalamic releasing/inhibiting factors regulating pituitary hormone secretion, while searching to isolate CRF which, however, he never succeeded in doing.¹³ Subsequently, his former PhD student, Wylie Vale, while leading his own independent group at the Salk Institute, put a close to this long-term quest and identified the structure of CRF, related peptides and cognate receptors at the beginning of the 1980.¹⁴ These historical developments illustrate the key role of strong mentoring linkage taking place with visionary leaders implementing high standards to address significant topics leading to breakthrough discoveries. Obviously, the opportunity to work with famous Professors in big laboratories is not the only path to experience successful mentoring. Young trainees may benefit to get mentoring from early stage productive investigators who use state-of-the art approaches to address exciting new areas of research in gastroenterology and will look out closely for his or her motivated trainees.

My research interest in neurogastroenterology can also be rooted in Professor Selye, based on his initial demonstration that the gut, in addition to the endocrine system, is responsive to stressors. After finishing my PhD training, I was intrigued about the possibilities that these hypothalamic peptides being discovered may play a role in the brain regulation of gut function and wanted to test this hypothesis in the context of stress. The Salk Institute where Guillemin as well as Vale’s independent groups pursued their impressive research seems to be the best place to continue my training (and to escape the Canadian winters). Wylie Vale, Marvin Brown, and Jean and Catherine Rivier’s seminal works on the characterization of peptides and their actions on the HPA axis along with the development of synthetic peptide agonists and antagonists were in front line. I was delighted to be able to spend 2 years in their laboratories thanks to a Centennial Fellowship grant sponsored by the Medical Research Council of Canada. In this novel Californian context, I witnessed additional insight of impactful and inspirational mentoring from talented and productive young basic scientists. Although the research focus of their laboratories was on the neuroendocrine regulation of the pituitary, they were very supportive that I branched out to a new direction of my interest looking at peptides action on the brain–gut axis. Their insightful advice, scientific rigor, and selfless support were the main determinants to anchor what became my

lifetime quest to understand the complex brain–gut interactions and the role of peptides in that context. This example emphasizes how a selfless and supportive mentorship encourages and provides means to carve out a new field to jumpstart a research career path. These elements are important attributes of mentoring, particularly in the context of training gastroenterology fellows. If the outcome of the initial research training experience is not promising, or rewarding, their career path can be easily substituted to teaching and clinical care and will impact on the future pool of physician scientists.

It should be also pointed out, as mentioned in previous articles,^{7,9} that mentoring is a lifelong process that is instrumental in facilitating career development even after the initial direct graduate and postgraduate/training is completed. While at the Salk Institute, I was invited to give a seminar on brain regulation of gastric acid secretion and erosion formation at the Center for Ulcer Research and Education (CURE) located within the Veteran Administration Research Facilities and part of the UCLA Digestive Diseases Division. The visit at CURE was a determinant turning point. The grilling questions from the famous gastroenterologists who included in the audience of my presentation Haile Debas, Mort Grossman, Paul Guth, Andrew Soll, Travis Solomon, Tachi Yamada, and John Walsh led me to realize that my knowledge in gastroenterology, although trained as a neuroendocrinologist, was largely inadequate to expand this promising field. CURE, with the number of prominent expert gastroenterologist clinician scientists was the ideal milieu to learn and spur the new brain–gut axis basic science field, in earnest. Mort Grossman, the founding member and director of CURE also had an interest in vagal regulation of gastric secretion and was receptive to the idea of recruiting me. After the award of my first NIH/NIDDKR01 grant in 1982, I moved to Los Angeles to found my independent laboratory. This was another decisive step in my career; it gave me the opportunity to be in a strong academic and research environment allowing productive interactions with CURE clinician scientists with complementary expertise to assess gastric function. There was also a strong tradition to promote career development as instilled by Morton Grossman. Haile Debas and John Walsh, who were both affiliated with the Veterans Administration and ULCA, were particularly instrumental in this respect after the passing of Mort and served as influential role models. In addition to scientific interactions, they introduced me to the importance of networking at meetings and serving on relevant societies and granting agency committees, and encouraged me to participate at the yearly Digestive Disease Week (DDW) meetings (before I became an attendee of the Endocrine Society annual meeting). In the mid 1980s, there was no abstract descriptor on brain–gut interactions, but Dr Walsh, who was an AGA Council member, was instrumental to add this topic to the *Hormones and Receptors* section of that time.

I was fortunate to also be the beneficiary of indirect mentoring by experienced investigators with keen interest in neurogastroenterology and fostering scientists at the start of their career. The thoughtful advice and encouragement received from Gabriel Makhoul and Joseph Szurszewski were precious, particularly at times of grant renewals. As the regulation of gastric acid secretion was taking a downturn after the era of proton pump inhibitors, Emeran Mayer came back from Germany to CURE with a keen interest in brain–gut interactions from a clinical and translational perspective using brain imaging. I benefited from his drive to expand my research to visceral pain and related experimental models of

irritable bowel syndrome while keeping the stress–gut component to understand the underlying molecular mechanisms. The importance of clinical–basic science team research work and complementary interest leading to translational approach to advance a pathophysiology of a gastrointestinal disease was particularly rewarding. A recent article reviewed comprehensively the benefits to be gained by PhD-trained investigators with expertise in gastrointestinal system who chooses a career path in a clinical department.⁶ This viewpoint encapsulates relevant advices to be successful as a basic scientist in this setting.⁶

As I reflect on these past 3 decades, I have had the privilege and responsibility of guiding nearly 60 MD, DVM, and/or PhD fellows interested in brain–gut interactions. To the best of my capacity, I have passed on to the next generations the features and examples that I received and appreciated as a mentee and junior faculty. I was honored to receive the Research Mentor Award, from the American Gastroenterology Association Institute Neurogastroenterology & Motility Council Section in 2013 and appreciated that this initiative came from one of my former fellows, Million Mulugeta, who is now a professor at UCLA. Mentoring throughout those years has been for me a mutual developmental partnership of great collegiality. The mentees' motivation, intellectual curiosity, skill, dedication, and focus were key components making the mentorship a fulfilling process for both parties leading to a successful outcome. It was a genuine satisfaction to see many of the fellows succeeding in their own career paths as chair of physiology, division chief of gastroenterology, professors, and head of laboratories in academia, hospitals, and private industries in the United States as well as in Europe and Asia. It was and continues to be stimulating to have the opportunity to work with bright and dedicated colleagues, and it is rewarding to have maintained with them enduring friendship through the years and to witness their success.

Last, as a PhD pursuing a path in a clinical department, it is relevant to mention that the pursuit of a career in the VA setting along with the parent academic university facilitated my research endeavors and achievements. This provided the eligibility to diversify the source of funding support with a focus on translational research projects and enhanced interactions with gastroenterologist investigators working at the VA. It also expended the possibility of playing a role in national committees relevant of the VA Office of Research and Development. In that context, it was a great honor to be the recipient of the 2014 William S. Middleton Award, which is “the highest honor for outstanding achievement given by Veterans Health Administration and the Biomedical Laboratory Research & Development Service of the Office of Research and Development.”

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