ŽIVOTOPIS

Ivana Munitić, dr. med., dr. sc.

Profesionalna adresa: Laboratorij za molekularnu imunologiju, Odjel za biotehnologiju, Radmile Matejčić 2, 51000 Rijeka, Hrvatska.

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Obrazovanje/Diplome/Ispiti:

2006.	Doktorat znanosti u području imunologije ("Determinants Relavant for Development and Activation of T Cells"), Université René Descartes Paris 5, Pariz, Francuska; diploma *summa cum laude*.
1998.	Državni ispit za doktore medicine, Zagreb.
1997.	Doktor medicine, Medicinski Fakultet Sveučilišta u Zagrebu (prosjek 4.88)

Zaposlenja:

2014-	Voditelj Laboratorija za molekularnu imunologiju, Odjel za biotehnologiju, Sveučilište u Rijeci.
2013-	Docent na Odjelu za biotehnologiju, Sveučilište u Rijeci.
2009-2012	Gostujući znanstvenik, Laboratory of Immune Cell Biology, National Cancer Institute, National Institutes of Health. Bethesda, SAD.
2005-2009	Gostujući znanstvenik, INSERM U591- Différenciation thymique et physiologie des lymphocytes T, Pariz, Francuska.
2000-2004	Gostujući znanstvenik, Laboratory of Immune Cell Biology, NCI, NIH, Bethesda, SAD.
1998-1999	Znanstveni novak, Zavod za Patofiziologiju, Medicinski Fakultet, Zagreb.
1997-1998	Obavezni liječnički staž, Bolnica Merkur, Zagreb.

Nagrade i stipendije:

2005-2007	Marie Curie Incoming Fellowship, EU.
2000-2004	Fogarty International Fellowship, SAD.
1995-1997	Rektorova nagrada Sveučilišta u Zagrebu.

Nastavna djelatnost:

2016-	Neuroimunologija, Odjel za biotehnologiju, Sveučilište u Rijeci (voditelj kolegija).
2015-	Imunologija, Odjel za biotehnologiju, Sveučilište u Rijeci (voditelj kolegija).
2014-	Metodologija znanstveno-istraživačkog rada (za doktorski studij), Odjel za biotehnologiju, Sveučilište u Rijeci (voditelj obaveznog kolegija i

Modula 3 doktorskog studija Medicinske kemije).

2014- Ljetna škola patofiziologije (engl. Capstone Course in Pathophysiology), Odjel za biotehnologiju, Sveučilište u Rijeci u suradnji s St. Cloud University, Minnesota (suradnik na kolegiju).

2013- Imunoterapija, Odjel za biotehnologiju, Sveučilište u Rijeci, (voditelj kolegija).

2013- Uvod u istraživački rad, Odjel za biotehnologiju, Sveučilište u Rijeci (voditelj kolegija).

1998-1999 Patofiziologija. Zavod za Patofiziologiju, Medicinski Fakultet, Zagreb (asistent).

1995- 1997 Demonstrator na Katedri za Patofiziologiju, Medicinski Fakultet, Sveučilište u Zagrebu.

1994- 1995 Demonstrator na Katedri za Kemiju i Biokemiju, Medicinski Fakultet, Sveučilište u Zagrebu.

Tečajevi:

2016 Trening za unaprjeđenje kompetencija nastavnika, Sveučilište u Rijeci.

2015 Advanced Operator Training for BD FACSAria III, Erembodegem, Belgium.

2008 In Vivo Non-Linear Microscopy, Institute Curie, Pariz, Francuska.

2004 Vaccines 2004. Foundation of Advanced Education in Science course, Bethesda, SAD.

2002 Molecular and Cellular Mechanisms of Immunity-II. Foundation of Advanced Education in Science course. Bethesda, SAD.

2000 Molecular and Cellular Mechanisms of Immunity. Foundation of Advanced Education in Science course. Bethesda, SAD.

1998 Molecular Medicine (Summer School). Dubrovnik.

Članstva:

2015 Hrvatsko Društvo za Neuroznanost (HDN)

2014 American Association of Immunologists (AAI)

2014 Hrvatsko Društvo za Biokemiju i Molekularnu Biologiju (HDBMB)

2013 European Federation of Immunological Societies (EFIS)

2013 Hrvatsko imunološko društvo (HID)

Projekti:

2014-2017 Uspostavni istraživački projekt Hrvatske zaklade za znanost (HRZZ). Projekt: Elucidating the Role of Optineurin in Neuroprotection.

