BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.

NAME	POSITION TITLE
Saarma, Mart	Academy Professor, director of CoE, Institute of Biotechnology, University of Helsinki, Finland
eRA COMMONS USER NAME	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Tartu University, Estonia	M.Sc.	1972	biochemistry
Tartu University, Estonia	PhD	1975	molecular biology
Friedrich Mischer Institute, Basel, Switzerland	postdoc	1982	neurobiology and immunobiology

A. Positions and Honors.

Positions and Employment

- *Research assistant & junior researcher,* Dept. Biological Chemistry, Tartu State University 1971-1977
- *Head of the Laboratory of Molecular Genetics* Institute of Physics, Estonian Academy of Sciences, Tartu 1977-1980
- *Head of the Department of Molecular Genetics,* Institute of Chemical Physics and Biophysics, Estonian Academy of Sciences, Tallinn 1980-1990
- *Professor,* Gene Technology Center, Tallinn Technical University (part time) 1997-
- *Director, Professor,* Institute of Biotechnology, University of Helsinki 1990-2008
- *Director,* Biocenter Finland 2008-2009
- *Director,* Centre of Excellence in Molecular and Integrated Neuroscience 2008-
- *Academy Professor*, Academy of Finland and Institute of Biotechnology 2009-

Other Experience and Professional Memberships

- Biocentrum Helsinki-*Vice-chairman of the board* 1994-2007, 2011-
- Scientific Advisory Board of Latvian Biomedical Research Centre *-Member of the board* 1993-
- Committee of equipment of the University of Helsinki-*Chairman* 1997-2005
  Institute of Medical Technology, University of Tampere, *-Member of the scientific advisory board* 1998-2007
- Board of the Directors of the biotech company Mobidiag Ltd., Finland *-Member of the board* 2000-2010
- Board of the Directors of the Finnish Genome Centre *-Chairman of the board* 2004-2007
- Estonian Prime Minister's Council for Science and Technology *-Member of the council* 2001-
- Scientific Advisory Board of the Heidelberg Neuroscience Center *-Chairman of the board* 2002-
- Scientific Board of the Finnish National Public Health Institute

-Member of the board	2002-2008
• Scientific Advisory Board of the Göttingen Neuroscience Center	
-Member of the board	2003-
• Journal Experimental Neurology-*member of the editorial board*	2003-
-Member of the board	
• Scientific Board of the Helsinki Institute of Information Technology	
-Member of the board	2003-
• Board of the Directors of the National Institute of Chemical Physics and Biophysics, Estonia	
-Chairman of the board	2004-2009
• Morris K. Udall Parkinson's Disease Center of Excellence	
-Member of the External Advisory Board	2005-
• Scandinavian Life Science Journal	
-Member of the advisory board	2006-
Frontiers in Autoniomic Nervous System	
- *Review Editor*	2010-
• Estonian President Academic Council	2007-2011
-Member of the council	
• Tanner Academy	
- *President*	2007-
• Biocenter Finland	
-Vice Director	2007-2008
-Director	2008-2009
• Board of the Directors of HermoPharma Ltd., Finland, chairman	2008-2009
• EMBO Council, member	2011-2013
• ERC Scientific Council, member	2011-2013

Honors

• *Academician,* Estonian Academy of Sciences	1990
• First order decoration of the Finnish White Rose Knighthood	1999
• Foreign Member of the Finnish Academy of Science	2000
• Member of the Tanner Academy	2001
• Second order decoration of the Estonian White Star	2001
• Helsinki Gold medal	2002
• Member of the Finnish Technical Academy of Sciences	2003
• Honorary Member of the Finnish Agricultural Science Foundation	2004
• European Molecular Biology organization (EMBO) member	2005
• Foreign Member of the Finnish Society of Sciences and Letters	2007
• Guest Professor of the Wuhan University, China	2011-2013

Awards

• Russian Academy of Sciences, prize for the young scientist	1974
• Estonian State prize for science and technology	1980
• Fellow of the Biocentrum Helsinki	1994, 2001,2007,2011
• Member of the Academy of Finland Centre of Excellence in molecular neurobiology	1999-2005
• Finnish Cultural Foundation Science Prize	2000
• Finnish Innovation Prize	2000
• Väino Tanner Prize	2001
• Helsinki Gold medal	2002
• Runeberg Medical Science Prize	2003
• Karl Schlossmann Science Prize	2004

- Chairman, Finland Centre of Excellence in Molecular Neurobiology 2008-2012
- Nordic Science Prize, Lundbeck Foundation 2009
- Tartu University Medical School Honorary Medal 2010

B. Selected peer-reviewed publications (in chronological order).

1. Sariola, H., Saarma, M., Sainio, K., Arumäe, U., Palgi, J., Vaahtokari, A., Thesleff, I. & Karavanov, A. (1991) Dependence of kidney morphogenesis on the expression of nerve growth factor receptor. **Science**, *254*, 571-573.

