

## CURRICULUM VITAE

IGOR O. SHMARAKOV, Ph.D., Sc.D.

### PERSONAL DATA

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#### Address:

Department of Animal Sciences  
Rutgers, The State University of New Jersey  
School of Environmental & Biological Sciences  
Foran Hall 326  
59 Dudley Road  
New Brunswick, NJ 08901  
tel.:+1 (848) 932-5617  
e-mail: ishmarakov@sebs.rutgers.edu

#### Education:

- B. S.  
(Biology)** June 2001, Yuriy Fed'kovich Chernivtsi National University, Chernivtsi, Ukraine.
- M. S.  
(Biology)** June 2002, Yuriy Fed'kovich Chernivtsi National University, Chernivtsi, Ukraine.  
Thesis: The intensity of Ca<sup>2+</sup>/Mg<sup>2+</sup>-dependent DNA endonucleolysis in the liver and Guerin's carcinoma nuclei of rats with a tumor.
- Ph. D.  
(Biochemistry)** October 2005, Yuriy Fed'kovich Chernivtsi National University, Chernivtsi, Ukraine.  
Dissertation: Nuclear DNA synthesis and degradation processes during oncogenesis in the preliminary irradiated animals.
- Sc. D.  
(Biochemistry)** June 2014, Taras Shevchenko Kyiv National University, Kyiv, Ukraine.  
Dissertation: Biochemical aspects of retinoid-dependent metabolic and signaling pathways.

#### Postdoctoral research training:

- 2008-2009 – Department of Medicine, College of Physicians and Surgeons, Columbia University, New York, USA.
- 2006 – Institute of Experimental and Theoretical Biophysics of the Russian Academy of Sciences, Laboratory of Tissue Engineering, Puschino, Moscow Region, Russia.
- 2005 – Department of Biochemistry, Taras Shevchenko Kyiv National University, Kyiv, Ukraine.

### PROFESSIONAL APPOINTMENTS

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- 2022-present – Assistant Professor, Department of Animal Sciences, Rutgers, The State University of New Jersey.
- 2016-2022 – Associate Research Scientist, Department of Medicine, Columbia University.
- 2009-2016 – Docent (equivalent to Associate Professor, with tenure), Department of Biochemistry and Biotechnology, Yuriy Fed'kovich Chernivtsi National University, Ukraine.
- 2008-2009 – Fulbright Visiting Researcher, Department of Medicine, Columbia University.
- 2007-2009 – Docent (equivalent to Associate Professor, non-tenured), Department of Biochemistry, Yuriy Fed'kovich Chernivtsi National University, Ukraine.

2002-2007 – Assistant (equivalent to Assistant Professor), Department of Biochemistry, Yuriy Fed'kovich Chernivtsi National University, Ukraine.

## **ADMINISTRATIVE POSITIONS**

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2014-2016 – Deputy Director of Education at the Institute of Biology, Chemistry and Natural Resources of Yuriy Fed'kovich Chernivtsi National University, Ukraine.

2015-2016 – Head of the organizing committee of the Ukrainian National Contest of Students' Scientific Work in Biology held by the Ministry of Education of Ukraine.

2010-2014 – Dean's Assistant on students' scientific work and international cooperation at the Biological Faculty / Institute of Biology, Chemistry and Natural Resources of Yuriy Fed'kovich Chernivtsi National University, Ukraine.

## **MEMBERSHIPS IN PROFESSIONAL SOCIETIES**

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American Society for Biochemistry and Molecular Biology.

Ukrainian Biochemical Society (a member of the Federation of European Biochemical Societies).

## **HONORS/AWARDS**

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2019 – Journal of Lipid Research Early-Career Researcher Award (<https://www.asbmb.org/asbmb-today/people/030119/shmarakov-jlr-early-career-researcher>).

2018 – Travel award for the FASEB 4<sup>th</sup> International Conference on Retinoids.

2014 – Regional Government Award for Distinguished University Teaching and Achievements.

2014 – Research Grant Award from the President of Ukraine for young scientists.

2013 – Scholarship Award from the Cabinet of Ministers (Government) of Ukraine.

2011 – Best oral presentation award at the conference for young scientists «Molecular Biology: Advances and Perspectives» at the Institute of Molecular Biology and Genetics of the National Academy of Sciences of Ukraine.