2014-2018 Financiranje doktoranda putem projekta: Projekt razvoja karijera mladih istraživača - izobrazba novih doktora znanosti.

2014-2017 Potpora Sveučilišta u Rijeci za projekt: Elucidating the Role of Optineurin in Neuroinflammation and Cytoprotection.

2016 Erasmus+ exchange program s Laval University, Quebec City, Canada.

Aktivne kolaboracije:

1. Jonathan D. Ashwell (National Cancer Institute, NIH, Bethesda, SAD): uloga optineurina u autofagiji.
2. Jasna Križ (University Laval, Quebec, Kanada): aktivacija NF-κB kao molekularna osnova amiotrofične lateralne skleroze.
3. Emanuele Buratti (ICGEB, Trst, Italija): uloga optineurina u agregaciji i funkcionalnom ispadu TDP-43 proteina.
4. Christopher Miller (King's College London, London, UK): uloga optineurina u interakciji ER-a i mitohondrija.
5. ENCALS centar Zagreb (voditelj: prof. Ervina Bilić): povezivanje bazičnih znanstvenika i kliničara koji rade na ALS-u u svrhu genotipizacije bolesnika, analize upalnih parametara u krvi i likvoru te uvođenja panela kognitivnih testova.

Pozvana predavanja:

2018 Cijepljenje: znanstveni pristup, predavanje u sklopu Dana filozofskog fakulteta, Sveučilište u Rijeci.
2018 Razvoj novih životinjskih modela za istraživanje amiotrofične lateralne skleroze, godišnja skuština Hrvatskog društva za znanost o laboratorijskim životinjama (CroLASA), Zagreb, Hrvatska.
2017 Characterization of the role of optineurin in neurodegeneration, 13th Symposium of the André-Delambre Foundation, Montreal, Canada.
2017 Elucidating the role of optineurin in amyotrophic lateral sclerosis, Laval University, CERVO Brain, Research Centre Quebec City, Canada.
2017 Animal Models of Amyotrophic Lateral Sclerosis, Croatian National Academy of Sciences and Arts International symposium on Neurodegeneration, Rijeka,Croatia.
2017 Istraživanje uloge optineurina u neuroprotekciji, Predstavljanje uspješnih uspostavnih HRZZ projekata, Medicinski Fakultet, Sveučilište u Rijeci, Hrvatska.
2017 Molecular characterization of mouse optineurin insufficiency models, Regional meeting of clinicians and basic scientists that work on ALS, Ljubljana, Slovenia.
2016 Animal models for elucidating the role of adaptor protein optineurin during inflammation; simpozij Translation of Basic Immunology and Neuroscience Tools to Therapies: Where are We Now?; Croatian Academy for Sciences and Arts, Rijeka, and University of Rijeka, Croatia.
2016 Iskustva i izazovi istraživača u biomedicini, Filozofski fakultet, Sveučilište u Rijeci, Hrvatska.
2016 Immune system in the brain: more important than we thought, Open day of the Department of Biotechnology, University of Rijeka, Croatia.
2014 A Mouse Model of Optineurin Insufficiency, 10th Symposium of the André-Delambre Foundation, Amyotrophic Lateral Sclerosis: Causes and Therapeutic Perspectives, Montreal, Canada.
2014 Nove funkcije dendritičkih stanica, Tribina Hrvatske akademije znanosti i umjetnosti, "Novija postignuća u imunologiji i hematologiji", Rijeka, Hrvatska.

Organizacija simpozija i okruglih stolova:

2018 2nd Meeting Of Basic Researchers And Clinicians Working On ALS (SLO/HR), Department of Biotechnology, University of Rijeka
2016 International Symposium: Translation of Basic Immunology and Neuroscience Tools to Therapies: Where are We Now?; Croatian Academy for Sciences and Arts, Rijeka, and University of Rijeka, Croatia.
2016 Roundtable: Interdisciplinary approach to complex diseases, Department of Biotechnology, University of Rijeka, Croatia.
2016 International symposium for young neuroscience researchers: 20th Young Neuroscientists Meeting, Department of Biotechnology, University of Rijeka, Croatia.

Institucijske obaveze:

2018- organizacija Otvorenog dana Odjela za biotehnologiju, Sveučilišta u Rijeci.
2018- član Povjerenstva za nastavu Odjela za biotehnologiju, Sveučilišta u Rijeci.
2017- organizacija 1. Dana doktoranada doktorskog studija Medicinska kemija Odjela za biotehnologiju, Sveučilišta u Rijeci.
2017- organizacija Seminara Zavoda za molekularnu i sistemsku medicinu Odjela za biotehnologiju, Sveučilišta u Rijeci.
2016- član Povjerenstva za doktorske studije Odjela za biotehnologiju, Sveučilišta u Rijeci.

