

Curriculum Vitae
Patrick T. Ronaldson, Ph.D., FAAPS

BUSINESS ADDRESS

Department of Pharmacology
College of Medicine
University of Arizona
Life Sciences North, Room 560
P.O. Box 245050
Tucson, AZ, 85724-5050

EDUCATION

Sept 1995 – June 2000

Honors Bachelor of Science (with Distinction)

Pharmacology
Faculty of Arts and Sciences
University of Toronto, Toronto, Ontario, Canada
Degree conferred June 2000

Jan 2001 – Nov 2007

Doctor of Philosophy

Pharmaceutical Sciences
Leslie Dan Faculty of Pharmacy
University of Toronto, Toronto, Ontario, Canada
Degree conferred Nov 2007

Nov 2007 – June 2008

Postdoctoral Fellowship

Pharmaceutical Sciences
Leslie Dan Faculty of Pharmacy
University of Toronto, Toronto, Ontario, Canada

June 2008 – Oct 2009

Postdoctoral Fellowship

Pharmacology
College of Medicine
University of Arizona, Tucson, Arizona, USA

Dissertation: *Functional Expression of ATP-Binding Cassette (ABC) Transporters in Brain Cellular Compartments and in Glial Cells Exposed to HIV-1 Viral Proteins.*

Doctoral Thesis Advisor: Dr. Reina Bendayan, Professor, Department of Pharmaceutical Sciences, Leslie Dan Faculty of Pharmacy, University of Toronto

EMPLOYMENT

Oct 2009 – Feb 2011

Research Assistant Professor

Department of Pharmacology
College of Medicine
University of Arizona, Tucson, Arizona, USA

Feb 2011 – Aug 2017

Assistant Professor, Tenure-Eligible
Department of Pharmacology
College of Medicine
University of Arizona, Tucson, Arizona, USA

Aug 2017 – Apr 2022

Associate Professor with Tenure
Department of Pharmacology
College of Medicine
University of Arizona, Tucson, Arizona, USA

Apr 2022 – Present

Professor with Tenure
Department of Pharmacology
College of Medicine
University of Arizona, Tucson, Arizona, USA

HONORS AND AWARDS

- Piafsky Memorial Trainee Award, Canadian Society for Clinical Pharmacology (CSCP), 2002.
- Certificate of Excellence, Top Research Abstract, American Association of Pharmaceutical Scientists (AAPS), 2003.
- Graduate Student Research Poster Award, Association of Faculties of Pharmacy of Canada (AFPC), 2003.
- Canadian Student Health Research Focus Poster Award, Canadian Institutes of Health Research (CIHR), 2006.
- Gordon Cressy Leadership Award, University of Toronto Alumni Association, Division of University Advancement, University of Toronto, 2007.
- Graduate Student Research Achievement Award, Association of Faculties of Pharmacy of Canada (AFPC) and GlaxoSmithKline Canada Inc., 2007.
- Postdoctoral Travel Award, American Association of Pharmaceutical Scientists (AAPS), 2007.
- New Investigator Award in Pharmacokinetics, Pharmacodynamics, and Drug Metabolism, American Association of Pharmaceutical Scientists (AAPS), 2011.
- Young Investigator Award, International Society of Cerebral Blood Flow and Metabolism (ISCBFM), 2013.
- Pharmacokinetics, Pharmacodynamics, and Drug Metabolism (PPDM) Section Service Award, American Association of Pharmaceutical Scientists (AAPS), 2016.
- News Feature, *University of Arizona Health Sciences Research studies Statins for Stroke Therapy*, KOLD News 13, Tucson, AZ; August 6, 2020.
- Expert Commentary, *Human organoid models of the blood-brain barrier*, *Neurology Today*, American Academy of Neurology (<https://journals.lww.com/neurotodayonline/pages/default.aspx>); September 17, 2020.
- Research highlighted in Drug Discovery News (<https://www.drugdiscoverynews.com>), *Statins for Stroke*; September 2020 (Volume 16, Number 8).
- Academy of Medical Education Scholars, University of Arizona College of Medicine, 2021
- Leadership in Pharmaceutical Sciences Award, Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada, 2023.
- Fellow, American Association of Pharmaceutical Scientists (AAPS), 2023.

SERVICE/OUTREACH (PAST 5 YEARS)

National/International Service

Grant Reviewing for the National Institutes of Health (NIH)

- NIH, Drug Discovery for the Nervous System (DDNS) Study Section, Member, June 2017 – June 2019.

- NIH ZRG1 IDM-T (50) Special Emphasis Panel, Approaches for Understanding Disease Mechanisms and Improving Outcomes in TB Meningitis (TBM), December 12, 2018.
- NIH, Drug Discovery for the Nervous System (DDNS) Study Section, Chair, June 2019 – June 2021
- NIH ZRG1 IDM-T (51) Special Emphasis Panel, Approaches for Understanding Disease Mechanisms and Improving Outcomes in TB Meningitis (TBM), December 12, 2019.
- NIH ZRG MDCN M91 Special Emphasis Panel, The Blood-Brain Barrier, Neurovascular System, and CNS Therapeutics, March 16, 2022

Grant Reviewing for National and International Grants

- Austrian Science Fund (FWF), Biological and Medical Sciences, Vienna, Austria; Research Grant Review (online), 2017.
- National Science Center, Life Sciences Division, Krakow, Poland; Research Grant Review (online), 2018.
- Netherlands Organization for Health Research and Development, VENI Program Research Grant Review (online), The Hague, NL, 2019.
- American Heart Association (AHA), BRAIN-1 Predoctoral and Postdoctoral Fellowship Application Review (online), October 21, 2019.
- Dunhill Medical Trust, Health Sciences, London, UK; Research Grant Review (online), 2020.
- Dutch Research Council, Medical and Health Sciences, Amsterdam, NL; Research Grant Review (online), 2020.
- American Heart Association (AHA), BRAIN Career Development Application Review (online), May 17, 2021.
- National Science Center, Life Sciences Division, Krakow, Poland; Research Grant Review (online), 2022.
- Swiss National Science Foundation, Switzerland; Research Grant Review (online), 2022.
- Austrian Science Fund (FWF), Biological and Medical Sciences, Vienna, Austria; Research Grant Review (online), 2022.

Scientific Meetings

- Co-chair, *American Association of Pharmaceutical Scientists' (AAPS) Workshop on Drug Transporters in ADME: From the Bench to the Bedside*, Dulles, Virginia, April 16-18, 2018.
- Scientific Planning Committee, *Novel Approaches Targeting Brain Barriers for Effective Delivery of Therapeutics*, American Association of Pharmaceutical Scientists (AAPS), Herndon, VA, April 29-May 1, 2019.
- Scientific Planning Committee, *Drug Transporters in ADME: From the Bench to the Bedside*, American Association of Pharmaceutical Scientists (AAPS), Virtual Event, April 20-21, 2020.

- Chair, Discovery and Basic Science Track, *PharmSci360*, American Association of Pharmaceutical Scientists (AAPS), October 22-25, 2023.

Professional Societies

- Learning Opportunities Manager, *Drug Transport Community*, American Association of Pharmaceutical Scientists (AAPS), 2018-present.
- Vice-Chair Elect, *Pharmacokinetics, Pharmacodynamics, and Drug Metabolism Community*, American Association of Pharmaceutical Scientists (AAPS), 2019-2020.
- Chair, *Pharmacokinetics, Pharmacodynamics, and Drug Metabolism Community*, American Association of Pharmaceutical Scientists (AAPS), 2020-2021.

Editorial Board, Scientific Journals

- Associate Editor, *Fluids and Barriers of the CNS* (2016 – Present)
- Editorial Board, *Hypoxia* (2017 – Present)
- Editorial Board, Drug Delivery, Design, and Discovery Section, *BMC Pharmacology and Toxicology* (2018 – Present)
- Executive Guest Editor, Drug Delivery to the Brain (Special Issue), *Pharmaceutics* (2019-2020)
- Editorial Board, *Pharmaceutics* (2020 – 2022)
- Associate Editor, Brain-Targeted Drug Delivery Section, *Frontiers in Drug Discovery* (2021 – Present)

Reviewer, Peer-Reviewed Scientific Journals

- ACS Chemical Neuroscience
- Advances in Pharmacology
- American Association of Pharmaceutical Scientists' (AAPS) Journal
- Bioengineered
- BMC Neuroscience
- BMC Pharmacology and Toxicology
- Brain, Behavior, and Immunity
- British Journal of Pharmacology
- Cellular and Molecular Neurobiology
- Current Medicinal Chemistry
- Current Pharmaceutical Design
- Drug Metabolism and Disposition
- European Journal of Pharmacology
- Experimental Neurology
- Expert Opinion in Drug Metabolism and Toxicology
- Fluids and Barriers of the CNS
- Journal of Cerebral Blood Flow and Metabolism
- Journal of Controlled Release
- Journal of Medicinal Chemistry
- Journal of Neuroscience
- Journal of Neuroscience Research
- Journal of Pharmaceutical Sciences

- Journal of Pharmacology and Experimental Therapeutics
- Journal of Pharmacy and Pharmacology
- Laboratory Investigation
- Molecular Neurobiology
- Molecular Pharmaceutics
- Molecular Pharmacology
- Neurochemistry International
- Neuroscience Letters
- Pharmaceutics
- Pharmacological Research
- PLoS One
- Stroke
- Therapeutic Delivery
- Toxicological Sciences
- Toxicology and Applied Pharmacology
- Translational Stroke Research

International Outreach

- Life Sciences Career Mentor, Royal St. George's College, Toronto, ON, Canada, 2019-present.

