

OSOBNJE INFORMACIJE

Nada Božina

ZVANJE

doktor medicine

TITULA

prof. dr. sc.

RADNO ISKUSTVO

04.2011 -

Pročelnik Kliničke jedinice za farmakogenomiku i individualizaciju terapije

Klinički bolnički centar Zagreb, 10 000 Zagreb, Kišpatićeva 12, www.kbc-zagreb.hr

www.kbc-zagreb.hr

Organizator i voditelj farmakogenetičkih ispitivanja u akreditiranom laboratoriju sa svrhom testiranja na genetičku predispoziciju za neočekivan-promijenjen odgovor na primijenjenu farmakoterapiju. Testiranja uključuju polimorfizme gena koji kodiraju metaboličke enzime faze I i II, transportnih proteina te receptora.

12.1997 - 03.2011

Voditelj laboratorija za farmakogenetiku

Klinički bolnički centar Zagreb, Kišpatićeva 12, 10 000 Zagreb, www.kbc-zagreb.hr

www.kbc-zagreb.hr

Organizacija rada laboratorija za farmakogenetiku i provođenje farmakogenetičkih testiranja

06.1987 - 11.1997

Voditelj laboratorija za stanične kulture u Centru za biomedicinska istraživanja

Klinički bolnički centar zagreb, Šalata 2, 10 000 Zagreb

Organiziranje rada u Laboratoriju za stanične kulture te provođenje testiranja aktivnosti i toksičnosti potencijalnih lijekova testovima in vitro

04.1983 - 05.1987

Analitičar u laboratoriju za stanične kulture

Klinički bolnički centar Zagreb

10.1979 - 03.1983

specijalizant na Klinici za unutarnje bolesti

Klinički bolnički centar

10.1977 - 09.1979

pripravnik

Klinički bolnički centar Zagreb

OBRAZOVANJE I OSPOBLJAVANJE

10.2000 - 10.2005

doktor biomedicinskih znanosti

Medicinski fakultet Sveučilišta u Zagrebu

10.1978 - 07.1980

magistar medicinskih znanosti

Medicinski fakultet Sveučilišta u Zagrebu

10.1972 - 07.1977

doktor medicine

Medicinski fakultet Sveučilišta u Zagrebu

OSOBNJE VJEŠTINE

Materinski jezik hrvatski

Ostali jezici	RAZUMIJEVANJE		GOVOR		PISANJE
	Slušanje	Čitanje	Govorna interakcija	Govorna produkcija	
engleski	C1/2: Iskusni korisnik	C1/2: Iskusni korisnik	B1/2: Samostalni korisnik	B1/2: Samostalni korisnik	B1/2: Samostalni korisnik

Organizacijske / rukovoditeljske vještine

Iskustvo u organizaciji rada i rukovođenju laboratorijem a trenutno organizacijom rada i upravljanje poslovima u Kliničkom odjelu.
Organizirala tečajeve trajnog usavršavanja i simpozij:
2015. Znanstveni odbor, EPST Integration of Pharmacogenomics in clinical decision support
2015. Znanstveni odbor VI. hrvatski kongres humane genetike
2013-tečaj "Farmakogenomika i farmakovigilancija
- sprječavanje nuspojava u individualizaciji terapije - upute i smjernice"
2013 Suorganizator simpozija "GoldenHelix Pharmacogenomics Day", Zagreb