Mentorstva doktorskih studenata:

2015- doktorandica Andrea Markovinović (HRZZ)
2017- doktorand Raffaello Cimbro (vanjski)
2017- doktorandica Tereza Ljutić

Mentorstva magistarskih i završnih radova:
2017- magistarski rad: Matea Rob
2017- magistarski rad: Nikolina Prtenjača
2015/6 magistarski rad: Tereza Ljutić
2014/5 magistarski rad: Mia Jakopović
2014/5 završni rad: Marina Rumora

Revizija za međunarodne časopise:

Journal of Neuroinflammation
Frontiers in Immunology
Immunity, Inflammation and Disease
Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration
Trends in Immunology
Neurological Sciences

Uredništvo u međunarodnom časopisu:

2017/8 gostujući urednik za časopis Frontiers in Immunology (zajedno s Dr. Andrew Smith i Prof. Folma Buss); tema: The Role of Optineurin in Immunity and Immune-Mediated Diseases.

https://www.frontiersin.org/research-topics/6554/the-role-of-optineurin-in-immunity-and-immune-mediated-diseases

Revizija projektnih prijedloga:

2017- Program cjeloživotnog učenja, Sveučilište u Rijeci
2016- projekti Hrvatske zaklade za znanost (HRZZ)

Popularizacija znanosti i predstavljanje laboratorija za široku javnost:

2018. Igrokaz: Tko je jači: Imuni sustav ili virusi? Te Otvorena vrata laboratorija
2017. Igrokaz: Tko je jači: Imuni sustav ili virusi?
2016. Plenarno predavanje: Imuni nadzor mozga, te Otvorena vrata laboratorija
2015. Predavanje: Mikroglija i ALS, te demonstracija: Određivanje krvnih grupa

Glavna postignuća:

1. Dizajn i uspostavljanje novog genetskog modela kondicionalne insuficijencije optineurina, te karakterizacija uloge optineurina u perifernom imunosnom sustavu te imunosnim stanicama u mozgu.

2. Pronalazak važnosti endogenih glukokortikoida u prevenciji smrti prilikom sepse putem dva komplementarna mehanizma: imunosupresijom i eliminacijom $CD8^+$ dendritičkih stanica. Taj rad rad naglašava da su i dendritičke stanica, a ne samo makrofazi kao što se prije mislilo, važan izvor proinflamatornih citokina u ranoj fazi sepse, ponajviše IL-12, te da njihova nekontrolirana aktivacija (u odsutnosti glukokokortikoidnog receptora u tim stanicama) dovodi do smrti od cytokine oluje.

3. Objavljivanje niza otkrića na memorijskim CD8 T stanicama i njihovim prekursorima, uključujući ulogu kostimulacijske molekule CD70, neovisnosti ekspresije citotoksičnih gena o klonalnoj zastupljenosti, te razlike između primarnih i sekundarnih memorijskih stanica.

4. Identifikacija i karakterizacija nove vrste stanica urođenog imunološkog sustava, nazvanih T_{DC}. T_{DC} stanice su neobične jer imaju $\alpha\beta$ T stanični receptor i probrane su u timusu, no po svemu drugome, kao npr. prezentaciji antigena i kostimulaciji T stanica te ovisnosti o Flt3 faktoru rasta, su slične klasičnim dendritičkim stanicama.

5. Karakterizacija važnosti dinamične ekspresije IL-7R receptora u ranoj fazi razvoja timocita. Analizom IL-7R transgeničnih miševa uviđeno je da ukoliko se IL-7R ekspresija ne ugasi u $CD4^+CD8^+$ stadiju, timus postaje hipocelularan zbog ograničenog pristupa $CD4^-CD8^-$ prekursorskih stanica trofičkom citokinu IL-7, što onemogućuje njihovu proliferaciju i razvoj.