University Service

Departmental Committees

- Member, Graduate Program in Medical Pharmacology Admissions Committee (2013-Present)
- Director, Graduate Program in Medical Pharmacology (2014-2018)
- Member, Department of Pharmacology Education Committee (2014-Present)
- Member, Department of Pharmacology Space Committee (2017-Present)

College of Medicine

- Graduate Program Advisory Council, COM (2014-2018)
- Member, Dean's Research Council, COM (2014-Present)
 - Re-elected to second term in 2019
- Member, Dean's Council on Faculty Affairs (2015-2020)
- Discipline Director, Pharmacology, COM (2019 – Present)
- Member, Tucson Curriculum Management Subcommittee (TCMS), COM (2019-Present)
- Member, Tucson Educational Policy Committee (TEPC), COM (2022-Present)

University Committees

- Member, Admissions Committee, Arizona Biosciences and Biomedical Sciences (ABBS) Graduate Program (2013-2018)
- Member, Admissions Committee, Neuroscience Graduate Interdisciplinary Program (2018-Present)
- Member, Executive Committee, Neuroscience Graduate Interdisciplinary Program (2019-Present)
- Member, Research, Innovation, and Impact (RII) Faculty Foresight Council (2021-Present)

Community Service

- Head Coach, Oro Valley Little League, (T-Ball, A-level, AA-level, and Majors-level), Oro Valley, AZ (March 2018 – Present)
- Coach, Under the Lights Flag Football, Oro Valley, AZ (September 2019 – November 2019)

Memberships in Professional Societies

- American Association of Pharmaceutical Scientists (AAPS)
- American Heart Association (AHA) Professional Member
- American Society of Pharmacology and Experimental Therapeutics (ASPET)
- International Brain Barriers Society (IBBS)
- International Society of Cerebral Blood Flow and Metabolism (ISCBFM)

PUBLICATIONS/CREATIVE ACTIVITY

Chapters in Scholarly Books and Monographs

(* work as a graduate student; ° undergraduate/graduate advisees or postdoctoral mentees)

1. **Ronaldson PT**, Babakhanian K, Bendayan R; *Drug Transport in the Brain; pp 411-462; In Drug Transporters: Molecular Characterization and Role in Drug Disposition; John Wiley & Sons; New York, NY; 2007; You G and Morris M eds.
2. Witt KA, **Ronaldson PT**, Sandoval KE, Davis TP; CNS delivery of peptides across the blood-brain barrier; pp 233-248; In Drug Delivery to the Central Nervous System; Humana Press Inc., Totowa, NJ; 2009; Jain KK ed.
3. Ashraf T, **Ronaldson PT**, Bendayan R; Drug Transport in the Brain; In Drug Transporters: Molecular Characterization and Role in Drug Disposition, 2nd Edition; John Wiley & Sons; New York, NY; 2013; You G and Morris M eds.
4. **Ronaldson PT**, Davis TP; Glial Support of Blood-Brain Barrier Integrity: Molecular Targets for Novel Therapeutic Strategies in Stroke; In Non-Neuronal Mechanisms of Brain Damage and Repair in Stroke; Springer; New York, NY; 2016; Chen J, Zhang J, and Hu X eds.
5. **Ronaldson PT**, Davis TP; Mechanisms of Endothelial Injury and Blood-Brain Barrier Dysfunction in Stroke; In Caplan Primer on Cerebrovascular Diseases, 2nd Edition; Elsevier Inc.; Philadelphia, PA; 2016; Lo EH ed.
6. Sangha V, Williams EI°, **Ronaldson PT**, Bendayan R; Drug Transport in the Brain; In Drug Transporters: Molecular Characterization and Role in Drug Disposition, 3rd Edition; John Wiley & Sons; New York, NY; 2022; You G and Morris M eds.
7. Betterton RD°, Williams EI°, Nilles KL°, Davis TP, **Ronaldson PT**; Methods to Study Drug Transport at the Blood-Brain Barrier Following Experimental Ischemic Stroke: In Vitro and In Vivo Approaches; In Methods in Molecular Biology; Springer; New York, NY; 2022; Karamyan V and Stowe A eds.

Refereed Journal Articles, Published or Accepted in Final Form

(11 publications with over 100 citations; H-index 35; * work as a graduate student; ° undergraduate/graduate advisees or postdoctoral mentees)

1. **Ronaldson PT**, Bendayan R; *Renal drug transport and drug-drug interactions; Journal of Pharmacy Practice; 2002; 15(6): 490-503.
2. **Ronaldson PT**, Bendayan M, Gingras D, Piquette-Miller M, Bendayan R; *Cellular localization and functional expression of P-glycoprotein in rat astrocyte cultures; Journal of Neurochemistry; 2004; 89(3): 788-800. PMID: 15086534.
3. Dallas S, **Ronaldson PT**, Bendayan M, Bendayan R; *Multidrug resistance protein-1-mediated transport of saquinavir in microglia; NeuroReport; 2004; 15(7): 1183-1186. PMID: 15129170.
4. **Ronaldson PT**, Lee G, Dallas S, Bendayan R; *Involvement of P-glycoprotein in the transport of saquinavir and indinavir in rat brain microvessel endothelial and microglial cell lines; Pharmaceutical Research; 2004; 21(5): 811-818. PMID: 15180339.
5. Cheung RY, Rauth AM, **Ronaldson PT**, Bendayan R, Wu XY; *In vitro toxicity to breast cancer cells of microsphere-delivered mitomycin C and its combination with doxorubicin; European Journal of Pharmaceutics and Biopharmaceutics; 2005; 62(3): 321-331. PMID: 16330194.
6. **Ronaldson PT**, Bendayan R; *HIV-1 viral envelope glycoprotein gp120 triggers an inflammatory response in cultured rat astrocytes and regulates the functional expression of P-glycoprotein; Molecular Pharmacology; 2006; 70(3): 1087-1098. PMID: 16790532.
7. Bendayan R, **Ronaldson PT**, Gingras D, Bendayan M; *In situ localization of P-glycoprotein (ABCB1) in human and rat brain; Journal of Histochemistry and Cytochemistry; 2006; 54(10): 1159-1167. PMID: 16801529.
8. **Ronaldson PT**, Bendayan R; *HIV-1 envelope glycoprotein gp120 produces oxidative stress and regulates the expression of multidrug resistance protein-1 (Mrp1) in glial cells; Journal of Neurochemistry; 2008; 106(3): 1298-1313. PMID: 18485102.
9. **Ronaldson PT**, Persidsky Y, Bendayan R; *Regulation of ABC membrane transporters in glial cells: relevance to the pharmacotherapy of brain HIV-1 infection; Glia; 2008; 56(16): 1711-1735. PMID: 18649402.
10. Zastre JA, Chan GN, **Ronaldson PT**, Ramaswamy M, Couraud PO, Romero IA, Weksler B, Bendayan M, Bendayan R; *Up-regulation of P-glycoprotein by HIV protease inhibitors in a human brain microvessel endothelial cell line; Journal of Neuroscience Research; 2009; 87(4): 1023-1036. PMID: 18855943.
11. **Ronaldson PT**, Demarco KM, Sanchez-Covarrubias L, Solinsky CM, Davis TP; *Transforming growth factor-beta signaling alters substrate permeability and tight junction protein expression at the blood-brain barrier during inflammatory pain; Journal of Cerebral Blood Flow and Metabolism; 2009; 29(6): 1084-1098. PMID: 19319146.
12. **Ronaldson PT**, Ashraf T, Bendayan R; *Regulation of multidrug resistance protein 1 (Mrp1) by tumor necrosis factor alpha (TNF- α) in cultured glial cells: involvement of nuclear factor- κ B (NF- κ B) and c-Jun N-terminal kinase (JNK) signaling pathways; Molecular Pharmacology; 2010; 77(4): 644-659. PMID: 20051532.
13. **Ronaldson PT**, Finch JD, Demarco KM, Quigley CE, Davis TP; Inflammatory pain signals an increase in functional expression of organic anion transporting polypeptide 1a4 at the blood-brain barrier; Journal of Pharmacology and Experimental Therapeutics; 2011; 336(3): 827-839. PMID: 21131267.
14. Ashraf T, **Ronaldson PT**, Persidsky Y, Bendayan R; *Regulation of P-glycoprotein by human immunodeficiency virus-1 in primary cultures of human fetal astrocytes; Journal of Neuroscience Research; 2011; 89(11): 1773-1782. PMID: 21826700.

15. **Ronaldson PT**, Davis TP; Targeting blood-brain barrier changes during inflammatory pain: an opportunity for optimizing CNS drug delivery; *Therapeutic Delivery*; 2(8): 1015-1041. PMID: 22468221.
16. Lochhead JJ, McCaffrey G, Sanchez-Covarrubias L, Finch JD, Demarco KM, Quigley CE, Davis TP, **Ronaldson PT**; Tempol modulates changes in xenobiotic permeability and occludin oligomeric assemblies at the blood-brain barrier during inflammatory pain; *American Journal of Physiology Heart and Circulatory Physiology*; 2011; 302(3): H582-H593. PMID: 22081706.
17. **Ronaldson PT**, Davis TP; Blood-brain barrier integrity and glial support: mechanisms that can be targeted for novel therapeutic approaches in stroke; *Current Pharmaceutical Design*; 2012; 18(25): 3624-3644. PMID: 22574987.
18. McCaffrey G, Staatz W, Finch JD, Demarco KM, Laracuenta ML, **Ronaldson PT**, Davis TP; Effect of inflammatory pain on P-glycoprotein trafficking at the blood-brain barrier; *Journal of Neurochemistry*; 2012; 122(5): 962-975. PMID: 22716933.
19. **Ronaldson PT**, Davis TP; Targeted drug delivery to treat pain and cerebral hypoxia; *Pharmacological Reviews*; 2013; 65(1): 291-314. PMID: 23343976.
20. Dallas S, Block ML, Thompson DM, Bonini MG, **Ronaldson PT**, Bendayan R, Miller DS; *Microglial activation decreases retention of the protease inhibitor saquinavir: implications for HIV treatment; *Journal of Neuroinflammation*; 2013; 10:58. PMID: 23642074.
21. **Ronaldson PT**, Davis TP; Gabapentin and diclofenac reduce opioid consumption in patients undergoing tonsillectomy: a result of altered CNS drug delivery? (Letter); *Archives of Trauma Research*; 2013; 2(2): 97-98. PMID: 24396803.
22. Sanchez-Covarrubias L, Slosky L, Thompson BJ^o, Davis TP, **Ronaldson PT**; Transporters at CNS barrier sites: obstacles or opportunities for drug delivery; *Current Pharmaceutical Design*; 2013; 20(10): 1422-1449. PMID: 23789948.
23. **Ronaldson PT**; Targeting transporters for CNS drug delivery; *Current Pharmaceutical Design*; 2013; 20(10): 1419-1421. PMID: 23789947.
24. Slosky LM, Thompson BJ^o, Sanchez-Covarrubias L, Zhang Y, Laracuenta ML, Vanderah TW, **Ronaldson PT**, Davis TP; Acetaminophen modulates P-glycoprotein functional expression at the blood-brain barrier by a constitutive androstane receptor-dependent mechanism; *Molecular Pharmacology*; 2013; 84(5): 774-786. PMID: 24019224.
25. Sanchez-Covarrubias L, Slosky LM, Thompson BJ^o, Zhang Y, Laracuenta ML, DeMarco KM, **Ronaldson PT**, Davis TP; P-glycoprotein modulates Morphine Uptake into the CNS: A role for the Non-steroidal Anti-inflammatory Drug Diclofenac; *PLOS One*; 2014; 9(2): e88516. PMID: 24520393.
26. Thompson BJ^o, Sanchez-Covarrubias L, Slosky LM, Zhang Y, Laracuenta ML, **Ronaldson PT**; Hypoxia/Reoxygenation Stress Signals an Increase in Organic Anion Transporting Polypeptide 1a4 (Oatp1a4) at the Blood-Brain Barrier: Relevance to CNS Drug Delivery; *Journal of Cerebral Blood Flow and Metabolism*; 2014; 34(4): 699-707. PMID: 24473481.
27. Thompson BJ^o, **Ronaldson PT**; Drug delivery to the ischemic brain; *Adv Pharmacol*; 2014; 71: 165-202. PMID: 25307217.
28. **Ronaldson PT**, Davis TP; Targeting transporters: Promoting blood-brain barrier repair in response to oxidative stress injury; *Brain Research*; 2015; 1623: 39-52. PMID: 25796436.