Poslovne vještine

Računalne vještine Microsoft Windows, Office

Vozačka dozvola B kategorija

DODATNE INFORMACIJE

Izdanja

- 1.Škarić-Jurić T, Tomas Ž, Zajc Petranović M, Božina N, Smolej Narančić N, Jančićević B, Salihović MP. Characterization of ADME genes variation in Roma and 20 populations worldwide. PLoS One. 2018 Nov 19;13(11):e0207671. doi: 10.1371/journal.pone.0207671. eCollection 2018; PubMed PMID: 30452466.
- 2.Grubelić Ravić K, Paić F, Vucelić B, Brinar M, Čuković-Čavka S, Božina N, Krznarić Ž, Kalauz M, Bešić D, Nikuševa Martić T. Association of polymorphic variants in serotonin re-uptake transporter gene with Crohn's disease: a retrospective case-control study. Croat Med J. 2018;59(5):232-243
- 3.Klarica Domjanović I, Lovrić M, Trkulja V, Petelin-Gadže Ž, Ganoci L, Čajić I, Božina N (2018). Interaction between ABCG2 421C>A polymorphism and valproate in their effects on steady-state disposition of lamotrigine in adults with epilepsy. Br J Clin Pharmacol. 2018;84(9):2106-2119.
- 4.Bielen L, Kralj I, Čurčić E, Vodanović M, Boban A, Božina N. Acute kidney injury, agranulocytosis, drug-induced liver injury, and posterior reversible encephalopathy syndrome caused by high-dose methotrexate-possible role of low activity ABC and SLC drug transporters. Eur J Clin Pharmacol. 2018;74(9):1191-1192.
- 5.Vrkić Kirhmajer M, Macolić Šarinić V, Šimičević L, Ladić I, Putarek K, Banfić L, Božina N. Rosuvastatin-Induced Rhabdomyolysis - Possible Role of Ticagrelor and Patients' Pharmacogenetic Profile. Basic Clin Pharmacol Toxicol. 2018;123(4):509-518.
- 6.Lovrić M, Čajić I, Petelin Gadže Ž, Klarica Domjanović I, Božina N. Effect of antiepileptic drug comedication on lamotrigine concentrations. Croat Med J. 2018; 28;59(1):13-19.
- 7.Makar-Aušperger K, Krželj K, Lovrić Benčić M, Radačić Aumiler M, Erdeljić Turk V, Božina N. Warfarin Dosing According to the Genotype-guided Algorithm is Most Beneficial in Patients With Atrial Fibrillation: A Randomized Parallel Group Trial. Ther Drug Monit. 2018;40(3):362-368.
- 8.Ziegler C, Wolf C, Schiele MA, Feric Bojic E, Kucukalic S, Sabic Džananovic E, Goci Uka A, Hoxha B, Haxhibeqiri V, Haxhibeqiri S, Kravic N, Muminovic Umihanic M, Cima Franc A, Jaksic N, Babic R, Pavlovic M, Warrings B, Bravo Mehmedbasic A, Rudan D, Aukst-Margetic B, Kucukalic A, Marjanovic D, Babic D, Božina N, Jakovljevic M, Sinanovic O, Avdibegovic E, Agani F, Dzubur-Kulenovic A, Deckert J, Domschke K. Monoamine oxidase A gene methylation and its role in Posttraumatic Stress Disorder - First evidence from the South Eastern Europe (SEE)-PTSD study. Int J Neuropsychopharmacol. 2018;21(5):423-432.
- 9.Krasniqi V, Dimovski A, Bytyqi HQ, Eftimov A, Šimičević L, Božina N. Genetic polymorphisms of CYP2C9, CYP2C19, and CYP3A5 in Kosovar population. Arh Hig Rada Toksikol. 2017;68(3):180-184.
- 10.Kudlek Mikulic S, Mihaljevic-Peles A, Sagud M, Bajs Janovic M, Ganoci L, Grubisin J, Kuzman Rojnić M, Vuksan Cusa B, Bradaš Z, Božina N. Brain-derived neurotrophic factor serum and plasma levels in the treatment of acute schizophrenia with olanzapine or risperidone: 6-week prospective study. Nord J Psychiatry. 2017;71(7):513-520
- 11.Božina N, Lalić Z, Nađ-Škegro S, Borić-Bilušić A, Božina T, Kaštelan Ž, Trkulja V. Steady-state pharmacokinetics of mycophenolic acid in renal transplant patients: exploratory analysis of the effects of cyclosporine, recipients' and donors' ABCC2 gene variants, and their interactions. Eur J Clin Pharmacol. 2017;73(9):1129-1140.
- 12.Knezovic A, Loncar A, Homolak J, Smailovic U, Osmanovic Barilar J, Ganoci L, Božina N, Riederer P, Salkovic-Petrisic M. Rat brain glucose transporter-2, insulin receptor and glial expression are acute targets of intracerebroventricular streptozotocin: risk factors for sporadic Alzheimer's disease? J Neural Transm (Vienna) 2017;124(6):695-708.
- 13.Potočnjak I, Likić R, Šimić I, Juričić Nahal D, Čegec I, Ganoci L, Božina N. Dapsone-induced agranulocytosis-possible involvement of low-activity N-acetyltransferase 2. Fundam Clin Pharmacol. 2017;31(5):580-586.
- 14.Ganoci L, Božina T, Mirošević Skvrce N, Lovrić M, Mas P, Božina N. Genetic polymorphisms of cytochrome P450 enzymes: CYP2C9, CYP2C19, CYP2D6, CYP3A4, and CYP3A5 in the Croatian population. Drug Metab Pers Ther. 2017;32(1):11-21.
- 15.Šagud M, Vuksan-Ćusa B, Božina N, Lovrić M, Mihaljević-Peleš A, Kramarić M. Olanzapine Long-Acting Injections After Neuroleptic Malignant Syndrome: Two Case Reports. J Clin Psychopharmacol 2016;36(6):733-735.
- 16.Mizzi C, Dalabira E, Kumuthini J, Dzimiri N, Balogh I, Bašak N, Böhm R, Borg J, Borgiani P, Božina N, Bruckmueller H, Burzynska B, Carracedo A, Cascorbi I, Deltas C, Dolzan V, Fenech A, Grech G, Kasiulevicius V, Kádaši L, Kučinskis V,

