



## Rita Levi-Montalcini



Turin, Italy, 22 April 1909 - Rome, Italy, 30 December 2012

**Nomination:** 24 June 1974

**Field:** Neurobiology

**Title:** Professor, Nobel laureate in Physiology or Medicine, 1986

### Most important awards, prizes and academies

**Awards:** Feltrinelli Award (1968); St Vincent Award (1979); Max Weinstein Award (1962); William Thomson Wakeman Award (1974); Schmitt Award, Cambridge, MA (1981); Lewis Rosensteil Award, Boston, MA (1982); Horwitz Award, Columbia University, NY (1983); Nobel laureate in Physiology or Medicine (1986); Lasker Award (1986); US National Medal of Science (1987); Cavaliere di Gran Croce Ordine al merito della Repubblica Italiana (1987); Senator for Life, Republic of Italy (2001). **Academies:** National Academy of Sciences, USA (1968); Pontificia Academia Scientiarum (1974); Accademia Nazionale dei Lincei, Rome (1976); National Acad. of Sciences 'dei XL', Rome (1981); Acad. Européenne des Sciences, des Arts et des Lettres, Paris (1981); Academy of Arts and Science, Florence (1981); American Philosophical Society, USA (1986), The Royal Society (1995).

### Summary of scientific research

Early work by Rita Levi-Montalcini resulted in the discovery of different developmental events which play an important role in the shaping of the nervous system. The two most significant findings are: a) the occurrence of massive cell death during early neurogenesis; b) the occurrence of massive migratory processes of neuronal cell populations at an incipient stage of their differentiation. These findings were followed by the major discovery in 1952 of a humoral factor which plays an essential role in the growth and differentiation of sensory and sympathetic nerve cells. To the study of this factor, which became known as the Nerve Growth Factor (NGF), of its chemical nature, source(s), biological activity, and mechanism of action, Levi-Montalcini has devoted more than three decades. While these findings gave unequivocal evidence for the trophic and differentiative role of NGF on its target nerve cells, a third distinct but no less important NGF property is to exert a tropic directional action on sympathetic and sensory nerve fibres. This property, first hypothesized at the time of the discovery of the humoral nature of NGF, was definitely proved by experiments of intracerebral injections of NGF in neonatal rodents. The NGF discovery brought to light the existence of an entirely new category of circulating molecules (growth factors) which modulate the proliferation and differentiation of their respective target cells.

### Main publications

Levi-Montalcini, R., Effects of mouse tumour transplantation on the nervous system, *NY Acad. Sci.*, 55, pp. 330-43 (1952); Levi-Montalcini, R., Meyer, H. and Hamburger, V., In vitro experiments on the effects of mouse sarcoma 180 and 37 on the spinal and sympathetic ganglia of the chick embryo, *Cancer Res.*, 14, pp. 49-57 (1954); Levi-Montalcini, R. and Booker, B., Excessive growth of the sympathetic ganglia evoked by a protein isolated from mouse salivary glands, *Proc. Natl. Acad. Sci. USA*, 46, pp. 373-84 (1960); Levi-Montalcini, R. and Booker B., Destruction of the sympathetic ganglia in mammals by an antiserum to a nerve growth protein, *Proc. Natl. Acad. Sci. USA*, 46, pp. 384-91 (1960); Levi-Montalcini, R. and Angeletti, P.U., Immunosympathectomy, *Pharmacol. Rev.*, 18, pp. 619-29 (1966); Levi-Montalcini, R., The nerve growth factor: its role in growth, differentiation and function of the sympathetic adrenergic neuron, *Perspectives in Brain Research* (M.A. Corner and D.F. Swaab, eds.)(1976); Aloe, L. and Levi-Montalcini, R., Mast cells increase in tissues of neonatal rats injected with the nerve growth factor, *Brains Res.*, 133, pp. 358-66 (1977); Aloe, L. and Levi-Montalcini, R., Nerve growth factor-induced transformation of immature chromaffin cells in vivo into sympathetic neurons:

effects of antiserum to nerve growth factor, *Proc. Natl. Acad. Sci. USA*, 76, pp. 1246-50 (1979); Levi-Montalcini, R., Developmental neurobiology and the natural history of nerve growth factor, *Ann. Rev. Neurosci.*, 5, pp. 341-62 (1982); Levi-Montalcini, R. and Aloe, L., The effect of nerve growth factor on autonomic ganglion cells, *Autonomic Ganglia* (L. Elfvin, ed.), J. Wiley and Sons, Chichester, NY, pp. 401-26 (1983); Levi-Montalcini, R. and Calissano, P., Nerve Growth Factor, *Encyclopedia of Neuroscience*, vol. 2 (G. Adelman, ed.), Birkhauser, Boston-Basel-Stuttgart, pp. 744-6 (1987); Levi-Montalcini, R., Dal Toso, R., Della Valle, F., Skaper, S.D. and Leon, A., Update of the NGF Saga, *J. Neurol. Sci.*, 130, pp. 119-27 (1995); Levi-Montalcini, R., Skaper, S.D., Dal Toso, R. and Leon, A., Nerve Growth Factor: From Neurotrophin to Neurokine, *TINS*, 19, pp. 514-20 (1996); Levi-Montalcini, R., Skaper, S.D., Aloe, L. and Leon, A., Nerve Growth Factor, *Encyclopedia of Neurosciences*, edited by Elsevier Science (1999); Levi-Montalcini, R., Elogio dell'imperfezione, Garzanti Editore (1988); Levi-Montalcini, R., *Il tuo futuro*, Garzanti Editore (1993); Levi-Montalcini, R., *Senz'olio contro vento*, Baldini & Castoldi (1996); Levi-Montalcini, R., *The Saga of the Nerve Growth Factor*, World Scientific Publishing Company Singapore (1997); Levi-Montalcini, R., *L'asso nella manica a brandelli*, Baldini & Castoldi (1998); Levi-Montalcini, R., *La galassia mente*, Baldini & Castoldi (1999); Levi-Montalcini, R., *Cantico di una vita*, Cortina Editore (2000); Levi-Montalcini, R., *Tempo di mutamenti*, Baldini & Castoldi (2002); Levi-Montalcini, R., *Abbi il coraggio di conoscere*, Rizzoli (2004); Levi-Montalcini, R., *Tempo di azione*, Baldini Castoldi Dalai (2004); Levi-Montalcini, R., *Eva era africana*, Gallucci (2005); Levi-Montalcini, R., *I nuovi Magellani nell'er@digitale*, Rizzoli (2006); Levi-Montalcini, R., *Tempo di revisione*, Baldini Castoldi Dalai (2006); Levi-Montalcini, R., Tripodi, G., *Rita Levi-Montalcini racconta la scuola ai ragazzi*, Fabbri (2007); Levi-Montalcini, R., Tripodi, G., *La clessidra della vita di Rita Levi-Montalcini*, Baldini Castoldi Dalai (2008); Levi-Montalcini, R., *Cronologia di una scoperta*, Baldini Castoldi Dalai (2009).