29. **Ronaldson PT**, Bauer B, El-Kattan AF, Shen H, Salphati L, Louie SW; Highlights from the AAPS/ITC joint workshop on drug transporters in ADME: From the bench to the bedside – Clinical considerations; *Clinical Pharmacology and Therapeutics*; 2016; 100; 419-422. PMID: 27500791.
30. Ibbotson K^o, Yell JA^o, **Ronaldson PT**; Nrf2 signaling increases expression of ATP-Binding Cassette Subfamily C mRNA transcripts at the Blood-Brain Barrier following Hypoxia-Reoxygenation Stress; *Fluids and Barriers of the CNS*; 2017; 14; 6. PMID: 28298215.
31. Lochhead JJ, **Ronaldson PT**, Davis TP; Hypoxic stress and inflammatory pain disrupt blood-brain barrier tight junctions: Implications for drug delivery to the Central Nervous System; *The AAPS Journal*; 2017; 19; 910-920. PMID: 28353217.
32. Brzica H^o, Abdullahi W^o, Ibbotson K^o, **Ronaldson PT**; Targeting blood-brain barrier transporters for drug delivery and vascular protection in ischemic stroke; *Journal of Central Nervous System Diseases*; 2017; 9; 1179573517693802. PMID: 28469523.
33. Abdullahi W^o, Brzica H^o, Ibbotson K^o, **Ronaldson PT**; Bone morphogenetic protein-9 increases functional expression of organic anion transporting polypeptide 1a4 at the blood-brain barrier via the activin receptor-like kinase (ALK)-1 receptor; *Journal of Cerebral Blood Flow and Metabolism*; 2017; 37; 2340-2345. PMID: 28387157.
34. Abdullahi W^o, Davis TP, **Ronaldson PT**; Functional expression of P-glycoprotein and organic anion transporting polypeptides at the blood-brain barrier: Understanding transport mechanisms for improved CNS drug delivery; *The AAPS Journal*; 2017; 19; 931-939. PMID: 28447295.
35. Brzica H^o, Abdullahi W^o, Reilly BG^o, **Ronaldson PT**; A simple and reproducible method to prepare membrane samples from freshly isolated rat brain microvessels; *Journal of Visualized Experiments*; 2018; 7;(135). PMID: 29782001.
36. Abdullahi W^o, Tripathi D^o, **Ronaldson PT**; Blood-brain barrier dysfunction in ischemic stroke: Targeting tight junctions and transporters for vascular protection; *American Journal of Physiology – Heart and Circulatory Physiology*; 2018; 315; C343-C356. PMID: 29949404.
37. Brzica H^o, Abdullahi W^o, Reilly BG^o, **Ronaldson PT**; Sex-specific differences in functional expression of organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier in Sprague-Dawley rats; *Fluids and Barriers of the CNS*; 2018; 15: 25. PMID: 30208928.
38. Abdullahi W^o, Brzica H^o, Hirsch NA^o, Reilly BG^o, **Ronaldson PT**; Regulation of organic anion transporting polypeptide 1a4 at the blood-brain barrier via activating receptor-like kinase (ALK)-1 receptor signaling; *Molecular Pharmacology*; 2018; 94; 1321-1333. PMID: 30262595.
39. Yang J^o, Reilly BG^o, Davis TP, **Ronaldson PT**; Modulation of opioid transport at the blood-brain barrier by altered ATP-binding cassette (ABC) transporter expression and activity; *Pharmaceutics*; 2018; 10; pii: E192. PMID: 30340346.
40. Lochhead JJ, Kellohen KL, **Ronaldson PT**, Davis TP; Distribution of insulin in trigeminal nerve and brain after intranasal administration; *Scientific Reports*; 2019; 9; 2621. PMID: 30796294.
41. Williams EI^o, Betterton RD^o, Davis TP, **Ronaldson PT**; Transporter-mediated delivery of small molecule drugs to the brain: A critical mechanism that can advance therapeutic development for ischemic stroke; *Pharmaceutics*; 2020; 12: 154. PMID: 32075088.

42. Lochhead JJ, Yang JZ^o, **Ronaldson PT**, Davis TP; Structure, function, and regulation of the blood-brain barrier tight junction in CNS disorders; *Frontiers in Physiology*; 2020; 11: 914. PMID: 32848858.
43. **Ronaldson PT**, Davis TP; Regulation of Blood-Brain Barrier integrity by microglia in health and disease: A therapeutic opportunity; *Journal of Cerebral Blood Flow and Metabolism*; 2020; 40(1_suppl): S6-S24. PMID: 32928017.
44. **Ronaldson PT**, Brzica H^o, Abdullahi W^o, Reilly BG^o, Davis TP; Transport properties of statins by organic anion transporting polypeptide 1A2 and regulation by transforming growth factor- β signaling in human endothelial cells; *Journal of Pharmacology and Experimental Therapeutics*; 2021; 376: 148-160. PMID: 33168642.
45. Betterton RD^o, Davis TP, **Ronaldson PT**; Organic cation transporter (OCT/OCTN) expression at brain barrier sites: Focus on CNS drug delivery; *Handbook of Experimental Pharmacology*; 2021; 266: 301-328. PMID: 33674914.
46. Nilles KL^o, Williams EI^o, Betterton RD^o, Davis TP, **Ronaldson PT**; Blood-Brain Barrier Transporters: Opportunities for Therapeutic Development in Ischemic Stroke; *International Journal of Molecular Sciences*; 2022; 23: 1898. PMID: 35163820.
47. Betterton RD^o, Abdullahi W^o, Williams EI^o, Lochhead JJ, Brzica H^o, Stanton JA^o, Reddell E^o, Ogbonnaya C^o, Davis TP, **Ronaldson PT**; Regulation of Blood-Brain Barrier Transporters by Transforming Growth Factor-beta/Activin Receptor-Like Kinase 1 (TGF-beta/ALK1) Signaling: Relevance to the Brain Disposition of 3-Hydroxy-3-Methylglutaryl Coenzyme A (HMG-CoA) Reductase Inhibitors (i.e., Statins); *Drug Metabolism and Disposition*; 2022; 50: 942-956. PMID: 35504656.
48. Yang J^o, Betterton RD^o, Williams EI^o, Stanton JA^o, Reddell ES^o, Ogbonnaya CE^o, Dorn E^o, Davis TP, Lochhead JJ, **Ronaldson PT**; High-Dose Acetaminophen Alters the Integrity of the Blood-Brain Barrier and Leads to Increased CNS Uptake of Codeine in Rats; *Pharmaceutics*; 2022; 14: 949. PMID: 35631535.
49. **Ronaldson PT**, Davis TP; Transport Mechanisms at the Blood-Brain Barrier and in Cellular Compartments of the Neurovascular Unit: Focus on CNS Delivery of Small Molecule Drugs; *Pharmaceutics*; 2022; 14: 1501. PMID: 35890396.
50. Stanton JA^o, Williams EI^o, Betterton RD^o, Davis TP, **Ronaldson PT**; Organic Cation Transporters at the Blood-Brain Barrier can be Targeted for CNS Drug Delivery in Ischemic Stroke; *Experimental Neurology*; 2022; 357: 114181. PMID: 35905840.
51. Lochhead JJ, Williams EI^o, Dorn E^o, Reddell ES^o, **Ronaldson PT**, Davis TP; High Resolution Multiplex Confocal Imaging of the Neurovascular Unit in Health and Experimental Ischemic Stroke; *Cells*; 2023; 12: 645. PMID: 36831312.
52. Williams EI^o, Betterton RD^o, Stanton JA^o, Moreno-Rodriguez VM^o, Lochhead JJ, Davis TP, **Ronaldson PT**. Organic anion transporting polypeptide (Oatp)-mediated transport: A mechanism for atorvastatin neuroprotection in stroke. *Stroke*; 2023; 54: 2875-2885. PMID: 33750296.
53. **Ronaldson PT**, Williams EI^o, Betterton RD^o, Stanton JA^o, Nilles KL^o, Davis TP. CNS drug delivery in stroke: Improving therapeutic translation from the bench to the bedside. *Stroke*; 2024; 55: 190-202. PMID: 38134249.
54. **Ronaldson PT**, Davis TP. Blood-brain barrier transporters: A translational consideration for CNS delivery of neurotherapeutics. *Expert Opinion on Drug Delivery*; 2024; 21: 71-89. PMID: 38217410.

55. Hammer MF, Krzyzaniak CT^o, Bahramnejad E^o, Smelser KJ, Hack JB, Watkins JC, **Ronaldson PT**. Sex differences in physiological response to increased neuronal excitability in a knockin mouse model of pediatric epilepsy. *Clinical Science (London)*; 2024; 138: 205-223. PMID: 38348743.
56. Lochhead JJ, **Ronaldson PT**, Davis TP. The role of oxidative stress in blood-brain barrier disruption during ischemic stroke: Antioxidants in clinical trials. *Biochemical Pharmacology*; 2024; 30: 166186. PMID: 38561092.
57. Hammer MF, Bahramnejad E^o, Watkins JC, **Ronaldson PT**. Candesartan restores blood-brain barrier dysfunction, mitigates aberrant gene expression, and extends lifespan in a knockin mouse model of epileptogenesis. *Clinical Science (London)*. 2024; **Epub Aug 2, 2024**. PMID: 39092536.

Abstracts at Scientific Meetings (National and International)

1. **Ronaldson PT**, Dallas S, Pallapothu M, Bendayan R; *Functional expression of P-glycoprotein (P-gp) in primary rat astrocyte cultures and an immortalized rat astrocyte cell line (DI-TNC); *Clin Pharmacol Ther*; 2002; 71(2): P15. (Presented as a poster and as an oral presentation at the American Society for Clinical Pharmacology and Therapeutics Annual Meeting, Atlanta, GA, March 24-27, 2002).
2. **Ronaldson PT**, Dallas S, Pallapothu M, Bendayan R; *Transport of saquinavir (SAQ) by P-glycoprotein and the multidrug resistance protein in an immortalized endothelial cell line (RBE4); *Clin Pharmacol Ther*; 2002; 71(2): P51. (Presented as a poster and as an oral presentation at the American Society for Clinical Pharmacology and Therapeutics Annual Meeting, Atlanta, GA, March 24-27, 2002).
3. **Ronaldson PT**, Dallas S, Piquette-Miller M, Bendayan R; *Functional expression of P-glycoprotein (P-gp) in primary rat astrocyte cultures: relevance to the treatment of HIV infection in the brain; *Can J Infect Dis*; 2002; 13: 151P. (Presented as a poster at the 11th Annual Canadian Conference on HIV/AIDS Research, Winnipeg, MB, April 25-28, 2002).
4. Lee G, **Ronaldson PT**, Bendayan R; *P-glycoprotein (P-gp) mediated transport of saquinavir (SAQ) across the blood-brain barrier (BBB) and microglia; *Can J Infect Dis*; 2002; 13: 141P. (Presented as a poster at the 11th Annual Canadian Conference on HIV/AIDS Research, Winnipeg, MB, Canada, April 25-28, 2002).
5. Lee G, **Ronaldson PT**, Bendayan R; *P-glycoprotein mediated transport of saquinavir at the blood-brain barrier and brain parenchyma. *AAPS J*; 2002; 4(S1): W4243. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Toronto, ON, Canada, November 10-14, 2002).
6. **Ronaldson PT**, Piquette-Miller M, Bendayan R; *Functional expression of P-glycoprotein (P-gp) in rat astrocyte cultures: relevance to the treatment of HIV-1 infection in the brain. *AAPS J*; 2002; 4(S1): W4255. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Toronto, ON, Canada, November 10-14, 2002).
7. Dallas S, Lee G, **Ronaldson PT**, Bendayan R; *Multidrug resistance protein (Mrp)-mediated transport of [14C]-saquinavir in a rat brain endothelial cell line (RBE4). *AAPS J*; 2002; 4(S1): W4269. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Toronto, ON, Canada, November 10-14, 2002).
8. **Ronaldson PT**, Gingras D, Piquette-Miller M, Bendayan M, Bendayan R; *Localization and functional expression of P-glycoprotein in rat astrocyte cultures. 2003; Abstract #A23. (Presented as a poster at the Association of Faculties of Pharmacy of Canada Annual Meeting, Montreal, PQ, Canada, May 29-June 1, 2003).