- Khusnutdinova E, Loukas YL, Macek M Jr, Makukh H, Mathijssen R, Mitropoulos K, Mitropoulou C, Novelli G, Papantoni I, Pavlovic S, Saglio G, Setric J, Stojiljkovic M, Stubbs AP, Squassina A, Torres M, Turnovec M, van Schaik RH, Voskarides K, Wakil SM, Werk A, Del Zompo M, Zukic B, Katsila T, Lee MT, Motsinger-Rief A, McLeod HL, van der Spek PJ, Patrinos GP. A European Spectrum of Pharmacogenomic Biomarkers: Implications for Clinical Pharmacogenomics. *PLoS One*. 2016;11(9):e0162866.
17. Šimić I, Potočnjak I, Kraljičković I, Stanić Benić M, Čegec I, Juričić Nahal D, Ganoci L, Božina N. CYP2D6 *6/*6 genotype and drug interactions as cause of haloperidol-induced extrapyramidal symptoms. *Pharmacogenomics*. 2016;17(13):1385-9.
18. Karmelić I, Lovrić J, Božina T, Merkler A, Božina N, Sertić J. Is there any association of apolipoprotein E gene polymorphisms with metabolic syndrome in a young population of Croatian origin? *Ann Hum Biol*. 2016;1-25.
19. Ladić A, Božina N, Borzan V, Brinar M, Vucelić B, Cuković-Cavka S. AN EPIDEMIOLOGICAL STUDY OF THIOPURINE-METHYLTRANSFERASE VARIANTS IN A CROATIAN INFLAMMATORY BOWEL DISEASE PATIENT COHORT. *Acta Clin Croat*. 2016;55(1):16-22.
20. Kulenović AD, Agani F, Avdibegović E, Jakovljević M, Babić D, Kucukalić A, Kucukalić S, Džananović ES, Mehmedbasic AB, Uka AG, Haxhibeqiri S, Haxhibeqiri V, Hoxha B, Sinanović O, Kravac N, Muminović M, Aukst-Margetić B, Jaksic N, Franc AC, Rudan D, Pavlovic M, Babić R, Bojic EF, Marjanović D, Božina N, Ziegler C, Wolf C, Warrings B, Domschke K, Deckert J. Molecular Mechanisms of Posttraumatic Stress Disorder (PTSD) as a Basis for Individualized and Personalized Therapy: Rationale, Design and Methods of the South Eastern Europe (SEE)-PTSD study. *Psychiatr Danub*. 2016;28(2):154-63.
21. Krasniqi V, Dimovski A, Domjanović IK, Bilić I, Božina N. How polymorphisms of the cytochrome P450 genes affect ibuprofen and diclofenac metabolism and toxicity. *Arh Hig Rada Toksikol*. 2016;67(1):1-8.
22. Koršić M, Muršić D, Badovinac S, Božina N, Roglić M, Jakopović M, Čučević B. Erlotinib-related rhabdomyolysis: the role of pharmacogenetics and drug-drug interaction. *Cancer Chemother Pharmacol* 2015;76(6):1317-9.
23. Mandić D, Božina N, Mandić S, Samardžija M, Milostić-Srb A, Rumora L. VKORC1 gene polymorphisms and adverse events in Croatian patients on warfarin therapy. *Int J Clin Pharmacol Ther*. 2015;53(11):905-13.
24. Mirošević Skvrce N, Macolić Šarinić V, Šimić I, Ganoci L, Muičević Katanec D, Božina N. ABCG2 polymorphism as risk factor for developing adverse drug reactions in patients taking atorvastatin: a case-control study. *Pharmacogenomics* 2015;16(9):959-70.
25. Šupe S, Poljaković Z, Božina T, Ljevak J, Macolić Šarinić V, Božina N. Clinical Application of Genotype-guided Dosing of Warfarin in Patients with Acute Stroke. *Arch Med Res*. 2015;46(4):265-73.
26. Markeljević J, Sarac H, Božina N, Henigsberg N, Simić M, Cicin Sain L. Serotonin transporter gene polymorphisms: Relation with platelet serotonin level in patients with primary Sjogren's syndrome. *J Neuroimmunol* 2015; 282:104-9.
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29. Šupe S, Božina N, Matijević V, Bazina A, Mišmaš A, Ljevak J, Alvir D, Habek M, Poljaković Z. Prevalence of genetic polymorphisms of CYP2C9 and VKORC1 - implications for warfarin management and outcome in Croatian patients with acute stroke. *J Neurol Sci* 2014;343(1-2):30-5.
30. Bilic P, Jukic V, Vilibic M, Savic A, Božina N. Treatment-resistant schizophrenia and DAT and SERT polymorphisms. *Gene* 2014;543(1):125-32.
31. Kao AC, Rojnic Kuzman M, Tiwari AK, Zivković MV, Chowdhury NI, Medved V, Kekić I, Zai CC, Lieberman JA, Meltzer HY, Božina T, Božina N, Kennedy JL, Sertić J, Müller DJ. Methylenetetrahydrofolate reductase gene variants and antipsychotic-induced weight gain and metabolic disturbances. *J Psychiatr Res* 2014;54:36-42.
32. Trkulja V, Lalić Z, Nađ-Škegro S, Lebo A, Granić P, Lovrić M, Pasini J, Božina N. Effect of cyclosporine on steady-state pharmacokinetics of mycophenolic acid (MPA) in renal transplant recipients is not affected by the MPA formulation: analysis based on therapeutic drug monitoring. *Ther Drug Monit* 2014;36(4):456-64.
33. Zivković M, Mihaljević-Peles A, Božina N, Sagud M, Nikolac-Perković M,

