



ZSOLT TÖRÖK, PHD

senior research associate

Tel: +36/62 432-038

Mobile: +36/30 574-9295

E-mail: tzsolt@brc.hu



Laboratory of Molecular
Stress Biology

PUBLICATION SUMMARY

LIST OF PUBLICATIONS

PERSONAL DATA

Born 1965

QUALIFICATIONS

M.Sc. 1989, physics, University of Szeged, Hungary

Ph.D. 1992, membrane biophysics, Biological Research Center, Hungarian Academy of Sciences, Institute of Biochemistry, Szeged, Hungary

PROFESSIONAL EXPERIENCE

- 2021- Group leader, Institute of Biochemistry, Biological Research Centre, Hungarian Academy of Sciences, Szeged, Hungary
"Laboratory Molecular stress biology"
- 2010- Board member, Pharmapolis Innovative Pharmaceutical Cluster, Hungary
- 2007- CEO, LipidArt Ltd., Hungary
"Develop medicines for diseases with unbalanced stress response"
- 1998- Senior scientist, Institute of Biochemistry, Biological Research Centre, Hungarian Academy of Sciences, Szeged, Hungary
"Laboratory of Biomembranes and Molecular stress biology"
- 2019-2020 Director General, Hungarian Centre of Excellence for Molecular Medicine, Szeged, Hungary
- 2002-2004 Visiting Scholar, Center for Biostabilization, University of California, Section of Molecular and Cellular Biology, University of California, Davis, USA
"DARPA project: Biostabilization of red blood cells"
- 1994-1998 Post doc, Institute of Biochemistry, Biological Research Centre, Hungarian Academy of Sciences, Szeged, Hungary
"Heat Shock Protein- membrane interactions"
- 1992-1994 Post doc. long term EMBO fellowship, Centre for Biomembranes and Lipid Enzymology, Department of Biochemistry of Membranes, Utrecht University, Utrecht, The Netherlands
"Role of membrane contact sites in mitochondrial protein import"

RESEARCH INTERESTS

- understanding the role of biological membranes in sensing environmental stress (including pathophysiological conditions)
- using ultrasensitive fluorescence microscopy to study plasma membrane nanostructures
- role of stress proteins in membrane stabilization
- mild stress-induced intracellular thermogenesis: beyond homeoviscous adaptation of biomembranes
- developing membrane lipid therapy for conditions in which stress response is deregulated (cancer, neurodegenerative and metabolic diseases, aging)

HONORS

1992-1994	EMBO long term fellowship
1997	Hans Selye Award
1998	Academy Award for Young Scientist
1998-2001	Bolyai János fellowship
2005-2008	Bolyai János fellowship

RESEARCH SUPPORT

2019-2023	OTKA-FWF joint grant ANN 132280 Biophysical aspects of mild heat stress in T-cell signaling (PI)
2018-2021	"A Clinical Phase IIB trial with 2OHOA in patients with newly-diagnosed malignant glioma" (CLINGLIO) (H2020 project consortium member)
2018-2020	GINOP-2.1.7-15-2016-02085 Development of drug prototype for the treatment of demencia (PI)
2014-2018	OTKA-FWF joint grant ANN 112372, Role of plasma membrane nanostructures during heat sensing (PI)
2012-2014	GOP-1.1.1-11-2012-0147 Development of drug candidates to prevent or treat cancer and neurodegenerative diseases based on stress protein modulation (PI)
2011-2014	GOP-1.1.1-11-2011-026 Development of screening for tumor therapy based on complex lipidomic, genomic and proteomic analysis (PI)
2012-2014	GOP-1.1.1-11-2012-0452 Early diagnostics of metabolic diseases by ultrasensitive high resolution mass spectrometry (PI)
2010-2013	OTKA K 82097, Individual stress response in heterogeneous cell population (PI)