9. **Ronaldson PT**, Gingras D, Piquette-Miller M, Bendayan M, Bendayan R; *Localization and functional expression of P-glycoprotein (P-gp) in rat astrocyte cultures: Relevance to the treatment of HIV-1 infection in the CNS. 2003. (Presented as a poster at the Cerebrovascular Biology Annual Meeting, Amarillo, TX, June 15-19, 2003).
10. Dallas S, **Ronaldson PT**, Zhu X, Schlichter L, Bendayan R; *MRP4- and MRP5-mediated efflux of 9-(2-phosphonylmethoxyethyl)adenine (PMEA) by microglia. Clin Pharmacol Ther; 2004; 75(2): P64. (Presented as a poster at the American Society of Clinical Pharmacology and Therapeutics Annual Meeting, Miami Beach, FL, March 24-27, 2004).
11. **Ronaldson PT**, Bendayan M, Gingras D, Bendayan R; *Molecular expression and physical association of P-glycoprotein (P-gp) and caveolin-1 in rat astrocyte cultures. 2004. (Presented as a poster at the Gordon Research Conference on Barriers of the CNS, Tilton, NH, June 27-July 2, 2004).
12. **Ronaldson PT**, Ramaswamy M, Bendayan R; *Effect of lipopolysaccharide (LPS) treatment on the expression of P-glycoprotein (P-gp) and Multidrug Resistance Protein 1 (Mrp1) in cultured glial cells. AAPS J; 2004; 6(S1); R6242. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Baltimore, MD, November 7-11, 2004).
13. **Ronaldson PT**, Ramaswamy M, Bendayan R; **In vitro* treatment of cultured glial cells with gp120, an HIV-1 envelope protein, modulates the functional expression of the ATP-binding cassette (ABC) transporter P-glycoprotein (P-gp). AAPS J; 2005; 7(S2): R6274. (Presented as an oral presentation and as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Nashville, TN, November 6-10, 2005).
14. Bendayan R, **Ronaldson PT**, Bendayan M; **In situ* localization of P-glycoprotein (ABCB1) in human and rat brain. AAPS J; 2005; 7(S2): R6275. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Nashville, TN, November 6-10, 2005).
15. **Ronaldson PT**, Ramaswamy M, Bendayan R; *Effect of gp120 and cytokines on the functional expression of P-glycoprotein (P-gp), an ATP binding cassette (ABC) drug efflux transporter, in cultured glial cells. 2005; Abstract #109. (Presented as an oral presentation at the Ontario HIV Treatment Network Research Conference, Toronto, ON, Canada, November 24-25, 2005).
16. Bendayan R, **Ronaldson PT**, Bendayan M; **In situ* localization of P-glycoprotein (ABCB1) in human and rat brain: relevance to the treatment of HIV-1 infection in the brain. 2005; Abstract #247. (Presented as a poster at the Ontario HIV Treatment Network Research Conference, Toronto, ON, Canada, November 24-25, 2005).
17. **Ronaldson PT**, Ramaswamy M, Bendayan R; *Functional expression of the ATP-binding cassette (ABC) membrane transporter P-glycoprotein (P-gp; ABCB1) in cultured glial cells treated with gp120. 2006; Abstract #TUPE-0076. (Presented as a poster at the XVI International AIDS Conference, Toronto, ON, Canada, August 13-18, 2006).
18. **Ronaldson PT**, Rasaiah VPA, Bendayan R; *Increased expression of Multidrug Resistance Protein-1 (Mrp1) in cultured astrocytes treated with HIV-1 viral envelope glycoprotein gp120 or cytokines. AAPS J; 2006; 8(S2): W5311. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, San Antonio, TX, October 29-November 2, 2006).
19. **Ronaldson PT**, Tran CS, Rasaiah VPA, Bendayan R; *Effect of gp120 and cytokines on the functional expression of the Multidrug Resistance-Associated Protein-1 (Mrp1), an ATP-binding cassette (ABC) efflux drug transporter, in cultured glial cells. 2006; Abstract #210. (Presented as an oral presentation and as a poster at the Ontario HIV Treatment Network Research Conference, Toronto, ON, Canada, November 27-28, 2006).
20. **Ronaldson PT**, Chan J, Bendayan R; *Involvement of the mitogen-activated protein kinase (MAPK) pathway in the regulation of P-glycoprotein (P-gp) expression in cultured rat astrocytes treated with gp120. 2006; Abstract #211.

(Presented as an oral presentation and as a poster at the Ontario HIV Treatment Network Research Conference, Toronto, ON, Canada, November 27-28, 2006).

21. **Ronaldson PT**, Tran CS, Rasaiah VPA, Bendayan R; *Increased functional expression of Multidrug Resistance Protein-1 (Mrp1) in cultured astrocytes treated with HIV-1 envelope glycoprotein gp120 or cytokines. *Can J Infect Dis*; 2007; 18: 13B. (Presented as an oral presentation at the 16th Annual Canadian Conference on HIV/AIDS Research, Toronto, ON, Canada, April 26-29, 2007).
22. **Ronaldson PT**, Chan J, Bendayan R; *Involvement of the mitogen-activated protein kinase (MAPK) pathway in the regulation of P-glycoprotein (P-gp) expression in cultured rat astrocytes treated with gp120. *Can J Infect Dis*; 2007; 18: 51B. (Presented as a poster at the 16th Annual Canadian Conference on HIV/AIDS Research, Toronto, ON, Canada, April 26-29, 2007).
23. Zastre J, Chan G, **Ronaldson PT**, Ramaswamy M, Bendayan R; *P-glycoprotein mediated transport and induction by the HIV-1 protease inhibitor atazanavir in a human brain microvessel endothelial cell line. *Can J Infect Dis*; 2007; 18: 53B. (Presented as a poster at the 16th Annual Canadian Conference on HIV/AIDS Research, Toronto, ON, Canada, April 26-29, 2007).
24. **Ronaldson PT**, Chan J, Bendayan R; *Involvement of the MAPK pathway in the regulation of P-glycoprotein (P-gp) expression in cultured glial cells triggered with HIV-1 envelope protein gp120. *AAPS J*; 2007; 9(S2): T3456. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, San Diego, CA, November 11-15, 2007).
25. **Ronaldson PT**, Tran CS, Rasaiah VPA, Bendayan R; *Increased functional expression of Multidrug Resistance Protein 1 (Mrp1) in cultured glial cells treated with HIV-1 viral envelope protein gp120 and cytokines. 2007; Abstract #204. (Presented as a poster at the Ontario HIV Treatment Network Research Conference, Toronto, ON, November 19-20, 2007).
26. **Ronaldson PT**, Chan J, Tran CS, Bendayan R; *Regulation of P-glycoprotein (P-gp) expression by the mitogen-activated protein kinase (MAPK) pathway in cultured rat astrocytes treated with gp120. 2007; Abstract #212. Presented as a poster at the Ontario HIV Treatment Network Research Conference, Toronto, ON, November 19-20, 2007).
27. **Ronaldson PT**, Demarco KM, Sanchez-Covarrubias L, Solinsky CM, Davis TP; Transforming growth factor- β (TGF- β) signaling is involved in the regulation of blood-brain barrier (BBB) functional integrity during peripheral inflammatory pain. 2009. (Presented as a poster at the XXIV International Symposium on Cerebral Blood Flow and Metabolism, Chicago, IL, June 29-July 3, 2009).
28. **Ronaldson PT**, Lochhead JJ, McCaffrey G, Davis TP; Hypoxia/reoxygenation stress alters solute permeability and occludin localization/phosphorylation at the blood-brain barrier. 2010. (Presented at a poster at the International Stroke Conference-American Heart Association, San Antonio, TX, February 23-25, 2010).
29. **Ronaldson PT**, Finch JD, Demarco KM, Quigley CE, Davis TP; Functional expression of organic anion transporting polypeptide 1a4 (Oatp1a4) is increased during peripheral inflammatory pain: relevance to CNS drug delivery. 2010. (Presented as a poster at the Gordon Research Conference on Barriers of the CNS, New London, NH, June 20-25, 2010).
30. **Ronaldson PT**, Lochhead JJ, Campos CR, Davis TP; Modulation of blood-brain barrier functional integrity by pain/inflammation. 2011. (Presented as an oral presentation at the American Society for Neurochemistry Annual Meeting, St. Louis, MO, March 19-23, 2011).