- Vuksan-Cusa B, Muck-Seler D. The association study of polymorphisms in DAT, DRD2, and COMT genes and acute extrapyramidal adverse effects in male schizophrenic patients treated with haloperidol. *J Clin Psychopharmacol.* 2013;33(5):593-9.
34. Mirošević Skvrce N, Božina N, Zibar L, Barišić I, Pejnović L, Macolic Šarinic V. CYP2C9 and ABCG2 polymorphisms as risk factors for developing adverse drug reactions in renal transplant patients taking fluvastatin: a case-control study. *Pharmacogenomics.* 2013;14(12):1419-31.
35. Brinar M, Cuković-Cavka S, Božina N, Ravic KG, Markos P, Ladic A, Cota M, Krznarić Z, Vucelić B. MDR1 polymorphisms are associated with inflammatory bowel disease in a cohort of Croatian IBD patients. *BMC Gastroenterol.* 2013;13:57.
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41. Božina N, Jovanović N, Podlesek A, Rojnić Kuzman M, Kudumija Slijepević M, Roguljić A, Dimitrović A, Božina T, Lovrić J, Ljubić H, Medved V. Suicide ideators and attempters with schizophrenia--the role of 5-HTTLPR, rs25531, and 5-HTT VNTR Intron 2 variants. *J Psychiatr Res.* 2012;46(6):767-73.
42. Karmelić I, Lovrić J, Božina T, Ljubić H, Vogrinc Ž, Božina N, Sertić J. Adiponectin level and gene variability are obesity and metabolic syndrome markers in a young population. *Arch Med Res.* 2012;43(2):145-53.
43. Božina N, Čuković-Cavka S, Šupe S, Nađ-Škegro S, Šimić I, Makar-Aušperger K, Kovačević I. Pharmacogenetics and adverse drug reactions-polymorphism of metabolic enzymes. *Neurol Croatica* 2012;61(Suppl.2):121-132.
44. Sertić J, Božina T, Skorić B, Lovrić J, Slaviček J, Šimićević L, Jelaković B, Božina N, Miličić D, Reiner Ž. New trends in laboratory diagnostics: biomarkers of atherosclerosis; preventive and personalized medicine. *Neurol Croatica* 2012;61(Suppl.2):137-149.
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46. Mirošević Skvrce N, Macolic Sarinic V, Mucalo I, Krnic D, Božina N, Tomic S. Adverse drug reactions caused by drug-drug interactions reported to Croatian Agency for Medicinal Products and Medical Devices: a retrospective observational study. *Croat Med J.* 2011;52(5):604-14.
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54. Božina N, Bradamante V, Lovrić M. Genetic polymorphism of metabolic