2009 – Research Grant Award from the President of Ukraine for young scientists.

2008 – Fulbright Faculty Development Program Award, US Department of State.

2006 – First Prize for the best poster presentation at School-conference for Young Scientists in Puschino, Moscow Region, Russia.

2006 – FEBS scholarship for attending 31<sup>st</sup> FEBS Congress in Istanbul, Turkey.

2000 – Scholarship from the President of Ukraine.

## **PROFESSIONAL SERVICE**

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### **Journal Reviews:**

Invited reviewer for: BBA - Molecular and Cell Biology of Lipids, PLOS One, Environmental Health Perspectives, Reproductive Toxicology, Environmental Pollution, Clinical and Translational Medicine, Nutrition, Nutrients, Antioxidants, Biomedicines, Prostaglandins and Other Lipid Mediators, Cells, Molecules, European Journal of Lipid Science and Technology, Oncotarget, Cellular Physiology and Biochemistry, Ukrainian Biochemical Journal.

### **Grant Reviews:**

2021 – Grant Proposal Reviewer, National Science Centre Poland.

2016-present, Young Scientists Grant Review Panel Member, Ministry of Education and Science of Ukraine.

2014-present, Review Panel Member, Ukrainian State Institute of Scientific Technical and Innovative Expertise;

2010-present, Review Panel Member, Ukrainian Fulbright Program;

## **TEACHING ACTIVITIES (at Chernivtsi National University, Ukraine)**

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### **Course Director:**

- Biochemistry (Bachelor's level course, 3<sup>rd</sup> year of university education).  
16 lecture hours, 60 students.  
Fall 2014-2015
- Bioorganic Chemistry (Bachelor's level course, 2<sup>nd</sup> year of university education).  
32 lecture hours, 35-45 students  
Fall/Spring 2006-2016
- Biotechnologies of Vitamin Production (Bachelor's level course, 4<sup>th</sup> year of university education).  
12 contact hours (lectures and seminars), 12 students.  
Spring 2012-2016
- Nutritional Biochemistry (Master's level course, 5<sup>th</sup> year of university education).  
10 lecture hours, 10-12 students.  
Fall 2010-2015
- Biochemistry of Vitamins (Master's level course, 5<sup>th</sup> year of university education).  
12 lecture hours, 10-12 students.  
Spring 2012-2016

### **Teaching Assistant**

- Biochemistry Laboratory Course (Bachelor's level course, 2<sup>nd</sup> year of university education).  
52 contact hours, 50 students.  
2002-2008
- Molecular Biology Laboratory Course (Bachelor's level course, 3<sup>rd</sup> year of university education)  
34 contact hours, 50 students  
Fall 2002-2005.
- Biochemistry Laboratory Course (specific practical skills, Bachelor's level course, 3<sup>rd</sup> and 4<sup>th</sup> year of university education).  
70 contact hours, 20 students.  
2005-2012
- Biochemical Methods in Research (Bachelor's level course, 4<sup>th</sup> year of university education).  
24 contact (as laboratory classes) hours, 20 students.  
2003-2004

### **Supervisor**

- Master's level thesis (graduate qualification work) – 3 students each year (2007-2016).  
Research theses of supervised students were among the winners of the Ukrainian National Contest of Students' Scientific Work held by the Ministry of Education: 1<sup>st</sup> place (2008, 2013), 2<sup>nd</sup> place (2014), 3<sup>rd</sup> place (2010).
- Bachelor's level thesis research (graduate qualification work) – 3-5 students each year (2005-2016).

### **Educational cooperation with middle and high schools**

- 2013-2016 – Head of organizing and evaluating committee of Chernivtsi Region National Olympiad in Biology among school students.

## **EDUCATIONAL PUBLICATIONS**

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- Marchenko M. M., Shmarakov I. O. Bioorganic Chemistry: Textbook. – Chernivtsi: Ruta, 2006. – 244 pages. (recommended by the Ministry of Education of Ukraine for use in teaching bioorganic chemistry to university students).
- Marchenko M. M., Shmarakov I. O. Bioorganic Chemistry: workshop textbook. – Chernivtsi: Ruta, 2010. – 102 pages.
- Laboratory workshop on Biochemistry: textbook / I. O. Shmarakov, O. M Voloshchuk - Chernivtsi: Chernivtsi University Press, 2014. - 80 pages.

