

Extracellular vesicles: current state of the art



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Extracellular vesicles (exosomes, microvesicles/microparticles and apoptotic vesicles) are membrane bound structures secreted by cells actively, in an evolutionarily conserved fashion. Extracellular vesicles are currently in the focus of intense investigation as complex signalosomes implicated both in the initiation and the progression of a wide variety of diseases. Extracellular vesicles carry lipids, proteins, carbohydrates and even nucleic acids. The presence of extracellular vesicles in the systemic circulation provides novel opportunities to diagnose different diseases from peripheral blood samples. Extracellular vesicles are also potential therapeutic vehicles and therapeutic targets and they may facilitate the development of future efficient gene therapies.

Curriculum Vitae

Prof. Buzás Edit MD, PhD, DSc

Present workplace:

Semmelweis University, Department of Genetics, Cell- and Immunobiology,
1089, Budapest, Nagyvárad tér 4., Hungary

Present position: Professor and Chairman

Degrees:

- 2007. Doctor of Sciences (DSc): Studies of the role of immune processes in the pathomechanism of bone and joint diseases (Semmelweis University, Department of Genetics, Cell- and Immunobiology)
- 1996. Candidate of Sciences (PhD): Studies on the pathomechanism of proteoglycan (aggrecan)-induced murine arthritis (Debrecen Medical University, Department of Anatomy, Histology and Embryology)
- 1983. Medical Degree (MD), Medical University of Szeged, Faculty of General Medicine, "Summa cum laude"

Workplaces:

- 1998- Department of Genetics, Cell- and Immunobiology, Semmelweis University,
- 1997-98 visiting assistant professor, Rush University, Chicago, IL, USA
- 1987-89 visiting scientist: McGill University, Montreal, Canada

1983-1998: University of Medicine, Debrecen, Hungary, Department of Anatomy, Histology and Embryology, research associate and assistant professor

Member of the Executive Board of the International Society for Extracellular Vesicles, Head of the Work Group on the pathophysiological role of extracellular vesicles of the European Network on Microvesicles and Exosomes (ME HAD). Associate Editor of the Journal of Extracellular Vesicles.

RELEVANT PUBLICATIONS

1. Critical role of extracellular vesicles in modulating the cellular effects of cytokines. Szabó GT, Tarr B, Pálóczi K, Eder K, Lajkó E, Kittel A, Tóth S, György B, Pásztói M, Németh A, Osteikoetxea X, Pállinger E, Falus A, Szabó-Taylor K, Buzás EI. Cell Mol Life Sci. 2014 Oct;71(20):4055-67.

2. Emerging role of extracellular vesicles in inflammatory diseases. Buzas EI, György B, Nagy G, Falus A, Gay S. Nat Rev Rheumatol. 2014 Jun;10(6):356-64.

3. Cardioprotection by remote ischemic preconditioning of the rat heart is mediated by extracellular vesicles. Giricz Z, Varga ZV, Baranyai T, Sipos P, Pálóczi K, Kittel Á, Buzás EI, Ferdinandy P. J Mol Cell Cardiol. 2014 Mar;68:75-8.

4. Improved circulating microparticle analysis in acid-citrate dextrose (ACD) anticoagulant tube. György B, Pálóczi K, Kovács A, Barabás E, Bekő G, Várnai K, Pállinger É, Szabó-Taylor K, Szabó TG, Kiss AA, Falus A, Buzás EI. Thromb Res. 2014 Feb;133(2):285-92.

5. Microencapsulation technology by nature: Cell derived extracellular vesicles with therapeutic potential. Kittel A, Falus A, Buzás E.

6. Eur J Microbiol Immunol (Bp). 2013 Jun;3(2):91-6. doi: 10.1556/EuJMI.3.2013.2.1. Epub 2013 Jun 5. Erratum in: Eur J Microbiol Immunol (Bp). 2014 Mar;4(1):88.