MEMBERSHIPS

Member of the Hungarian Biochemical Society

Member of the Hungarian Biophysical Society

SELECTED PEER-REVIEWED PUBLICATIONS

- Török, Z., Demel, R.A., Leenhouts, J.M., & de Kruijff, B. (1994) Presequence-mediated intermembrane contact formation and lipid flow. A model membrane study. *Biochemistry* **33**, 5589-5594.
- Török, Z., Vígh, L. & Goloubinoff, P. (1996) Fluorescence detection of symmetric GroEL₁₄(GroES₇)₂ heterooligomers involved in protein release during the chaperonin cycle. *J. Biol. Chem.* **271**, 16180-16186.
- Török, Z., Horváth, I., Goloubinoff, P., Kovács, E., Glatz, A., Balogh, G. & Vígh, L. (1997) Evidence for a lipochaperonin: Association of active protein-folding GroESL oligomers with lipids can stabilize membranes under heat shock conditions. *Proc. Natl. Acad. Sci. USA* **94**, 2192-2197.
- Vígh, L. Literáti, P.N., Horváth, I., Török, Z., Balogh, G., Glatz, A., Kovács, E., Boros, I., Ferdinándy, P., Farkas, B., Jaszlits, L., Jednákovics, A., Korányi, L. & Maresca, B. (1997) Bimocloamol: A nontoxic, hydroxylamine derivative with stress protein-inducing activity and cytoprotective effects. *Nature Medicine*, **3**, 1150-1154.
- Horváth, I., Glatz, A., Varvasovszki, V., Török, Z., Páli, T., Balogh, G., Kovács, E., Nádasdi, L., Benkő, S., Joó, F. & Vígh, L. (1998) Membrane physical state controls the signaling mechanism of the heat shock response in *Synechocystis* PCC 6803: Identification of *hsp17* as a "fluidity gene". *Proc. Natl. Acad. Sci. USA*, **95**, 3513-3518.
- Török Z., Goloubinoff, P., Horváth, I., Tsvetkova, N., Glatz, A., Balogh, G., Varvasovszki, V., Los, D.A., Vierling, E., Crowe, J., Vígh, L. (2001) *Synechocystis* HSP17 is an amphitropic protein that stabilizes heat-stressed membranes and binds denatured proteins for subsequent chaperone-mediated refolding. *Proc. Natl. Acad. Sci. USA*, **98**, 3098-3103.