2. Pirvola, U., Palgi, J., Ylikoski, J., Lehtonen, E. Arumäe, U. & Saarma, M. (1992) Brain-derived neurotrophic factor and neurotrophin 3 in the peripheral target fields of developing inner ear ganglia. **Proc. Natl. Acad. Sci**., USA, *89,* 9915-9919.

3. Arumäe, U., Pirvola, U., Palgi, J., Kiema, T.-R., Palm, K., Moshnyakov, M., Ylikoski, J. & Saarma, M. (1993) Neurotrophins and their receptors in rat peripheral trigeminal system during maxillary nerve growth. **J. Cell. Biol.**, *122*, 1053-1065.

4.Timmusk, T., Palm, K., Metsis, M., Reintamm, T., Paalme, V., Saarma, M. & Persson, H. (1993) Multiple promoters direct tissue specific expression of rat BDNF gene. **Neuron**, *10*, 475-489.

5. Pichel, J.G., Shen, L., Sheng, H.Z., Granholm, A.-C., Drago, J., Grinberg, A., Lee, E.J., Huang, S.P., Saarma, M., Hoffer, B.J., Sariola, H. & Wesphal, H. (1996) Defects in enteric innervation and kidney development in mice lacking GDNF. **Nature**, *382*, 73-76.

6. Trupp, M., Arenas, E., Fainzilber, M., Nilsson, A.-S., Sieber, B.-A., Grigoriou, M., Kilkenny, C., Salaxar-Grueso, E., Pachnis, V., Arumäe, U., Sariola, H., Saarma, M. & Ibañéz, C.F. (1996) Functional receptor for GDNF encoded by the c-*ret* proto-oncogene. **Nature**, *381*, 785-789.

7. Suvanto, P., Wartiovaara, K., Lindahl, M., Arumäe, U., Moshnyakov, M., Horelli-Kuitunen, N., Airaksinen, M. S., Palotie, A., Sariola, H. & Saarma, M. (1997) Cloning, mRNA distribution and chromosomal localization of the gene for glial cell line-derived neurotrophic factor receptor beta, a homologue to GDNFR- alpha. **Hum. Mol. Gen.**, Vol. 6, *8*,1267-1273.

8. Rivera, C., Voipio, J., Payne, J.A., Ruusuvuori, E., Lahtinen, H., Lamsa, K., Pirvola, U., Saarma, M. & Kaila, K. (1999) A K^+/Cl^- co-transporter KCC2 renders GABA hyperpolarizing during neuronal maturation. **Nature 397,** 251-255.

9. Rossi, J., Luukko, K., Poteriaev, D., Laurikainen, A., Sun, Y.F., Laakso, T., Eerikäinen, S., Tuominen, R., Lakso, M., Rauvala, H., Arumäe, U., Pasternack, M., Saarma, M. & Airaksinen, M.S. (1999) Retarded growth and deficits in the enteric and parasympathetic nervous system in mice lacking GFRa2, a functional neurturin receptor. **Neuron 22**, 243-252.

10. Meng, X., Lindahl, M., Hyvönen, M. E., Parvinen, M., de Rooij, D. G., Hess, M. W., Raatikainen-Ahokas, A., Sainio, K., Rauvala, H., Lakso, M., Pichel, J. G. , Westphal, H., Saarma, M. & Sariola, H. (2000) Regulation of cell fate decision of undifferentiated spermatogonia by GDNF. **Science**, 287, 1489-1493.

11. Lindahl; M., Poteryaev, D.,Liying, Y., Arumäe, U.,Timmusk, T., Bongarzone, I., Aiello, A., Pierotti, M. A., Airaksinen, M.S. & Saarma, M. (2001). Human GFRα4 is the receptor for persephin, and is selectively expressed in normal and malignant thyroid medullary cells. **J. Biol. Chem.**, 276 (12), 9344-9351.

12. Airaksinen, M. S. & Saarma, M. (2002) GDNF family neurotrophic factors: receptor mechanisms, biological functions and therapeutic utility. **Nature Rev. Neurosci**., 3, 383-394.