- enzymes P450 (CYP) as a susceptibility factor for drug response, toxicity, and cancer risk. *Arh Hig Rada Toksikol.* 2009;60(2):217-42.
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57. Mihaljević-Peles A, Sagud M, Božina N, Zivković M. Pharmacogenetics and antidepressant treatment in integrative psychiatry perspective. *Psychiatr Danub.* 2008;20(3):399-401.
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65. Božina N. Interactions of antiepileptic and psychotropic drugs - pharmacogenetics of CYP enzymes and P-glycoprotein transporter. *Paediatrica Croatica.* 2006;50(2):41-8.
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Poglavlja u knjizi-priručniku:

- Božina N. Prepoznavamo li nuspojave lijekova-farmakogenomička objašnjenja. U: *Pedijatrija danas 2017: Uočimo rane znakove bolesti.* Tješić-Drinković D, Senečić-Čala I, Vuković J (ur). *Medicinska Naklada, Zagreb 2017:31- 40.*
- Vitezić D, Božina N, Mršić-Pelčić J, Erdeljić Turk V, Francetić I. Personalized Medicine in Clinical Pharmacology. U: *Bodiroga-Vukobrat N, Rukavina D, Pavelić K, Sander GG. Personalized Medicine, A New Medical and Social Challenge.* Springer International Publishing, 2016: 265-278.

Božina N. Farmakogenomika. U: Klinička kemija i molekularna dijagnostika u kliničkoj praksi. Sertić J. (ur). Zagreb, Medicinska naklada, 2015.

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2017. Voditelj projekta , potpora Sveučilišta u Zagrebu“ Uloga farmakogenetike u interakcijama i nuspojavama opioidnih lijekova“

2013- Voditelj projekta:“Farmakogenomika i farmakovigilancija - sprečavanje nuspojava u individualizaciji terapije“.

Suradnik na međunarodnom projektu, 2018.- COST Association- CA17130 (The Action Enhancing Psychiatric Genetic Counselling, Testing, and Training in Europe – EnGagE)

2018. - suradnik na projektu , Potpora Sveučilišta u Zagrebu, "Uloga genskog polimorfizma metaboličkih enzima citokroma P450(CYP) kao čimbenika hepatotoksičnosti"

Suradnja sa Sveučilištem u Würzburgu na projektu "Molecular Basis of Neuropsychiatric Disorders", podprojekt "Molecular Mechanisms of Posttraumatic Stress Disorder", financiran od Deutscher Akademischer Austauschdienst (DAAD), Stability Pact for South Eastern Europe.

Suradnik na projektu Sveučilišta: "Farmakogenomko ispitivanje u djece s idiopatskim nefrotskim sindromom" (voditelj prof.dr.sc. D. Milošević)

Suradnik na projektima MZOS: od 2006. „Funkcijska genomika i proteomika rizičnih čimbenika ateroskleroze“ (voditelj prof.dr.sc. J.Sertić); „Farmakogenetska varijabilnost u psihijatrijskih bolesnika“ (voditelj prof.dr.sc. A. Mihaljević Peleš); “Upalne bolesti crijeva” (voditelj prof.dr.sc. B. Vucelić)

2002-2006 "Molekularna osnova aterogeneze voditelj prof.dr.sc. A. Stavljenić Rukavina)

Konferencije

Sudjelovala kao pozvani predavač na više konferencija i simpozija s temama farmakologija i toksikologija, sigurnost primjene lijeka, farmakogenomika

Priznanja i nagrade

Nagrade na simpozijima:

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Članstva

Hrvatsko društvo farmakologa

Hrvatsko društvo za humanu genetiku

Hrvatsko društvo za biologijsku psihijatriju

International Association of therapeutic drug monitoring and clinical toxicology

European Society of Pharmacogenomics and Theranostics

European Society of Human Genetics

Hrvatski predstavnik u European Medicines Agency (EMA) Scientific Committee

and working party meetings, European Network of Centre for

Pharmacoepidemiology and Pharmacovigilance (ENCePP) i u Pharmacogenomics working party