31. Davis TP, **Ronaldson PT**; CNS drug delivery: Molecular targeting at the blood-brain barrier. 2011. (Presented as a poster at the XXVth International Symposium on Cerebral Blood Flow, Metabolism, and Function, Barcelona, Spain, May 25-28, 2011).
32. Sanchez-Covarrubias L, Slosky LM, Finch JD, Demarco KM, Davis TP, **Ronaldson PT**; Hypoxia/reoxygenation stress signals an increase in organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier: relevance to CNS drug delivery. *AAPS J*; 2012; 14(S2): M1341. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Chicago, IL, October 14-18, 2012).
33. Slosky LM, Thompson BJ^o, Sanchez-Covarrubias L, Davis TP, **Ronaldson PT**; Acetaminophen modulates P-glycoprotein functional expression at the blood-brain barrier by a constitutive androstane receptor-dependent mechanism. *AAPS J*; 2012; 14(S2): M1342. (Presented as a poster at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, Chicago, IL, October 14-18, 2012).
34. **Ronaldson PT**, Slosky LM, Thompson BJ^o, Davis TP. Targeting organic anion transporting polypeptides to treat pain and hypoxia/reoxygenation stress. 2013; Abstract #439. (Presented as an oral presentation at the XXVth International Symposium on Cerebral Blood Flow, Metabolism, and Function, Shanghai, China, May 20-23, 2013).
35. Sanchez-Covarrubias L, **Ronaldson PT**, Demarco KM, Davis TP; Diclofenac modulates morphine uptake into the CNS: A role for P-glycoprotein. 2013: Abstract #207. (Presented as a poster at the American Association of Pharmaceutical Scientists' Workshop on Drug Transporters in ADME: From the Bench to the Bedside, Bethesda, MD, March 17-20, 2013).
36. Slosky LM, Thompson BJ^o, Sanchez-Covarrubias L, Davis TP, **Ronaldson PT**; Acetaminophen modulates P-glycoprotein functional expression at the blood-brain barrier by a constitutive androstane receptor-dependent mechanism. 2013; Abstract #208. (Presented as a poster at the American Association of Pharmaceutical Scientists' Workshop on Drug Transporters in ADME: From the Bench to the Bedside, Bethesda, MD, March 17-20, 2013).
37. Thompson BJ^o, Sanchez-Covarrubias L, Slosky LM, **Ronaldson PT**; Altered expression of blood-brain barrier transporters under hypoxia/reoxygenation stress: Relevance to treatment of cerebral hypoxia. 2013; Abstract #209. (Presented as a poster at the American Association of Pharmaceutical Scientists' Workshop on Drug Transporters in ADME: From the Bench to the Bedside, Bethesda, MD, March 17-20, 2013).
38. **Ronaldson PT**, Yell JA^o, Laracuenta ML; Nrf2 signaling modulates expression of Multidrug Resistance Proteins at the Blood-Brain Barrier following Hypoxia/Reoxygenation Stress. (Presented as a poster at the Gordon Research Conference on Barriers of the CNS, New London, NH, June 15-20, 2014).
39. Abdullahi W^o, Brzica H^o, Ibbotson K^o, **Ronaldson PT**; TGF- β /ALK1 Signaling Alters Organic Anion Transporting Polypeptide 1a4 (Oatp1a4) Expression at the Blood-Brain Barrier. (Presented as a poster at the Arizona Physiological Society Annual Meeting, Glendale, AZ, November 13-14, 2015).
40. Abdullahi W^o, Brzica H^o, Ibbotson K^o, **Ronaldson PT**; TGF- β /ALK1 Signaling Increases Organic Anion Transporting Polypeptide 1a4 (Oatp1a4) Expression at the Blood-Brain Barrier. (Accepted for poster presentation at the American Association for Pharmaceutical Scientist's Annual Meeting and Exposition, Denver, CO, November 13-17, 2016).
41. Brzica H^o, Abdullahi W^o, **Ronaldson PT**; Atorvastatin Protects Against Neurodegeneration Induced by Hypoxia/Reoxygenation Stress: A Role for Organic Anion Transporting Polypeptide 1a4 (Oatp1a4). (Accepted for poster presentation at the American Association for Pharmaceutical Scientist's Annual Meeting and Exposition, Denver, CO, November 13-17, 2016).

42. Abdullahi W^o, Brzica H^o, Ibbotson K^o, **Ronaldson PT**; Targeting Organic Anion Transporting Polypeptide 1a4 (Oatp1a4) Expression at the Blood-Brain Barrier: Implications for Stroke Therapy. (Accepted for poster presentation at the International Stroke Conference 2017, Houston, TX, February 21-24, 2017).
43. Abdullahi W^o, Brzica H^o, Ibbotson K^o, **Ronaldson PT**; BMP-9 increases Organic Anion Transporting Polypeptide 1a4 (Oatp1a4) Expression at the Blood-Brain Barrier via Smad1/5/8 Signaling. (Accepted for poster presentation at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, San Diego, CA, November 12-15, 2017).
44. **Ronaldson PT**, Abdullahi W^o, Brzica H^o; Functional expression of Organic Anion Transporting Polypeptide (Oatp1a4) is Increased at the Blood-Brain Barrier in Female Sprague-Dawley Rats. (Accepted for poster presentation at the American Association of Pharmaceutical Scientists' Annual Meeting and Exposition, San Diego, CA, November 12-15, 2017).
45. Abdullahi W^o, Brzica H^o, Reilly B^o, **Ronaldson PT**; Functional expression of Organic Anion Transporting Polypeptide 1a4 (Oatp1a4) at the Blood-Brain Barrier is Regulated via the ALK-1 Receptor. (Accepted for poster presentation at the 12th International Conference on Cerebral Vascular Biology, Melbourne, Australia, November 28-December 1, 2017).
46. Brzica H^o, Abdullahi W^o, Reilly BG^o, **Ronaldson PT**; Sex differences in functional expression of organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier: Relevance to treatment of ischemic stroke. (Accepted for poster presentation at the 3rd Annual Arizona Biomedical Research Commission Conference, Phoenix, AZ, March 8, 2018).
47. Brzica H^o, Abdullahi W^o, Reilly BG^o, **Ronaldson PT**; Sex differences in functional expression of organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier in Sprague-Dawley rats. (Accepted for poster presentation at the American Association of Pharmaceutical Scientists' Workshop on Drug Transporters in ADME: From the Bench to the Bedside, Herndon, VA, April 16-18, 2018).
48. Brzica H^o, Abdullahi W^o, Reilly BG^o, **Ronaldson PT**; Sex differences in functional expression of organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier: Relevance to treatment of ischemic stroke. (Accepted for poster presentation at the Gordon Research Conference on Barriers of the CNS, New London, NH, June 18-22, 2018).
49. **Ronaldson PT**, Abdullahi W^o, Lochhead JJ, Davis TP; Organic anion transporting polypeptide (Oatp)-mediated uptake transport at the blood-brain barrier is required for atorvastatin to provide neuroprotective effects in experimental ischemic stroke. (Accepted for poster presentation at the American Association of Pharmaceutical Scientists (AAPS)/International Brain Barriers Society (IBBS) Joint Workshop on Novel Approaches Targeting Brain Barriers for Effective Delivery of Therapeutics, Herndon, VA, April 29 – May 1, 2019).
50. Lochhead JJ, Abdullahi W^o, Davis TP, **Ronaldson PT**; Neuroprotective effects of atorvastatin in ischemic stroke. A role for the endogenous blood-brain barrier transporter organic anion transporting polypeptide 1a4 (Oatp1a4). (Accepted for poster presentation at the 4th Annual Arizona Biomedical Research Commission Research Conference, Phoenix, AZ, May 4, 2019).
51. **Ronaldson PT**, Abdullahi W^o, Lochhead JJ, Davis TP; Neuroprotective effects of atorvastatin in experimental stroke requires organic anion transporting polypeptide (Oatp)-mediated transport at the blood-brain barrier; *Fluids Barriers CNS*. **16(Suppl 1):** A104. (Accepted for poster presentation at the 13th International Conference on Cerebral Vascular Biology, Miami, FL, June 25-28, 2019).

52. Reilly BG^o, Betterton RD^o, Brzica H^o, **Ronaldson PT**; Expression of glucose transporters in an immortalized rat brain endothelial cell line (RBE4) subjected to *in vitro* stroke conditions. *Fluids Barriers CNS*. **16(Suppl 1)**: A66. (Accepted for poster presentation at the 13th International Conference on Cerebral Vascular Biology, Miami, FL, June 25-28, 2019).
53. Betterton RD^o, Abdullahi W^o, Yang J^o, Reilly BG^o, Serna S^o, **Ronaldson PT**; Modulation of the transforming growth factor-beta (TGF-beta) co-receptor endoglin (CD105) by oxygen/glucose deprivation in cultured rat brain endothelial cells: Relevance to ischemic stroke treatment; *Fluids Barriers CNS*. **16(Suppl 1)**: A96. (Accepted for poster presentation at the 13th International Conference on Cerebral Vascular Biology, Miami, FL, June 25-28, 2019).
54. Serna S^o, Brzica H^o, Becktel D^o, Reilly BG^o, Yang J^o, Betterton RD^o, **Ronaldson PT**; Sex differences in multidrug resistance protein 4 (Mrp4) expression at the blood-brain barrier in Sprague-Dawley rats; *Fluids Barriers CNS*. **16(Suppl 1)**: A135. (Accepted for poster presentation at the 13th International Conference on Cerebral Vascular Biology, Miami, FL, June 25-28, 2019).
55. Yang J^o, Betterton RD^o, Reilly BG^o, Lochhead JJ, Davis TP, **Ronaldson PT**; Acetaminophen modulates blood-brain barrier permeability by altering tight junction protein expression in brain vasculature; *Fluids Barriers CNS*. **16(Suppl 1)**: A4. (Accepted for poster presentation at the 13th International Conference on Cerebral Vascular Biology, Miami, FL, June 25-28, 2019).
56. Davis TP, Abdullahi W^o, Lochhead JJ, **Ronaldson PT**; Organic anion transporting polypeptide (Oatp)-mediated transport at the blood-brain barrier is required for atorvastatin-induced neuroprotection in experimental ischemic stroke. (Accepted for poster presentation at the BRAIN and BRAIN PET 2019 Conference, Yokohama, Japan, July 4-7, 2019).
57. **Ronaldson PT**, Lochhead JJ, Davis TP. Organic anion transporting polypeptide (Oatp)-mediated transport is required for statin-induced neuroprotection: A role for blood-brain barrier transporters in stroke treatment. (Accepted for poster presentation at the 2020 International Stroke Conference, Los Angeles, CA, February 19-21, 2020).
58. Williams EI^o, Lochhead JJ, Davis TP, **Ronaldson PT**. Acute neuroprotective effects of statins in ischemic stroke is dependent upon an Oatp-mediated transport mechanism at the BBB. (Accepted for poster presentation at PharmSci360, American Association of Pharmaceutical Scientists (AAPS), Philadelphia, PA, October 17-20, 2021).
59. Betterton RD^o, Lochhead JJ, Williams EI^o, Yang J^o, Abdullahi W^o, Davis TP, **Ronaldson PT**. Targeting transforming growth factor- β (TGF- β signaling to modulate organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier: Relevance to the treatment of ischemic stroke. (Accepted for poster presentation at PharmSci360, American Association of Pharmaceutical Scientists (AAPS), Philadelphia, PA, October 17-20, 2021).
60. **Ronaldson PT**, Williams EI^o, Stanton JA^o, Betterton RD^o, Davis TP. Endogenous Blood-Brain Barrier Transporters are Critical Determinants of Neuroprotective Drug Efficacy in Ischemic Stroke. (Accepted for poster presentation at PharmSci360, American Association of Pharmaceutical Scientists (AAPS), Boston, MA, October 16-19, 2022).
61. Betterton RD^o, Williams EI^o, Stanton JA^o, Lochhead JJ, Davis TP, **Ronaldson PT**. Role of endoglin in the regulation of organic anion transporting polypeptide 1a4 at the blood-brain barrier. (Accepted for poster presentation at the 1st Keystone Symposium on Drug Delivery to the Brain, Breckenridge, CO, January 23-26, 2023).
62. Williams EI^o, Betterton RD^o, Stanton JA^o, Lochhead JJ, Davis TP, **Ronaldson PT**. Organic anion transporting polypeptide 1a4, an endogenous blood-brain barrier transporter, can be targeted for improved efficacy

of neuroprotective drugs. (Accepted for poster presentation at the 1st Keystone Symposium on Drug Delivery to the Brain, Breckenridge, CO, January 23-26, 2023).