13. Rivera, C., Hong Li, Thomas-Crusells, J., Lahtinen, H., Viitanen, T., Nanobashvili, A., Kokaia, Z., Airaksinen, M. S., Voipio, J., Kaila, K. & Saarma, M. (2002). BDNF-induced TrkB activation down-regulates the K+–Cl- cotransporter KCC2 and impairs neuronal Cl- extrusion**. J. Cell Biol.,** 159: 747-752.

14. Popsueva, A., Poteryaev, D., Arighi, E., Meng, X., Angers-Loustau, A., Kaplan, D., Saarma, M. & Sariola, H. (2003). GDNF promotes tubulogenesis of GFRα1-expressing MDCK cells by Src-mediated phosphorylation of MET receptor tyrosine kinase**. J. Cell Biol.**, 161(1):119-129.

15. Yu, L.- Y., Jokitalo, E., Sun, F.- S., Mehlen, P., Lindholm, D., Saarma, M. and Arumäe U. (2003) GDNF-deprived sympathetic neurons die via a novel nonmitochondrial pathway. **J. Cell Biol.**, 163: 987-997.

16. Leppänen, V.-M., Bespalov, M. M., Runeberg-Roos, P., Puurand, Ü., Merits, A., Saarma, M. and Goldman, G. (2004) The structure of GFRα1 domain 3 reveals a novel fold and new insights into GDNF binding and RET activation. **EMBO J.,** 23(7):1452-1462.

17. Mijatovic, J., Airavaara, M., Planken, A., Auvinen, P., Raasmaja, A., Piepponen, P., Costantini, F., Ahtee, L. and Saarma, M. (2007). Constitutive Ret activity in knock-in Multuole Endocrine Neoplasia type B mice induces profound elevation of brain dopamine concentration via enhanced synthesis and increases number of TH-positive cells in substantia nigra**. J. Neurosci.,** 27 (18), 4799-4809.

18. Lindholm, P., Voutilainen, M .H., Laurén, J., Peränen, J., Leppänen, V-M., Andressoo, J-O., Lindahl, M., Janhunen, S., Kalkkinen, N., Timmusk, T., Tuominen, RK. and Saarma, M. (2007) Novel neurotrophic factor CDNF protects and rescues midbrain dopaminergic neurons *in vivo*. **Nature**, 448, 73-77.

19. Li, H., Khirug, S., Cai C., Ludwig, A., Blaesse, P., Kolikova, J., Afzalov, R., Coleman, S.K., Lauri, S., Airaksinen, M. S., Keinänen, K., Khiroug, L., Saarma, M., Kaila, K. and Rivera, C. (2007) KCC2 interacts with the dendritic cytoskeleton to promote spine development. **Neuron**, 56(6), 1019-1033.

20. Yang, J., Runeberg-Roos, P., Leppänen, V.-M. and Saarma, M. **(2007)** The mouse soluble GFRα4 receptor activates RET independently of its ligand persephin. ***Oncogene***, 26 (26): 3892-3898.

21. Parkash, V., Leppänen, V-M., Virtanen, H., Jurvansuu, J. M., Bespalov, M. M., Sidorova, Y. A., Runeberg-Roos, P., Saarma, M. and Goldman, A. (2008) The Structure of the glial cell line-derived neurotrophic factor-coreceptor complex. Insights into RET signalling and heparin binding. **J. Biol. Chem**., 283, (50), 35164-35172.

22. Palgi M, Lindström R, Peränen J, Piepponen TP, Saarma M, Heino TI. (2009) Evidence that DmMANF is an invertebrate neurotrophic factor supporting dopaminergic neurons. **Proc. Natl. Acad. Sci. U S A**.,106 (7): 2429-2434.

23.Voutilainen, M.H., Bäck, S., Pörsti, E., Toppinen, L., Lindgren, L., Lindholm, P., Peränen, J., Saarma, M*. and Tuominen, R. K. (2009) Neurotrophic factor MANF is neurorestorative in rat model of Parkinson's disease **. J. Neurosci.,** 29(30):9651-9659.* Corresponding author.

24. Lonka-Nevalaita L, Lume M, Leppänen S, Jokitalo E, Peränen J and Saarma M. (2010) Characterization of the intracellular localization, processing and secretion of two GDNF splice isoforms. **J. Neurosci.** , 30(34):11403-11413.

25. Bespalov MM, Sidorova Y A, Tumova S, Ahonen-Bishopp A, Magalhães AC, Kulesskiy E, Paveliev M, Rivera C, Rauvala H, and Saarma M. . (2011) Heparan sulfate proteoglycan syndecan-3 is a novel receptor for GDNF, neurturin and artemin **J. Cell Biol.,** 192(1), 153-169.