Bibliografija:

2017 Markovinovic A, Cimbro R, Ljutic T, Kriz J, Rogelj B and Munitic I. Optineurin in amyotrophic lateral sclerosis: Multifunctional adaptor protein at the crossroads of different neuroprotective mechanisms. **Progress in Neurobiology, 154, 1-20.**

2017 Malatesti N, Munitic I, and Jurak I. Porphyrin-based cationic amphiphilic photosensitisers as potential anticancer, antimicrobial and immunosuppressive agents. **Biophysical Reviews, 9(2), 149-168.**

2016 Pourcelot M, Zemirli N, Silva Da Costa L, Loyant R, Garcin D, Vitour D, Munitic I, Vazquez A, and Arnoult, D. The Golgi apparatus acts as a platform for TBK1 activation after viral RNA sensing. **BMC Biology, 14, 69.**

2016 Meena NP, Zhu G, Mittelstadt PR, Giardino Torchia ML, Pourcelot M, Arnoult D, Ashwell JD and Munitic I. The TBK1-binding domain of optineurin promotes type I interferon responses. **FEBS Letters***,* 590, 1498-1508.

2015 Li CC*, Munitic, I*, Mittelstadt PR, Castro E, Ashwell, JD. Suppression of dendritic cell-derived IL-12 by endogenous glucocorticoids is protective in LPS-induced sepsis, **PLOS Biology**. 13, e1002269.
***jednak doprinos.**

2015 Giardino Torchia, ML, Munitic, I, Castro E, Herz J, McGavern DB, Ashwell, JD. c-IAP ubiquitin protein ligase activity is required for 4-1BB signaling and CD8 memory T-cell survival, **European Journal of Immunology**, 45, 2672-82.

2013 Munitic I*, Giardino Torchia ML, Meena NP, Zhu G, Li CC, Ashwell, JD*. Optineurin Insufficiency Impairs IRF3 but not NF-κB Activation in Immune Cells. **Journal of Immunology**, 191(12): 6231-40
*** autor za korespondenciju.**

2013 Kuka M*, Munitic I*, Giardino Torchia ML, Ashwell JD. CD70 is downregulated by interaction with CD27. **Journal of Immunology**, 191(5): 2282-9.
*** jednak doprinos.**

2013 Munitic I, Kuka M, Allam A, Scoville JP, Ashwell JD. CD70-deficiency impairs effector CD8 T cell generation and viral clearance but is dispensable for the recall response to LCMV. **Journal of Immunology**, 190(3): 1169-79.

2012 Kuka M, Munitic I, Ashwell JD. Identification and characterization of polyclonal αβ-T cells with dendritic cell properties. **Nature Commununications,** 2012: 3: 1223.

2010 Munitic I, Evaristo C, Sung HC, Rocha B. Transcriptional regulation during CD8 T-cell immune responses. **Advances in Experimental Medicine and Biology,** 684:11-27.

2010 Decaluwe H, Taillardet M, Corcuff E, Munitic I, Law HK, Rocha B, Riviere Y, Di Santo JP. Gamma(c) deficiency precludes CD8+ T cell memory despite formation of potent T cell effectors. **Proceedings of the National Academy of Sciences**, 107(20): 9311-6.

2009 Munitic I*, Decaluwe H, Evaristo C, Lemos S, Wlodarczyk M, Worth A, Le Bon A, Selin LK, Riviere Y, Di Santo JP, Borrow P, Rocha B*. Epitope specificity and relative clonal abundance do not affect CD8 differentiation patterns during lymphocytic choriomeningitis virus infection. **Journal of Virology,** 83(22): 11795-807.
*** autor za korespondenciju.**

2009 Allam A, Conze DB, Giardino Torchia ML, Munitic I, Yagita H, Sowell RT, Marzo AL, Ashwell JD. The CD8+ memory T-cell state of readiness is actively maintained and reversible. **Blood,** 114(10): 2121-30.

2007 Peixoto A, Evaristo C, Munitic I, Monteiro M, Charbit A, Rocha B. Veiga-Fernandes H. CD8 single-cell gene co-expression reveals three different

effector types present at distinct phases of the immune response. **Journal Experimental Medicine**, 204, 1193-205.

2005 Munitic I, Ryan PE and Ashwell, JD. T cells in G1 provide a memory-like response to secondary stimulation. **Journal of Immunology**, 174, 4010-8.

2004 Munitic I, Williams JA, Yang Y, Dong B, Lucas PJ, El Kassar N, Gress RE, and Ashwell JD. Dynamic regulation of IL-7 receptor expression is required for normal thymopoiesis. **Blood**, 104, 4165-72.

2002 Oro U*, Munitic I*, Chacko G, Karpova T, McNally J, Ashwell JD. Regulation of constitutive T cell receptor internalization by the ζ chain. **Journal of Immunology**, 169(11): 6269-78.
*** jednak doprinos.**

Odabrana izlaganja i poster prezentacije na simpozijima:

2017 Andrea Markovinović, Tereza Ljutić, Milojević i Ivana Munitić: Characterization of the role of optineurin in neuroinflammation. Atypical dementias: from diagnosis to emerging therapies, Trst, Italija.