63. Stanton JA[°], Williams EI[°], Betterton RD[°], Lochhead JJ, Davis TP, **Ronaldson PT**. Endogenous functional expression of organic cation transporters (Octs) and multidrug and toxin extruders (Mates) at the blood-brain barrier: Targets for optimization of CNS drug delivery. (Accepted for poster presentation at the 1st Keystone Symposium on Drug Delivery to the Brain, Breckenridge, CO, January 23-26, 2023).
64. Betterton RD[°], Williams EI[°], Stanton JA[°], Lochhead JJ[°], Davis TP[°], **Ronaldson PT**. Role of endoglin in the regulation of organic anion transporting polypeptide 1a4 at the blood-brain barrier: Relevance to the treatment of ischemic stroke. (Accepted for poster presentation at the International Stroke Conference, Dallas, TX, February 8-10, 2023).
65. Williams EI[°], Betterton RD[°], Stanton JA[°], Lochhead JJ, Davis TP, **Ronaldson PT**. Organic anion transporting polypeptides: Endogenous blood-brain barrier transporters that are required for statins to exert neuroprotective effects in ischemic stroke. (Accepted for poster presentation at the International Stroke Conference, Dallas, TX, February 8-10, 2023).
66. Stanton JA[°], Williams EI[°], Betterton RD[°], Lochhead JJ, Davis TP, **Ronaldson PT**. Localization and expression of transporters for cationic drugs at the blood-brain barrier: Relevance to the pharmacotherapy of ischemic stroke. (Accepted for poster presentation at the International Stroke Conference, Dallas, TX, February 8-10, 2023).

Manuscripts Submitted or in Preparation

(* work as a graduate student; [°] undergraduate/graduate advisees or postdoctoral mentees; # co-lead authors)

1. Betterton RD, Williams EI, Stanton JA, Davis TP, **Ronaldson PT**. Endoglin is a Critical Regulator of Oatp-Mediated Transport in Brain Microvessel Endothelial Cells. *Journal of Pharmaceutical Sciences*. Manuscript to be Submitted October 1, 2024.
2. Zhu K, He Q, Tsai SF, Mudalige DM, Henrion MYR, Zaidi SA, Lau B, Tang A, Cadiz MP, Hodos-Nkhereanye R, Moein S, Alamprese ML, Bennett DA, De Jager PL, Frye JD, Ertekin-Taner N, Kuo YM, **Ronaldson PT**, Chang R. Novel Master Regulators of Microglial Phagocytosis and Repurposed FDA-Approved Drugs for Treatment of Alzheimer's Disease. *Science Translational Medicine*. Manuscript to be Submitted November 1, 2024.

SCHOLARLY PRESENTATIONS (LAST 5 YEARS)

- Invited Lecture at Texas Tech University Health Sciences Center School of Pharmacy, Amarillo, TX, February 1, 2017. Title: Targeting organic anion transporting polypeptide 1a4 (Oatp1a4) at the blood-brain barrier: Implications for CNS drug delivery.
- Invited Lecture at the 12th International Conference on Cerebral Vascular Biology, Melbourne, Australia, November 29, 2017. Title: Targeting blood-brain barrier transporters for CNS drug delivery.
- Invited Lecture at the American Association of Pharmaceutical Scientists' (AAPS) Workshop on Drug Transporters in ADME: From the Bench to the Bedside, Herndon, VA, April 16, 2018. Title: Regulation of Oatp1a4 functional expression by transforming growth factor signaling at the blood-brain barrier.

- Invited Lecture at the American Society for Pharmacology and Experimental Therapeutics Annual Meeting at Experimental Biology, San Diego, CA, April 23, 2018. Title: Targeting blood-brain barrier transporters for CNS drug delivery: Role of transforming growth factor-beta signaling.
- Invited Lecture at the Stroke Translational Research Advancement Workshop, Lexington, KY, October 25, 2018. Title: Targeting blood-brain barrier transporters to treat ischemic stroke.
- Invited Lecture at the 2019 International Stroke Conference, Honolulu, HI, February 6, 2019. Title: Pericytes and transporters: Focus on drug delivery to the ischemic brain.
- Invited Lecture at the American Society for Pharmacology and Experimental Therapeutics Annual Meeting at Experimental Biology, Orlando, FL, April 9, 2019. Title: Targeting the blood-brain barrier for delivery of neuroprotective drugs in ischemic stroke.
- Invited Lecture at the Center for Natural Products, Drug Discovery, and Development, University of Florida College of Pharmacy, Gainesville, FL, April 10, 2019. Title: Endogenous blood-brain barrier transporters are critical determinants of statin neuroprotective effects in stroke.
- Invited Lecture at the American Association of Pharmaceutical Scientists' (AAPS) Workshop on Novel Approaches Targeting Brain Barriers for Effective Delivery of Therapeutics, Herndon, VA, April 29, 2019. Title: Transporter-mediated uptake of small molecules at the blood-brain barrier.
- Invited Lecture at Solvo Biotechnology Meet the Experts Transporter Conference, Cambridge, MA, September 4, 2019. Title: Blood-brain barrier transporters in ischemic stroke: Focus on organic anion transporting polypeptides (Oatps).
- Invited Lecture, Neuroscience Faculty Forum, Department of Neuroscience, University of Arizona, Tucson, AZ, November 7, 2019. Title: Blood-brain barrier transporters in ischemic stroke: Focus on organic anion transporting polypeptides (Oatps).
- Invited Lecture at the University of Mississippi Medical Center, Jackson, MS, February 11, 2020. Title: Blood-brain barrier transporters determine effects of statins in ischemic stroke.
- Invited Lecture, *Current Research in Vision and Neurodegeneration (PSIO 696E)*, Department of Neuroscience, University of Arizona, Tucson AZ, March 11, 2020. Title: Blood-brain barrier transporters determine effects of statins in ischemic stroke.
- Invited Lecture at the Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada, June 19, 2020. Title: Targeting blood-brain barrier transporters: A therapeutic opportunity (presented virtually).
- Invited Lecture at PharmSci 360, Annual Meeting of the American Association of Pharmaceutical Scientists (AAPS), New Orleans, LA, November 3, 2020. Title: Transporter-mediated delivery of small molecules across the blood-brain barrier (presented virtually).
- Invited Lecture at Chongqing University and BayRay Innovation Center, Chongqing, China, December 2, 2020. Title: Transporter-mediated delivery of small molecules across the blood-brain barrier: Relevance to the treatment of stroke (presented virtually).
- Invited Lecture at University of Arizona College of Medicine Research Day, Tucson, AZ, May 4, 2022. Title: Blood-Brain Barrier Transporters are Required for Therapeutic Effectiveness of Statins in Ischemic Stroke.

- Invited Lecture at ORIC Pharmaceuticals, San Francisco, CA, September 27, 2022 (via Zoom). Title: Targeting Blood-Brain Barrier Transporters: A Therapeutic Opportunity for CNS Delivery of Small Molecule Drugs.
- Invited Lecture at PharmSci 360, Annual Meeting of the American Association of Pharmaceutical Scientists (AAPS), Boston, MA, October 19, 2022. Title: Endogenous Blood-Brain Barrier Transporters are Critical Determinants of Neuroprotective Drug Efficacy in Ischemic Stroke.
- Invited Lecture at the 1st Keystone Symposium on Drug Delivery to the Brain, Breckenridge, CO, January 24, 2023. Title: Predictive Network Analysis for Identification of Therapeutics Targeting SLC Transporters: Relevance to the Treatment of Neurological Diseases.
- Invited Lecture at the International Stroke Conference, Phoenix, AZ, February 9, 2024. Title: Blood-Brain Barrier Transporters Determine Neuroprotective Effectiveness of Small Molecule Drugs in Stroke.

AWARDED GRANTS AND CONTRACTS (LAST 5 YEARS)

Federal (Active)

R01 DA051812-02 (Davis/Ronaldson)	07/01/2020 - 06/30/2025	5.00 Calendar
NIH/NIDA	\$368,666	

“Increased CNS Opioid Exposure by an Acetaminophen-Induced Blood-Brain Barrier Mechanism”

The overall goal of this project is to assess effects of acetaminophen exposure on tight junction protein expression and trafficking at the blood-brain barrier (BBB). These studies will show the relationship between tight junction complex integrity and BBB “leak” and how these parameters affect opioid-associated adverse events as well as addiction/tolerance. These studies will be conducted in control animals as well as in *in vivo* models of acute and chronic pain.

Role: Co-Principal Investigator

R01 NS084941-07 (Ronaldson)	07/01/2014 – 12/31/2025	5.00 Calendar
NIH/NINDS	\$368,022	

“Targeting Blood-Brain Barrier Transporters to Treat Ischemic Stroke”

The goal of this study is to facilitate discovery of novel approaches for treating ischemic stroke component by therapeutic targeting of endogenous transporters at the BBB. Specifically, this work will focus on utilizing organic anion transporting polypeptides (Oatps) for delivery of neuroprotective drugs. Transporter uptake kinetics and neurocognitive outcomes will be evaluated using the middle cerebral artery occlusion (MCAO) model of focal cerebral ischemia.

Role: Principal Investigator

F31 NS125917-01 (Williams)	07/01/2022 – 06/30/2025	0.00 Calendar
NIH/NINDS	\$42,792	

“Investigating Oatp-Mediated Delivery of Statins to the Brain in Males and Females: Relevance to Neuroprotective Treatment for Ischemic Stroke”

This predoctoral fellowship application will seek to evaluate the impact of sex as a biological variable in determining statin delivery to the brain in the setting of ischemic stroke. The proposed training program will provide an opportunity to develop research skills in blood-brain barrier transport, molecular pharmacology, and behavioral pharmacology.

Role: Sponsor

R41 AG080571 (Chang, Ronaldson, Wang)	04/01/2023 – 03/31/2023	1.50 Calendar
	\$500,000	

This project will evaluate pharmacological and toxicological properties of natural product compounds in animal models of Alzheimer's disease. Specifically, we will use the 3xTg mouse model of Alzheimer's disease to validate compounds identified through *in silico* and *in vitro* screening for their ability to reduce CNS biomarkers of Alzheimer's disease and to improve neurocognitive performance. Additionally, the systemic and central safety profile of each compound will be determined.

Role: Principal Investigator

Federal (Completed)

R56 AG062620-03 (Chang)	07/01/2019 – 06/30/2022	1.50 Calendar
NIH/NIA	\$619,843	

"Predictive Networks-based-in-silico approach for Precision Medicine Repurposing for Alzheimer's Disease"

This grant aims to repurpose FDA-approved investigational and experimental drugs and/or drug combinations for Alzheimer's Disease. Compounds will be identified using *in silico* strategies and validated using cell-based assays and in *in vivo* murine models of Alzheimer's Disease.

Role: Co-Investigator

State (Active)

None

State (Completed)

ABRC #000036665 (Ronaldson)	03/01/2017 – 02/28/2020	3.00 Calendar
Arizona Biomedical Research Commission	\$75,000	

"Effect of Aging in Transporter Functional Expression at the Blood-Brain Barrier: Relevance to the Treatment of Hypoxia/Reoxygenation Stress"

This grant examines the role of aging on expression of endogenous blood-brain barrier uptake transporters involved in CNS delivery of neuroprotective drugs. Specifically, regulation and functional expression of organic anion transporting polypeptide and organic cation transporters will be studied in an effort to develop precision medicine approaches to treat diseases with a hypoxia/reoxygenation component such as ischemic stroke.