## **CURRENT AND COMPLETED RESEARCH SUPPORT**

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### **Pending research grant applications:**

NIH/NHLBI R01 (I. O. Shmarakov, PI)

Title: Local intracellular retinoid stores in health and disease

The goal of the project is to provide new mechanistic understanding that may be useful for the development of cell-specific molecular manipulations targeting vitamin A signaling in alveolar cells aimed at reducing the severity of lung injury and enhancing lung repair during acute respiratory distress syndrome (ARDS).

Role: Principal Investigator

NIH/NIEHS R21 (I. O. Shmarakov, PI)

Title: Disruption of adipose RAR signaling in PCB-induced metabolic disease

The goal of the project is to elucidate poorly understood mechanisms of metabolic disruption in adipose tissue associated with PCB exposure that involve adipocyte RAR-driven retinoid signaling. The studies will explore the effect of environmentally relevant PCB exposure on transcriptional and metabolic parameters using genetically or pharmacologically compromised RAR-driven signaling in adipocytes and adipose tissue.

Role: Principal Investigator

NIH/NIEHS R21 (I. O. Shmarakov, PI)

Title: Adipocyte CAR-mediated signaling in energy metabolism

The goal of the project is to explore the physiological role of adipocyte-specific effects of CAR-mediated signaling and its role in regulating whole-body energy metabolism.

Role: Principal Investigator

USDA/NIFA/AFRI (I. O. Shmarakov, PI)

Title: Intestinal NRF2 signaling in retinol absorption and gut health

The overall goal of the project is to gain a molecular understanding of how the dietary consumption of the compounds that can interfere with nuclear factor erythroid-2 related factor 2 (NRF2) signaling affects nutrient absorption and gut health. We propose to undertake a systematic study aimed at understanding the physiological importance that dietary compromised NRF2-driven signaling has in vitamin A absorption and the extent to which this affects gut integrity, barrier function, inflammation, and the gut microbiome.

Role: Principal Investigator

### **Past research:**

NIH/NIDDK R01 DK068437 (W. S. Blaner, PI)

Title: Postprandial Vitamin A

The goal of the project is to identify the mechanistic basis for why retinol-binding protein 4 (RBP4) synthesized in adipocytes gives rise to impaired glucose clearance from the circulation and the development of the fatty liver. These investigations involve the use of novel transgenic mice that express RBP4 specifically in adipocytes.

Role: Co-Investigator

Pilot Project Award from NIEHS Center for Environmental Health in Northern Manhattan (5P30 ES009089 07/01/2017 – 03/30/2019)

Title: Xenobiotic-Nutrient Interactions for Prevention against Environmental Chemical Toxicity and Associated Diseases

The goal of the project is to explore the molecular interactions between polychlorinated biphenyls (PCBs) and retinoids that affect PCB biotransformation and toxicity.

Role: Principal Investigator

Grant from the President of Ukraine for young scientists funded by the Ukrainian Fundamental Research State Fund (01/01/2014 – 12/31/2014)

Title: Biochemical aspects of retinoid-dependent metabolic and signaling pathways.

Role: Principal Investigator.

Grant from the President of Ukraine for young scientists funded by the Ukrainian Fundamental Research State Fund (01/01/2010 – 12/31/2010)

Title: Biochemical rationale for the metabolic strategy of tumor growth correction with nanobiotechnology compounds in vitro / in vivo.

Role: Principal Investigator.

## **BIBLIOGRAPHY (ORCID: <http://orcid.org/0000-0002-4073-9585>; H-index: 11)**

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### **Book chapters:**

1. **Shmarakov I. O.**, Yuen J. J., Blaner W. S. Carotenoid Metabolism and Enzymology, in: Carotenoids and Human Health Ed. by S. A. Tanumihardjo. – Springer Science + Business Media New York, 2012.

### **Review Articles:**

1. Blaner W.S., **Shmarakov I.O.**, Traber M. G. Vitamin A and Vitamin E, Will the Real Antioxidant Please Stand Up? Annual Review of Nutrition. – 2021 – 41:1.
2. \***Shmarakov I. O.** Retinoid-Xenobiotic interactions: the Ying and the Yang. Hepatobiliary Surgery and Nutrition - Special Issue on Retinoid Biology Edited by William S. Blaner and Nuttaporn Wongsiriroj. – 2015 – Vol. 4(4). – P. 243-267. (\*Corresponding author, PMID: 26311625).

