

A tribute to Professor Sergio Adamo, Full Professor of Histology and Embryology at Sapienza University, Rome

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Abstract

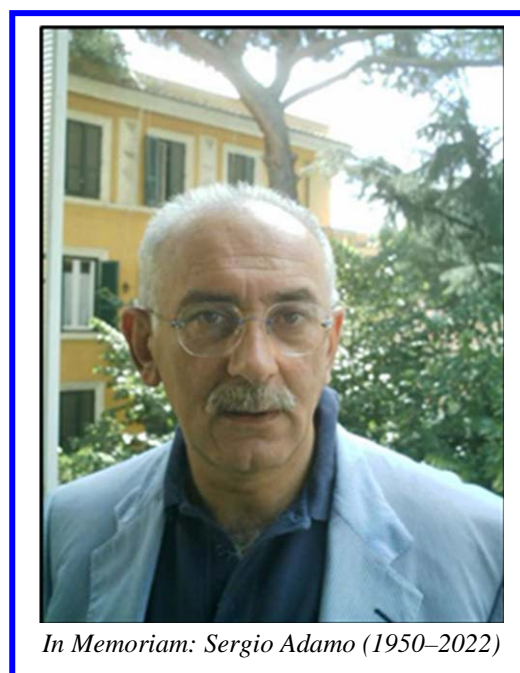
Sergio Adamo prematurely left us on January 7th 2022, just one year after his retirement, leaving his family, friends and colleagues deeply sad and grieving. Sergio was a full Professor of Histology and Embryology at the Sapienza University of Rome. Since the foundation of the Institute of Histology and Embryology more than 50 years ago, he dedicated himself to the institution, research, and teaching with integrity, generosity, and a great sense of teamwork. Sergio's main research interests have been the mechanisms of myogenesis, muscle homeostasis and regeneration under normal and pathological conditions. Most relevant results obtained by Sergio and his collaborators indicate novel functions for the neurohypophyseal hormones, vasopressin and oxytocin, upon striated muscle differentiation, trophism, and homeostasis. Here we like to give the proper tribute to a mentor, a colleague and a sincere friend. He left an indelible mark on the professional and personal lives of all of us and his absence provokes a profound sense of emptiness.

"The trouble with the world is that the stupid are cocksure and the intelligent are full of doubt." Bertrand Russell

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Sergio Adamo, full Professor in Histology and Embryology at the Sapienza University of Rome, passed away on January 7th, 2022 leaving his family, friends, and colleagues with a profound sense of sadness. He had retired just one year earlier, but he was still an active participant within the Department and the academic community. He was a well-known and highly respected scientist and teacher. Since the foundation of the Institute of Histology and Embryology more than 50 years ago, he dedicated himself to the institution, research, and teaching, always with integrity, generosity, and a great sense of teamwork. He joined the Institute when he was still a Medical student, when Valerio Monesi, the father of the Histology discipline in Rome, moved there to establish an innovative and active research center. Sergio started his research activity within the myogenesis group, coordinated by Mario Molinaro, who was developing a line of research aimed to study cell differentiation, among the few, at that time, establishing primary cell cultures as experimental strategy.^{1,2} After a period at the NIH in Bethesda, where Sergio improved his expertise in cellular biochemistry,



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he returned to Rome in 1978, and established his own laboratory, making his contribution towards the understanding of the regulation of in vitro myoblasts differentiation.^{3,4} Since then, he continued his research in muscle biology, using both in vitro and in vivo experimental models.