Role: Principal Investigator

Industry (Completed)

MapLight Therapeutics, Inc. (Ronaldson)	04/01/2020 – 03/31/2021	1.00 Calendar
	\$34,128	

"P-glycoprotein-mediated transport of CNS Therapeutics at the Blood-Brain Barrier"

This contract utilized cell-based assays commonly utilized in the laboratory to assess P-glycoprotein transport liability of proprietary neurotherapeutics designed and developed by MapLight Therapeutics, Inc.

Role: Principal Investigator

Vigil Neuroscience (Ronaldson)	01/01/2022 – 12/31/2022	1.00 Calendar
	\$64,500	

“Blood-Brain Barrier Permeability and Microglia Targeting of Novel Neurotherapeutics”

This project will involve the development of an *in vitro* human endothelial cell/human microglia co-culture model to study BBB uptake kinetics and microglial stimulatory properties of proprietary compounds under development by Vigil Neuroscience.

Role: Principal Investigator

Private Foundation (Active)

19TPA34910113 (Ronaldson)	07/01/2019 – 06/30/2022	0.50 Calendar
American Heart Association (AHA)	\$90,909	

“Statins require endogenous blood-brain barrier transporters to confer neuroprotective effects in stroke”

The major goal of this project is to study pharmacokinetic properties of statin transport mediated by various transport mechanisms at the blood-brain barrier (BBB) in the setting of experimental stroke.

Role: Principal Investigator

Institutional (Active)

None

Institutional (Completed)

SWEHSC Pilot Grant (Ronaldson)	04/01/2019 – 03/31/2020	1.50 Calendar
University of Arizona College of Pharmacy	\$40,000	

“Effect of Arsenic on Functional Expression of Organic Anion Transporting Polypeptide 1a4 at the Blood-Brain Barrier: Relevance to Ischemic Stroke Treatment”

The objective of this project was to evaluate effects of arsenic, an environmental toxicant found in water sources in the American Southwest, on blood-brain barrier transporter expression and CNS drug delivery in the context of ischemic stroke.

Role: Principal Investigator

RII Core Facilities Pilot Program (Ronaldson)	04/29/2021 – 04/30/2022	0.00 Calendar
University of Arizona College of Medicine	\$10,438	

“Development of a High Throughput Screening Assay to Identify Alzheimer’s Disease Therapeutics”

This pilot grant proposal aims to develop a cell-based assay using neuroblastoma cells conditioned to develop into neurons in order to identify novel neuroprotective compounds. Such compounds will then be validated for their therapeutic utility in more robust in vitro assays and using in vivo animal models of Alzheimer's disease.

Role: Principal Investigator

SUBMITTED GRANTS AND CONTRACTS (LAST 5 YEARS)

Federal

R01 DA011271-17 (Davis/Ronaldson) NIH/NIDA	12/01/2017 – 11/30/2022 \$392,300 (Unawarded)	5.00 Calendar
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"Blood-to-CNS Drug Uptake in Pain: Drug-Drug Interactions"

The goal of this grant application was to study how polypharmacy can affect opioid delivery to the brain via changes in blood-brain barrier (BBB) tight junctions and transporters. Such changes constitute a mechanism that can cause drug-drug interactions (DDIs), thereby limiting the effectiveness and safety of opioid therapy.

Role: Co-Principal Investigator

R21 DA047057-01 (Ronaldson) NIH/NIDA	07/01/20218 – 06/30/2020 \$150,000 (Unawarded)	2.00 Calendar
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"Modulation of CNS Opioid Delivery by Acetaminophen-Induced Activation of Constitutive Androstane Receptor Signaling: A Mechanism for Drug-Drug Interactions"

This grant application sought to evaluate the molecular pharmacology of nuclear receptor signaling at the blood-brain barrier (BBB), particularly with respect to its regulation of brain opioid permeation. This project will have a direct impact on public health in the United States by characterizing mechanisms of drug-drug interactions (DDIs) at the BBB in order to develop treatment paradigms for pain that are safer and more effective.

Role: Co-Principal Investigator

R01 DA047832-01 (Davis/Ronaldson) NIH/NIDA	04/01/2019 – 03/31/2024 \$378,977 (Unawarded)	5.00 Calendar
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"Blood-to-CNS Drug Uptake: Effect of APAP and Pain"

This grant proposal aimed to study BBB changes in occludin and claudin-5 expression and trafficking induced by acetaminophen (APAP), both by itself and in *in vivo* models of acute/chronic pain. The impact of the proposed work will inform strategies to counteract misuse of analgesic medications and to develop safer medications for treatment of acute and chronic pain.

Role: Co-Principal Investigator

R01 AG070051-01 (Chang/Ronaldson et al) NIH/NIA	03/01/2021 – 02/28/2026 \$499,999 (Unawarded)	2.00 Calendar
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"Predictive Network Study of Blood-Based Aging-Related Metabolic Biomarkers and Therapeutics for the Preclinical Stage of Alzheimer's Disease"

This proposal aims at using a validated and cutting-edge computational systems biology approach integrating multi-scale omics data to improve our understanding of how age-associated metabolic pathways affect onset and progression of Alzheimer's Disease. This work will also identify novel therapeutic compounds that prevent or delay Alzheimer's disease onset, which will be validated in vivo using multiple murine disease models.

Role: Co-Principal Investigator

R01 NS119631-01 (Lochhead) NIH/NINDS	07/01/2021 – 06/30/2026 \$250,000 (Unawarded)	1.50 Calendar
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"Pain-Induced Changes in P-glycoprotein Activity at the Blood-Brain Barrier"

Our group has previously shown that pain alters the function of the critical efflux transporter P-glycoprotein in cerebral microvessels, an effect that modulates CNS drug delivery. This grant proposal will identify molecular mechanisms involved in altered P-gp activity and delivery of non-steroidal anti-inflammatory drugs (NSAIDs) to the brain. Such studies will enable novel strategies to provide optimal pain relief and reduce adverse effects associated with NSAID overconsumption.

Role: Co-Investigator

DOD EP220063 (Hammer/Ronaldson)	01/01/2023 – 12/31/2027 \$428,000 (Unawarded)	2.00 Calendar
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"Repurposing Drugs for Treatment of Post-Traumatic Epilepsy"

This grant is designed to evaluate efficacy of angiotensin receptor II antagonists in the reduction of seizure onset/frequency as well as in conferring blood-brain barrier (BBB) in the setting of post-traumatic epilepsy. For these studies, we will use mice with genetically altered voltage-gated sodium channels, which have the advantage of suffering from spontaneous seizures of variable frequency.

R21 AG083272-01 (Chang/Ronaldson/Wang)	07/01/2023-06/30/2028 \$250,000 (Unawarded)	1.50 Calendar
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"Integrative multi-omics network modeling to identify targets and treatments for exceptional longevity."

This grant is designed to identify novel gene targets that can be exploited to reduce cellular injury and/or dysfunction associated with aging. Additionally, new compounds will be identified that target the identified genes that will be developed as pharmacological treatments for age-related diseases such as Alzheimer's disease and related dementias.

R21 NS133557-01 (Ronaldson)	07/01/2023-06/30/2025 \$137,500 (Unawarded)	2.00 Calendar
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"Advancing Stroke Treatment by Targeting Blood-Brain Barrier Transporters for Cationic Small Molecule Drugs."

This grant will seek to develop endogenous blood-brain barrier transporters (i.e., organic cation transporters, multidrug and toxin extruders) as a mechanism for CNS delivery of small molecule therapeutics. Of note, we will test the relationship between these transport proteins and neuroprotective drug efficacy in the setting of ischemic stroke.

State

None

Industry

Aya Biosciences, Inc. (Ronaldson)

08/01/2021 – 07/31/2022

1.00 Calendar

\$28,450 (Pending)

“Evaluation of Blood-Brain Barrier Permeability of Novel Therapeutics for CNS Disorders”

This contract will employ cell-based assays of human brain endothelial cells to assess transport properties of Aya Biosciences’ proprietary compounds. Studies will evaluate uptake kinetics associated with BBB transport mediated by organic cation transporters (OCTs) and choline transporters.

Role: Principal Investigator

Private Foundation

None

EXTENT OF TEACHING (LAST 5 YEARS)

Medical School Teaching

Course Name	Course Number	Format	Semester(s) Taught	Co-Taught?	Co-Teaching Percent Effort	Last Academic Year Taught	Total Number of Years Taught	Student Enrollment # Last Semester Taught
Foundations Block	N/A	In Person (Online for 2020)	Fall	Yes	5.0%	2023-2024	12	121
Musculoskeletal System	N/A	In Person (Online for 2020)	Fall	Yes	2.5%	2023-2024	3	120
Clinical Reasoning	N/A	In Person	Spring	Yes	3.75%	2020-2021	8	117
Application of Basic Science to Clinical Medicine	MED 840	Online	Spring	Yes	13.2%	2020-2021	2	38

Graduate Teaching

Course Name	Course Number	Format	Semester(s) Taught	Co-Taught?	Co-Teaching Percent Effort	Last Academic Year Taught	Total Number of Years Taught	Student Enrollment # Last Semester Taught
Pharmacology of Cardiovascular, Respiratory, GI, and CNS Drugs	PHCL 601C	In Person (Online for Fall 2020)	Fall	Yes	25.0%	2023-2024	12	15

Neuropharmacology	PHCL 553	In Person (Online for Spring 2020)	Spring	Yes	7.1%	2023-2024	12	12
Molecular Targets for Pharmacological Agents	PHCL 551A	In Person (Online for Spring 2020)	Spring	Yes	61.3%	2023-2024	10	10
General and Systems Toxicology	PCOL 535	In Person (Online for Fall 2020)	Fall	Yes	7.1%	2023-2024	5	15
Cellular and Molecular Physiology	PSIO 503	In Person (Online for Fall 2020)	Fall	Yes	6.4%	2023-2024	3	29

COURSE DESCRIPTIONS

Medical School Courses

Foundations Block: The six-week Foundations block fosters development of skills in evidence-based decision making, self-directed learning, communication, and professionalism, while also addressing medical-based topics including cell biology, genetics, embryology, biochemistry, histology, pathology, the immune system, microbiology, pharmacology, and biostatistics.

Musculoskeletal System: The six-week Musculoskeletal System block provides a basic understanding of the musculoskeletal system designed to help students approach its clinical presentation in their future clinical practice. The block discusses the location and function of bones, muscles, peripheral nerves, and vessels of the limbs; and the structure and basic physiology of the tissues of the musculoskeletal system (cartilage, bone, joint, and muscle). Students are taught to use knowledge of anatomy and the tissues to approach musculoskeletal disease and injuries. Many diseases of the musculoskeletal system overlap with diseases of other systems, such as neurological and immunological disorders; therefore, this block builds upon material learned in the Foundations and Nervous System blocks and lays the foundation for material that will be encountered in subsequent blocks. In addition, the Musculoskeletal System block covers most aspects of skin required for USMLE Step 1, including normal structure and function, as well as common skin lesions. Finally, because many musculoskeletal diseases require chronic care, material in the block addresses issues of health care delivery for disability and chronic care.