- Tsvetkova, N.M., Horváth, I., Török, Z., Wolkers, W.F., Balogi, Z., Shigapova, N., Crowe, L.M., Tablin, F., Vierling, E., Crowe, J.H. & Vígh, L. (2002) Small heat-shock proteins regulate membrane lipid polymorphism. *Proc. Natl. Acad. Sci. USA* 99, 13504-13509
- Török, Z., Tsvetkova, N.M., Balogh, G., Horváth, I., Nagy, E., Péntzes, Z., Hargitai, J., Bensaude, O., Csermely, P., Crowe, J.H., Maresca, B. & Vígh, L. (2003) Heat shock protein coinducers with no effect on protein denaturation specifically modulate the membrane lipid phase. *Proc. Natl. Acad. Sci. USA* 100, 3131-3136.
- Nagy E, Balogi Z, Gombos I, Akerfelt M, Bjorkbom A, Balogh G, Torok Z, Maslyanko A, Fiszer-Kierzkowska A, Lisowska K, Slotte PJ, Sistonen L, Horvath I, Vigh L. (2007) Hyperfluidization-coupled membrane microdomain reorganization is linked to activation of the heat shock response in a murine melanoma cell line. *Proc. Natl. Acad. Sci. USA* **104**, 7945-7950
- Balogh G., Péter M., Liebisch G., Horváth I., Török Zs., Nagy E., Maslyanko A., Benkő S., Schmitz G., Harwood J.L., Vigh L. (2010) Lipidomics reveals membrane lipid remodelling and release of potential lipid mediators during early stress responses in a murine melanoma cell line. *Biochim. Biophys. Acta – Mol. Cell Biol. Lipids* 1801, 1036-1047.
- Gombos, I., Crul, T., Piotto, S., Güngör, B., Török, Z., Balogh, G., Péter, M., Slotte, J.P., Campana, F., Pilbat, A-M., Hunya, Á., Tóth, N., Literáti-Nagy, Z., Vigh Jr, L., Glatz, A., Brameshuber, M., Schütz, G.J., Hevener, A., Febbraio, M.A., Horváth, I., Vígh, L. (2011) Membrane-lipid therapy in operation: the HSP co-inducer BGP-15 activates stress signal transduction pathways by remodeling plasma membrane rafts. *PLoS ONE* 6, e28818. doi:10.1371/journal.pone.0028818
- Török, Z., Pilbat A-M., Gombos I., Hocsak, E., Sümegi, B., Horváth, I. & Vígh, L. (2012) Evidence on cholesterol-controlled lipid raft interaction of the small heat shock protein Hspb11. In: *Cellular trafficking of cell stress proteins in health and disease* Eds: Henderson, B. & Pockley, A.G. ISBN: 978-94-007-4739-5.
- Török, Z., Crul, T., Maresca, B., Schütz, G.J., Viana, F., Dindia, L., Piotto, S., Brameshuber, M., Balogh, G., Péter, M., Porta, A., Trapani, A., Gombos, I., Glatz, A., Gungor, B., Peksél, B., Vigh, L. Jr., Csoboz, B., Horváth, I., Vijayan, M.M., Hooper, P.L., Harwood, J.L., Vigh, L. (2014) Plasma membranes as heat stress sensors: From lipid-controlled molecular switches to therapeutic applications. *BBA* 1838, 1594-1618
- Glatz, A., Pilbat, A-M., Németh, G.L., Vince-Kontár, K., Jósavay, K., Hunya, A., Udvardy, A., Gombos, I., Péter, M., Balogh, G., Horváth, I., Vígh, L., Török, Z. (2015) Involvement of small heat shock proteins, trehalose, and lipids in the thermal stress management in *Schizosaccharomyces pombe*. *Cell Stress Chaperones* **21**, 327-338.
- Kasza, Á., Hunya, Á., Frank, Z., Fülöp, F., Török, Z., Balogh, G., Sántha, M., Bálint, Á., Bernáth, S., Blundell, K.L., Prodromou, C., Horváth, I., Zeiler, H-J., Hooper, P.L., Vigh, L., Penke, B. (2016) Dihydropyridine Derivatives Modulate Heat Shock Responses and have a Neuroprotective Effect in a Transgenic Mouse Model of Alzheimer's Disease. *J. Alzheimers Dis.* 53, 557-571
- Hooper, P.L., Durham, H.D., Török, Z., Hooper, P.L., Crul, T., Vígh, L. (2016) The central role of heat shock factor 1 in synaptic fidelity and memory consolidation. *Cell Stress Chaperones* **21**, 745-753
- Peksél, B., Gombos, I., Péter, M., Vigh, L. Jr., Tiszlavicz, Á., Brameshuber, M., Balogh, G., Schütz, G.J., Horváth, I., Vígh, L., Török, Z. (2017) Mild heat induces a distinct "eustress" response in Chinese Hamster Ovary cells but does not induce heat shock protein synthesis". *Scientific Reports* 7: 15643
- Tiszlavicz, Á., Gombos, I., Péter, M., Hegedűs, Z., Hunya, Á., Dukic, B., Nagy, I., Peksél, B., Balogh, G., Horváth, I., Vígh, L., Török, Z. (2022) Distinct cellular tools of mild hyperthermia-induced acquired stress tolerance in chinese hamster ovary cells. *Biomedicines* **10**, 71172.

Patents

- Literáti, N.P., Vígh, L., Szilbereky, J., Ürögdi, L., Jednákovits, A., Jaszlits, L., Bíró, K., Márványos, E., Barabás, M., Hegedűs, E., Korányi, L., Kürthy, M., Balogh, G., Horváth, I., Török, Z., Udvardy, É., Dormán, Gy., Medzihradszky, D., Mézes, B., Kovács, E., Duda, E., Farkas, B., Glatz, A.: Eljárás sejtek molekuláris chaperon-termelésének fokozására, a chaperon termelést fokozó hidroxilamin-származékok és azok előállítására. 61.312/SZE
- Fulop F, Vigh, L., Torok Z., Penke, B., Horvath, I., Balogh, G., Bernath, S., Hunya, Á. (2013) 1,4 dihydropyridine derivatives with HSP modulating activity. *PCT. Int. Appl.*, WO2013076516A2013076511.