### **Peer-reviewed journal articles:**

1. Gusarova G.A., Das S.R., Islam M.N., Westphalen K., Jin G., **Shmarakov I.O.**, Li L., Bhattacharya S., Bhattacharya J. Actin fence therapy with exogenous V12Rac1 protects against acute lung injury. JCI Insight. 2021 Mar 22;6(6):135753. doi: 10.1172/jci.insight.135753. (PMID: 33749665).
2. Cai B., Dongiovanni P., Corey K.E., Wang X., **Shmarakov I.O.**, Zheng Z., Kasikara C., Davra V., Meroni M., Chung R.T., Rothlin C.V., Schwabe R.F., Blaner W.S., Birge R.B., Valenti L., and Tabas I. Macrophage MerTK Promotes Liver Fibrosis in Nonalcoholic Steatohepatitis. Cell Metab, 2020 Feb 4;31(2):406-421.e7. (PMID: 31839486).
3. Lee S.-A., Yang K. J. Z., Brun P.-J., Silvaroli J. A., Yuen J. J., **Shmarakov I.**, Jiang H., Feranil J. B., Li X., Lackey A. I., Krężel W., Leibel R. L., Libien J., Storch J., Golczak M., and Blaner W. S. Retinol-Binding Protein 2 (RBP2) Binds Monoacylglycerols and Modulates Gut Endocrine Signaling and Body Weight. Science Advances, 2020 Mar 11;6(11):eaay8937. (PMID: 32195347).
4. \***Shmarakov, I.O.**, Lee Y.J., Jiang H., Blaner W.S. Constitutive androstane receptor mediates PCB-induced disruption of retinoid homeostasis. Toxicol. Appl. Pharmacol., 2019 Oct 15;381:114731. (\*Corresponding author, PMID: 31449830).
5. \***Shmarakov, I.O.**, Jiang H., Liu J., Fernandez E.J., and Blaner W.S., Hepatic stellate cell activation: A source for bioactive lipids. Biochim. Biophys. Acta (BBA) – Mol. Cell Biol. Lipids, 2019. 1864(5): 629-642. (\*Corresponding author, PMID: 30735856).
6. Belyaeva, O.V., L. Wu, **I. Shmarakov**, P.S. Nelson, and N.Y. Kedishvili, Retinol dehydrogenase 11 is essential for the maintenance of retinol homeostasis in liver and testis in mice. J Biol Chem, 2018. 293(18): p. 6996-7007. (PMID: 29567832).
7. Marchyshak, T., T. Yakovenko, **I. Shmarakov**, and Z. Tkachuk, The Potential Protective Effect of Oligoribonucleotides-d-Mannitol Complexes against Thioacetamide-Induced Hepatotoxicity in Mice. Pharmaceuticals (Basel), 2018. 11(3). (PMID: 30082619).
8. Ketsa, O.V., M.M. Marchenko, and **I.A. Shmarakov**, Role of mitochondrial NO-synthase in the implementation of antitumor effects of polyunsaturated fatty acids in the model of Guerin's carcinoma under in vivo conditions. Voprosy Onkologii, 2018. 64(1): p. 138-143.