2017 Hrvoje Jakovac, Andrea Markovinovic and Ivana Munitic: Neurohistopathological characterization of an optineurin insufficiency mouse model. Congress of Croatian Physiological Society and Regional Congress of the Physiological Societies, Dubrovnik.

2017 Andrea Markovinović, Tereza Ljutić, Milojević i Ivana Munitić: Characterization of the role of optineurin in neurodegeneration, Young Neuroscientists Meeting (YMN), Zagreb.

2017 Hrvoje Jakovac, Andrea Markovinovic and Ivana Munitic: Characterization of neurodegeneration in an optineurin insufficiency mouse model. Annual Meeting Of The Croatian Immunological Society With EFIS On Tour, Zagreb.

2017 Andrea Markovinović, Tereza Ljutić i Ivana Munitić: Molecular characterization of mouse optineurin insufficiency models, European Network for the Cure for ALS (ENCALS) meeting, Ljubljana, Slovenija.

2017 Tereza Ljutić, Andrea Markovinović, Sai Sampath Thammisetty, Jasna Križ, Ivana Munitić. Characterization of the optineurin insufficiency mouse model. Scientific poster day of CERVO Institute, Quebec city, Canada.

2016 Munitic I, Markovinovic A, and Ashwell JD. An optineurin insufficiency model of ALS. ENCALS (European Network for the Cure of ALS) meeting in Milano, Italy. Selected Oral presentation.

2015 Munitic I, Li CC, Mittelstadt PR, Castro E, and Ashwell JD. Endogenous glucocorticoids suppress dendritic cell-derived IL-12 and prevent death in LPS-induced sepsis, 4th European Congress of Immunology, Vienna, Austria. Selected Oral presentation.

2015 Markovinović A, Barukčić A, Jakopović M, Šinkovec V, Jakovac H, Grabušić K, Ashwell JD, and Munitić I. An optineurin insufficiency model as a potential tool for elucidating the pathogenesis of amyotrophic lateral sclerosis. Croatian Society for Neuroscience, Split, Croatia.

2015 Munitic I, Giardino Torchia ML, and Ashwell JD. Optineurin is dispensable for LPS- and Salmonella typhimurium-induced autophagy. American Associations of Immunologists, New Orleans, USA.

2014 Munitic I, Giardino Torchia ML, Meena NP, and Ashwell JD. Optineurin is a Positive Regulator of IFN-b. Annual meeting of the Croatian Imunological Society, Krk, Croatia. Selected Oral presentation.

2013 Munitic I, Giardino Torchia ML, Meena NP, and Ashwell JD. A Mouse Model of Optineurin Insufficiency Exhibits Impaired Signaling via IRF3 but not NF-κB

Activation Pathway. 4th Croatian Neuroscience Congres. Zagreb, Croatia.

2013 Munitic I, Giardino Torchia ML, Meena NP, and Ashwell JD. Optineurin is Indispensible for Signaling via IRF3 but not NF-κB Activation Pathway. 2nd Meeting on Middle-European Societies for Immunology and Allergology. Opatija, Croatia.

2007 Munitic, I, Le Bon A and Rocha B. Evaluating CD8 differentiation during LCMV response by a multiparametric gene expression study of individual cells. Keystone Symposium on Immunological Memory. Santa Fe, NM, USA.

2006 Munitic, I, Le Bon A and Rocha B. Evaluating CD8 differentiation during LCMV response by a multiparametric gene expression study of individual cells. 16th European Congress of Immunology – ECI. Paris, France.

2006 Munitic, I, Le Bon A and Rocha B. Single-cell multiparametric gene expression analysis of CD8 differentiation during an immune response to LCMV. DC-Thera Graduate School in St. Moritz, Switzerland. Selected oral Presentation.

2004 Munitic, I, Ryan, P and Ashwell, JD. T Cells in G_1 provide a memory-like response to antigen rechallenge. National Institutes of Health-Immunology Interest Group Retreat. Warrenton, VA, USA. Selected Oral presentation.

2002 Munitic, I, D'Oro U, Chacko, G, Karpova, T, McNally, J, Ashwell, JD. Enhanced Rates of Constitutive TCR Cycling in z-deficient Cells. Federation of American Societies for Experimental Biology Meeting (FASEB). New Orleans, LA, USA.