

The Challenge of Neuroscience in Italy

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The International Neuroscience Journal (INJ) comes at the right time to add a novel scientific insight into the Neurosciences. In my opinion, one of the major breakthroughs of this Journal will be the possibility to represent the most advanced knowledge in the Translational Neuroscience. In the scenario of the scientific publications, several journals are devoted to a specific field, restricting the interest of the readers. Otherwise, there is a great demand for widening the communication among neuroscientists in order to find new pathways for research and for treatment of patients. As a neurosurgeon, I am aware that surgical skill and technical advances are very important but only the understanding of new discoveries in other fields of Neuroscience may open the mind to new applications for the benefit of patients complaining of neurological disorders. The INJ will be successful if it will be able to host contributions from different perspectives and to involve as many neuroscientists as possible. The challenging task is to train the next generation of translational neuroscientists to fill the gap between the tremendous achievements of Biomedicine and clinical applications and to enhance research collaborations of young trainees.

In Italy, Neurosciences have a long history and a widely acknowledged tradition of outstanding contributions to the research on CNS function and disease. Beyond the well-known studies of Italian anatomists, Mondino de Luzzi in the thirteenth century, Leonardo da Vinci and Giovan Battista Morgagni, the description of the sylvian fissure by Fabricius di Acquapendente remains a milestone in *TabulePictae*, first published in 1600 (1, 2).

In the last century, some Italian neuroscientists have deservedly accepted the Nobel Prize for their discoveries: Camillo Golgi, jointly with Ramon y Cajal, in 1906, pioneered the silver salts coloring method by which it was possible to recognize neurons for the first time. He also discovered, before the advent of microscopy, the so-called Golgi apparatus in nervous cells of cats (3). Daniel Bovet, Neuropharmacologist, was awarded the Nobel in

1957 for the research on drugs blocking the actions of specific neurotransmitters (4). In addition, Rita Levi Montalcini was the Nobel laureate in 1986 for the discovery of the Nerve Growth Factor (NGF) (5).

A fundamental contribution to the knowledge of neuro-cognitive functions has been recently provided by the physiologist and neuroscientist Giacomo Rizzolatti with his group of investigators in Parma (6). In 1992, he discovered the mirror neurons in the premotor cortex, the supplementary motor area and the primary somatosensory cortex. He demonstrated that the mirror neurons fire during action and during observation of the same action performed by another person. This discovery has several important implications not only in performative arts but also in neurological rehabilitation and disease. Currently, several groups of investigators are involved in advanced neuroscience fields, such as the study of genetics and molecular biology of neurodegenerative diseases. Outstanding results in this field have been obtained at the Mendel Institute of Rome, at the Institute of Experimental Neurology of San Raffaele Scientific Institution as well as in other Universities or National Research Council centers distributed in all geographical areas of Italy.

Italy has given relevant contributions to the history of neurosurgery as well. Francesco Durante, from Letojanni (Messina), performed, at the University of Rome, the first successful removal of an olfactory groove meningioma in 1884 (7). The case, reported in Washington, at the American College of Surgeons, was the most celebrated and widely known of early neurosurgical operations (8). In 1956 Bernasconi and Cassinari identified a typical medial tentorial artery in tentorial meningiomas (9). Its importance in neurosurgery is emphasized still today in the literature (10). More recently, in 1989, Guido Guglielmi, developing detachable platinum coils, opened the era of neuro-endovascular treatment for cerebral aneurysms (11). As neurosurgeons, we must incorporate discoveries in the field of neuroscience in as timely a fashion as possible in our treatments to be guided by advancing knowl-

edge. A perfect model of how neurosciences, including cognitive neuroscience, are applied to neurosurgery is the surgical treatment of movement disorders and, more recently, of psychiatric disorders. Reconstructive neurosurgery, in the era of stem cells, will have major chances if neurosurgeons and biologists will work together in an interdisciplinary environment. Similarly, surgical procedures for epilepsy offer a particularly exciting opportunity for neuroscientists by allowing a prolonged access to the cortex and very precise recording.

At this time, it appears mandatory to increase and support translational Neurosciences improving the collaboration between basic and clinical scientists. The objective reduction of financial resources for research in Italy stimulated the competition of applications for funding of European Projects. This challenge encouraged new relationships of laboratory, diagnostic and clinical investigators, statisticians, bioengineers and computational scientists with the aim of constituting European and international networks of researchers working to improve study designs in advanced scientific Projects for Horizon 2020. For this purpose, the planning of Joint Sessions of the Societies of Neurology, Neurosurgery, Neuroradiology, Neuroparmacology, Neurophysiology, Molecular Neurobiology, Nuclear Medicine and Radiation Therapy is greatly growing. The relationships are not always easy because of different scientific interests but the awareness that nobody alone can face the complex problems of brain function and disease convinces that there is no other chance than to share an integrated comprehension of the Neurosciences.

Another important issue in Italy is the integration of competences in a specific and high technological field, such as neuro-oncology. The availability of state-of-the-art neuroimaging, advanced neurophysiological equipment, laboratory dedicated to detection of biomarkers, neuropathological evaluation, intraoperative identification of tumoral tissue and preservation of normal brain, radio-oncological therapies needs experienced researchers and clinicians to team up to warrant highest standards of care and clinical outcome. For this, different centers in Italy have recently implemented programs of neuro-oncology, to provide the most advanced methods of investigation, imaging and treatment (12-15). A collaborative and continuous work has been done in the last decade by endocrinologists and neurosurgeons providing a world leadership in the care of pituitary tumors (16-19).

In conclusion, Italy must meet the challenge of neurosciences that today engage many aspects of the human sciences including philosophy, ethics, psychology, as well as life sciences and medicine. Certainly, this is a complicated moment for the European economy in general and for the Italian one in particular that must be renewed more than others to face the huge challenge of globalization. Italian researchers have the gift of individual genius and dedication. The research system, however, requires better organization and meritocracy. Many initiatives are

ongoing, most of which pertain to the legislature. Nonetheless, there is something that this Journal can do for all the Italian neuroscientists: providing a platform for debate and critical discussion of the various aspects of the discipline. For this reason, I hope that this editorial initiative is accepted with the enthusiasm it deserves.

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