9. **\*Shmarakov, I.O.**, V.L. Borschovetska, and W.S. Blaner, Hepatic Detoxification of Bisphenol A is Retinoid-Dependent. *Toxicol. Sci.*, 2017. 157(1): p. 141-155. (\*Corresponding author, PMID: 28123100).
10. **\*Shmarakov, I.**, I. Mukha, N. Vityuk, V. Borschovetska, N. Zhyshchynska, G. Grodzyuk, and A. Eremenko, Antitumor Activity of Alloy and Core-Shell-Type Bimetallic AgAu Nanoparticles. *Nanoscale Res Lett*, 2017. 12(1): p. 333. (\*Corresponding author, PMID: 28476089).
11. **\*Shmarakov, I.O.**, V.L. Borschovetska, L.P. Ivanishchuk, and M.M. Marchenko, Hepatotoxicity of bisphenol A under conditions of differential supplementation with retinoids. *Ukr Biochem J*, 2016. 88(3): p. 99-105. (\*Corresponding author, PMID: 29235335).
12. Marchenko, M.M., O.V. Ketsa, **I.O. Shmarakov**, and K.H. Abutnaritsa, Monooxygenase system in Guerin's carcinoma of rats under conditions of omega-3 polyunsaturated fatty acids administration. *Ukr Biochem J*, 2016. 88(4): p. 48-56. (PMID: 29235764).
13. **\*Shmarakov, I.O.**, T.V. Marchyshak, V.L. Borschovetska, M.M. Marchenko, and Z.Y. Tkachuk, Hepatoprotective Activity of Exogenous RNA. *Ukr Biochem J*, 2015. 87(4): p. 37-44. (\*Corresponding author, PMID: 26547962).
14. **\*Shmarakov, I.O.**, V.L. Borschovetska, M.M. Marchenko, and W.S. Blaner, Retinoids modulate thioacetamide-induced acute hepatotoxicity. *Toxicol. Sci.*, 2014. 139(2): p. 284-92. (\*Corresponding author PMID: 24614237).
15. **\*Shmarakov, I.O.**, I.P. Mukha, V.V. Karavan, O.Y. Chunikhin, M.M. Marchenko, N.P. Smirnova, and A.M. Eremenko, Tryptophan-Assisted Synthesis Reduces Bimetallic Gold/Silver Nanoparticle Cytotoxicity and Improves Biological Activity. *Nanobiomedicine (Rij)*, 2014. 1: p. 6. (\*Corresponding author, PMID: 30023017).
16. **Shmarakov, I.O.**, H. Jiang, K.J. Yang, I.J. Goldberg, and W.S. Blaner, Hepatic retinoid stores are required for normal liver regeneration. *J Lipid Res*, 2013. 54(4): p. 893-908. (PMID: 23349206).
17. **\*Shmarakov, I.A.** and N.V. Katan, The induction of Guerin's carcinoma cytochrome P450 hydroxylase activity by retinoids. *Biochemistry (Moscow) Supplement Series B: Biomedical Chemistry*, 2011. 5(4): p. 369-375. (\*Corresponding author, PMID: 23289295).
18. **Shmarakov, I.**, M.K. Fleshman, D.N. D'Ambrosio, R. Piantedosi, K.M. Riedl, S.J. Schwartz, R.W. Curley, Jr., J. von Lintig, L.P. Rubin, E.H. Harrison, and W.S. Blaner, Hepatic stellate cells are an important cellular site for beta-carotene conversion to retinoid. *Arch Biochem Biophys*, 2010. 504(1): p. 3-10. (PMID: 20470748).

### Complete List of Published Work in My Bibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/1Tw5ZsrFuUwQG/bibliography/public/>

### CONFERENCE PRESENTATIONS

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1. Retinoid Metabolism in the Lung: a Cellular Dissection, FASEB 6<sup>th</sup> International Conference on Retinoids, Athens, USA, 2022.
2. Constitutive androstane receptor mediates PCB-induced disruption of retinoid homeostasis, Cellular and Molecular Mechanisms of Toxicity, Gordon Research Conference, Andover, USA, 2019.
3. Retinol-Binding Protein 4 (RBP4) in Adipocytes and Obesity, Experimental Biology Annual Meeting, Orlando, USA, 2019.
4. Retinol-Binding Protein 4 (RBP4) in Adipocytes and Obesity, FASEB 4<sup>th</sup> International Conference on Retinoids, Steamboat Springs, USA, 2018.
5. Hepatic stellate cell activation: A source for bioactive lipids, International Retinoids Meeting Gifu, Japan, 2015.
6. Biochemical aspects of retinoid-dependent metabolic and signaling pathways, X Ukrainian Biochemical Congress, Kyiv, Ukraine, 2014.
7. Hepatic Retinoids Modulate Thioacetamide-induced Acute Hepatotoxicity, First International Retinoids Meeting, Cosenza, Italy, 2013.

8. Hepatic stellate cells are an important cellular site for  $\beta$ -carotene conversion to retinoid, 16th International Symposium on Carotenoids, Krakow, Poland, 2011.
9. Liver regeneration requires sufficient hepatic retinoid stores, 4th International conference for young scientists at the Institute of Molecular Biology and Genetics «Molecular Biology: Advances and Perspectives», Kyiv, 2011.