As a full Professor of Histology and Embryology since 1990, and for many years as a coordinator of the Ph.D. program in Morphogenesis and Engineering Tissue, he was a scientific guide and an inspiration for all the students and colleagues as a person of the highest integrity, honesty, and sincerity. Likewise, as a Director of the Histology Department from 2007 to 2010, he worked tirelessly in improving the academic standing not only for his lab but also for the entire community. Sergio's main research interests were focused on muscle homeostasis and regeneration under normal and pathologic conditions.¹⁻¹⁶ The most relevant results obtained by Sergio and his collaborators indicate novel functions for the neurohypophyseal hormones, vasopressin (AVP) and oxytocin (OT), which regulate skeletal muscle differentiation, trophism, and homeostasis. In particular, Sergio's group demonstrated for the first time that AVP promotes muscle differentiation, hypertrophy, and regeneration through the combined activation of the calcineurin and Calcium/Calmodulin-dependent Protein Kinase (CaMK) pathways.⁵⁻⁹ Sergio's studies revealed that the AVP system is impaired in several neuromuscular diseases, suggesting that AVP may act as a physiological factor in skeletal muscle. This prompted Sergio to investigate the role of AVP in vivo demonstrating in a murine model that local over-expression of the AVP receptor V1a enhances the regeneration of atrophic muscle. Indeed, by upregulating the regeneration/differentiation markers, modulating the inflammatory response, and attenuating fibrogenesis, the stimulation of AVP-dependent pathways creates a favorable environment for efficient and sustained muscle regeneration and repair even in the presence of elevated levels of the inflammatory cytokine TNF.¹⁰⁻¹⁵ All these studies performed by Sergio's group highlight a novel in vivo role for AVP-dependent pathways, which may represent an interesting strategy to counteract muscle decline in aging or in muscular pathologies.¹³ All of the above prompted to verify whether neurohypophysial hormones might be proposed as a hormonal treatment to counteract cancer-induced muscle wasting, as well. Indeed, circulating concentration of OT was found reduced in cancer patients, and its administration in a pre-clinical model of cancer cachexia appeared to be promising: these results are currently submitted for publication and represent a cue strongly suggesting that the use of neurohypophysial hormones has potential clinical applications. Additional contributions to counteract cachexia come from his group's studies on the mechanisms underlying the impairment of muscle

stem cells in cachexia and countermeasures, such as physical exercise.¹⁶

The area of interest of Sergio's group recently spread also in the mechanisms underlying muscle denervation and the pathophysiology of Duchenne Muscular Dystrophy (DMD), focusing in both cases on the role of HDAC4 in muscle fiber atrophy and on mechanisms of sarcolemma repair.¹⁶

We all had the opportunity to work with Sergio, either enjoining his laboratory or closely collaborating in research and teaching. He has been an extraordinary support for all of us, and we all established a profound friendship together with a working relationship. His passion for science was truly contagious and he was a generous, open-minded, and helpful mentor and collaborator, always willing to listen and truly pleased to see the progress of our achievements and success. We also had a lot of fun with him, pleased by his sharp humor, always searching for new jokes to share. Do you remember his mustache bended by the ironic but always friendly smile? This is the way we evoke our Sergio, professor at Sapienza, scientist, and friend: gentlemanly but funny, exciting but calm, pleasant but strict, upstanding. A honest person. His teaching will remain in all of us, students and colleagues, spread around the world, forever. Many people will miss him, we will certainly miss him sorely.

Bianca, Marina, Clara, Dario

When I joined Monesi's group in 1969 as assistant professor, Sergio Adamo together with Marco Conti, two young students at the Medical School, were already there, the first to be present in Monesi's lab. Indeed, when Valerio Monesi was appointed as professor of Histology in 1968, his lab was an empty small space inside the Institute of Anatomy, and Sergio and Marco represented the founder germ of the new histological institution, helping Monesi in moving furniture, mounting shelves, and planning about the future. I was immediately attracted by Sergio's curiosity, his desire of knowledge and experimental ability. Sergio was promptly involved in setting up a model of myogenesis in primary cultures, laying the foundation the future studies on satellite muscle cell differentiation and their role in muscle growth and repair. Since then, we never stopped our long-lasting collaboration. Many qualities were harmoniously fused in Sergio's person. His sudden death left a sense of sadness for the loss of a friend, a colleague, a teacher, a just man.

Mario Molinaro

List of acronyms

AVP - Arginine Vasopressin
CaMK - Calcium/Calmodulin-dependent Protein Kinase
DMD - Duchenne Muscular Dystrophy
OT - Oxytocin
TNF - Tumor Necrosis Factor

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