7. Distinct RNA profiles in subpopulations of extracellular vesicles: apoptotic bodies, microvesicles and exosomes. Crescitelli R, Lässer C, Szabó TG, Kittel A, Eldh M, Dianzani I, Buzás EI, Lötvall J. *J Extracell Vesicles*. 2013 Sep 12;2.
8. Standardization of sample collection, isolation and analysis methods in extracellular vesicle research. Witwer KW, Buzás EI, Bemis LT, Bora A, Lässer C, Lötvall J, Nolte-'t Hoen EN, Piper MG, Sivaraman S, Skog J, Théry C, Wauben MH, Hochberg F. *J Extracell Vesicles*. 2013 May 27;2.
9. Vesiclepedia: a compendium for extracellular vesicles with continuous community annotation. Kalra H, Simpson RJ, Ji H, Aikawa E, Altevogt P, Askenase P, Bond VC, Borràs FE, Breakefield X, Budnik V, Buzas E, Camussi G, Clayton A, Cocucci E, Falcon-Perez JM, Gabrielsson S, Gho YS, Gupta D, Harsha HC, Hendrix A, Hill AF, Inal JM, Jenster G, Krämer-Albers EM, Lim SK, Llorente A, Lötvall J, Marcilla A, Mincheva-Nilsson L, Nazarenko I, Nieuwland R, Nolte-'t Hoen EN, Pandey A, Patel T, Piper MG, Pluchino S, Prasad TS, Rajendran L, Raposo G, Record M, Reid GE, Sánchez-Madrid F, Schiffelers RM, Siljander P, Stensballe A, Stoorvogel W, Taylor D, Thery C, Valadi H, van Balkom BW, Vázquez J, Vidal M, Wauben MH, Yáñez-Mó M, Zoeller M, Mathivanan S. *PLoS Biol*. 2012;10(12):e1001450.
10. Improved flow cytometric assessment reveals distinct microvesicle (cell-derived microparticle) signatures in joint diseases. György B, Szabó TG, Turiák L, Wright M, Herczeg P, Lédeczi Z, Kittel A, Polgár A, Tóth K, Dérfalvi B, Zelenák G, Böröcz I, Carr B, Nagy G, Vékey K, Gay S, Falus A, Buzás EI. *PLoS One*. 2012;7(11):e49726. doi: 10.1371/journal.pone.0049726. Epub 2012 Nov 20.
11. Antibacterial effect of microvesicles released from human neutrophilic granulocytes. Timár CI, Lorincz AM, Csépanyi-Kömi R, Vályi-Nagy A, Nagy G, Buzás EI, Iványi Z, Kittel A, Powell DW, McLeish KR, Ligeti E. *Blood*. 2013 Jan 17;121(3):510-8
12. The recently identified hexosaminidase D enzyme substantially contributes to the elevated hexosaminidase activity in rheumatoid arthritis. Pásztói M, Sódar B, Misják P, Pálóczi K, Kittel Á, Tóth K, Wellinger K, Géher P, Nagy G, Lakatos T, Falus A, Buzás EI. *Immunol Lett*. 2013 Jan;149(1-2):71-6.
13. Proteomic characterization of thymocyte-derived microvesicles and apoptotic bodies in BALB/c mice. Turiák L, Misják P, Szabó TG, Aradi B, Pálóczi K, Ozohanics O, Drahos L, Kittel A, Falus A, Buzás EI, Vékey K. *J Proteomics*. 2011 Sep 6;74(10):2025-33.
14. Membrane vesicles, current state-of-the-art: emerging role of extracellular vesicles.
15. György B, Szabó TG, Pásztói M, Pál Z, Misják P, Aradi B, László V, Pállinger E, Pap E, Kittel A, Nagy G, Falus A, Buzás EI. *Cell Mol Life Sci*. 2011 Aug;68(16):2667-88
16. Detection and isolation of cell-derived microparticles are compromised by protein complexes resulting from shared biophysical parameters. György B, Módos K, Pállinger E, Pálóczi K, Pásztói M, Misják P, Deli MA, Sipos A, Szalai A, Voszka I, Polgár A, Tóth K, Csete M, Nagy G, Gay S, Falus A, Kittel A, Buzás EI. *Blood*. 2011 Jan 27;117(4):e39-48.
17. T lymphocytes are targets for platelet- and trophoblast-derived microvesicles during pregnancy. Pap E, Pállinger E, Falus A, Kiss AA, Kittel A, Kovács P, Buzás EI. *Placenta*. 2008 Sep;29(9):826-32.