Clinical Reasoning: The Clinical Reasoning course is longitudinal and runs throughout the preclerkship curriculum during the first 18-months of medical school. It is designed to complement the Blocks, the Doctor and Patient Course, and the Societies Program. Students meet for two hours every week with their Clinical Reasoning facilitator to practice the basic principles of clinical reasoning and prepare themselves for their clinical clerkships. The Clinical Reasoning course uses active learning to emphasize higher-level thinking and support independent thought by the students.

Application of Basic Science to Clinical Medicine (MED 840): This required course is intended for fourth-year medical students and focuses on the application of the biomedical sciences to the practice of medicine, including the etiology, diagnosis, prognosis and treatment of human disease. Students will use self-directed and group-learning skills to acquire new basic science information relevant to a clinical specialty of their choosing.

Graduate Courses

Pharmacology of Cardiovascular, Pulmonary, GI, and CNS Drugs (PHCL 601C): Introduction to the mechanism of action and side effects of drugs affecting the cardiovascular, pulmonary, gastrointestinal, and central nervous system. This will include medications used for the treatment of hypertension, heart arrhythmias, hyperlipidemia, gastrointestinal ulcers, asthma, allergic rhinitis, or to alter the coagulation pathways, as well as agents used for their analgesic and anti-inflammatory properties. In the central nervous system section the focus will be on medications used for the treatment

of seizures, Parkinson's disease, psychosis, depression, pain, anesthetics and drugs of abuse. The basic pharmacology of ethanol will also be covered.

Neuropharmacology (PHCL 553): Consideration of the neurobiological basis of drug action on the central nervous system, including mechanism of action and therapeutic use in psychiatric disorders, neurodegeneration, and neuroinflammation; control of neuronal excitability and pain; and drug abuse and addiction.

Molecular Targets of Pharmacological Agents (PHCL 551A): This graduate-level course will use scientific publications from high impact peer-reviewed journals to demonstrate principles in molecular pharmacology. Key concepts to be considered include i) screening of chemical libraries for discovery of new drugs; ii) molecular pharmacology of drug transporters and metabolizing enzymes; iii) biochemical approaches for the study of signaling cascades; and iv) use of *in vivo* disease models to develop novel therapies for neurological diseases.

General and Systems Toxicology (PCOL 535): Survey of tissue and organ system effects of toxins and toxicants. Introduction to adsorption, distribution, metabolism, and elimination of chemicals; toxicology of liver, lung, kidney, central nervous system, skin, reproductive systems, hematopoietic system, and immune system; examine carcinogenesis and developmental toxicology.

Cellular and Molecular Physiology (PSIO 503): Through examination of fundamental cellular processes, the integrated function of diverse cell types is discussed. Topics include: mechanisms involved in protein expression, intracellular protein targeting, and regulation of protein function; membrane transport phenomena; cell signaling mechanisms-excitability, ion channels, synaptic function; muscle and vascular function.

ADVISING AND MENTORING – GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

Name	Grad (G) or Post Doc (PD)	Degree & Discipline	Yr Start-Yr End	Type of Mentoring	Dr. Ronaldson's Role	Trainee's Role	# Publications	# Years Funded by Advisor's Grants	Current Position
Thompson, Brandon	G	PhD, Physiological Sciences GIDP	2011-2014	Traditional	Primary Advisor	Research	5	4	Scientist, Roche Diagnostics, Oro Valley, AZ
Ibbotson, Kathryn	G	MS, Pharmacology & Toxicology	2014-2017	Traditional	Primary Advisor	Research	3	3	N/A
Abdullahi, Wazir	G	PhD, Medical Pharmacology	2015-2018	Traditional	Primary Advisor	Research	8	2	Senior Scientist, OncoMyx Therapeutics, Phoenix, AZ
Hirsch, Nicholas	G	MS, Perfusion Sciences	2016-2018	Traditional	Research Advisor	Research	1	0	Perfusionist, Austin, TX
Yang, Junzhi	G	PhD, Pharmacology & Toxicology	2018-2023	Traditional	Primary Advisor	Research	3	2	TBD
Williams, Erica	G	PhD, Medical Pharmacology	2019-2024	Traditional	Primary Advisor	Research	1	2	Postdoctoral Fellow, BioMarin
Sami, Ayman	G	MS, Medical Pharmacology	2019-2021	Traditional	Primary Advisor	Research	0	1	N/A
Nava, Raul	G	MS, Physiological Sciences GIDP	2019-2022	Traditional	Primary Advisor	Research	0	1	Research Technician, Bio5 Institute, University of Arizona
Betterton, Robert	G	PhD, Medical Pharmacology	2019-2024	Traditional	Primary Advisor	Research	2	1	Postdoctoral Fellow,

									Department of Pharmacology, University of Arizona
Fu, Tianhong	G	MS, Perfusion Sciences	2019-2021	Traditional	Research Advisor	Research	0	0	Perfusionist, Columbus, OH
Dunaj, Sean	G	MS, Perfusion Sciences	2020-2022	Traditional	Research Advisor	Research	0	0	N/A
Tang, Andrew	G	PhD, Neuroscience GIDP	2020-	Traditional	Co-Primary Advisor	Research	0	0	Current Trainee
Nilles, Kelsy	G	PhD, Neuroscience GIDP	2020-	Traditional	Primary Advisor	Research	0	1	Current Trainee
Vagnerova, Barbora	G	PhD, Medical Pharmacology	2020-	Traditional	Co-Primary Advisor	Research	0	1	Current Trainee
Rodriguez-Moreno, Valeria	G	PhD, Medical Pharmacology	2023-	Traditional	Primary Advisor	Research	1	1	Current Trainee
Brzica, Hrvoje	PD	Pharmacology	2015-2017	Traditional	Primary Mentor	Research	6	3	Team Leader, Pharmacologists at Fidelta, Zagreb, Croatia
Tripathi, Dinesh	PD	Pharmacology	2018-2018	Traditional	Primary Mentor	Research	1	1	Research Scientist, King George Medical University, Lucknow, India
Mudalige, Dinusha Maheepala	PD	Pharmacology	2019-2022	Traditional	Co-Primary Mentor	Research	0	1	Research Scientist, Department of Plant Sciences, University of Arizona

ADVISING AND MENTORING – UNDERGRADUATE STUDENTS

Name	Undergrad (U), Grad (G) or Post Doc (PD)	Degree & Discipline	Yr Start-Yr End	Type of Mentoring	Dr. Ronaldson's Role	Trainee's Role	# Publications	# Years Funded by Advisor's Grants	Current Position
Yell, Joshua	U	Neuroscience (UBRP Program)	2014-2016	Traditional	Research Mentor	Research	1	1	Pediatrics Resident, Nationwide Children's Hospital, Columbus, OH
Reilly, Bianca	U	Biochemistry	2017-2021	Traditional	Research Mentor	Research	5	3	Research Associate, Ventana Medical Systems
Pinter, Corbin	U	Cellular and Molecular Medicine	2017-2018	Traditional	Research Mentor	Research	0	2	N/A
Betterton, Robert	U	Biochemistry (Senior Capstone)	2018-2019	Traditional	Research Mentor	Research	0	0	PhD Student, Dept of Pharmacology, U of Arizona

Serna, Samantha	U	Biochemistry (Senior Capstone)	2018-2019	Traditional	Research Mentor	Research	0	0	PhD Student, Dept of Pharmacology and Toxicology, U of Utah
Stanton, Joshua	U	Biochemistry	2019-	Traditional	Research Mentor	Research	3	2	PhD Student, Dept of Pharmacology, U of Arizona
Ogbonnaya, Chidinma	U	Pharmaceutical Sciences (EHS-TRUE Program)	2021-2022	Traditional	Research Mentor	Research	2	0	Pharmacy Student, U of Arizona College of Pharmacy
Reddell, Samantha	U	Biochemistry (EHS-TRUE Program)	2021-2022	Traditional	Research Mentor	Research	2	0	PhD Student, Dept of Pharmacology, U of Arizona
Dorn, Emma	U	Biochemistry	2021-2022	Traditional	Research Mentor	Research	1	1	N/A
Tempkin, Megan	U	Cellular and Molecular Medicine	2021-2023	Traditional	Research Mentor	Research	0	1	Medical Student, Baylor College of Medicine
Loforte, Erica	U	Biochemistry	2021-	Traditional	Research Mentor	Research	0	1	Research Technician, University of California – San Diego
Soliman, Sofia	U	Psychology	2023-	Traditional	Research Mentor	Research	0	1	N/A
Hejl, Sophia	U	Biochemistry	2023-	Traditional	Research Mentor	Research	0	1	Pharmacy Student, College of Pharmacy, University of Arizona
Fitzgerald, Zachary	U	Neuroscience	2023-	Traditional	Research Mentor	Research	0	1	Current Trainee

GRADUATE ADVISORY AND EXAMINATION COMMITTEES

1. Mr. Jeffrey J. Lochhead, PhD program, Neuroscience GIDP, 2010-2011
2. Mr. Joshua Strom, PhD program, Medical Pharmacology, 2010-2014
3. Ms. Lucy Martinez-Guerrero, PhD program, Physiological Sciences GIDP, 2011-2015
4. Ms. Lucy Sanchez-Covarrubias, PhD program, Medical Pharmacology, 2011-2013
5. Mr. David Klein, PhD program, Pharmacology and Toxicology, 2012-2015
6. Mr. Jason Singh, MS program, Physiological Sciences GIDP, 2013-2014
7. Mr. Phillip Sandoval, PhD program, Physiological Sciences GIDP, 2014-2017
8. Mr. Joseph Tillotson, PhD program, Pharmacology and Toxicology, 2014-2017
9. Ms. Yuanzhang Yang, PhD program, Cellular and Molecular Medicine, 2016-2019
10. Ms. Erica Toth, PhD program, Pharmacology and Toxicology, 2016-2019
11. Mr. Willie Mohammed Johnson, MS program, Cellular and Molecular Medicine, 2016-2018
12. Mr. David Duron, PhD program, Medical Pharmacology, 2018-2020
13. Ms. Siannah Miller, PhD program, Pharmacology and Toxicology, 2018-2021
14. Ms. Kayla Lee Frost, PhD program, Pharmacology and Toxicology, 2019-2023
15. Mr. Devin Seka, PhD program, Chemistry and Biochemistry, 2021-present
16. Ms. Ingrid Peterson, PhD program, Pharmacology and Toxicology, 2022-2024

MENTOR TO JUNIOR FACULTY

1. Dr. Jeffrey J. Lochhead, Research Assistant Professor, Department of Pharmacology, University of Arizona, 2019-present.
2. Dr. Jacob Schwartz, Assistant Professor, Department of Pharmacology, University of Arizona, 2021-present.

MEDICAL STUDENT MENTORING

1. Mr. Billy Joe Evans, Medical Student Research Program, College of Medicine, University of Arizona, 2021-2023.

HIGH SCHOOL STUDENT MENTORING

1. Ms. Alyssa Antone (Tohono O'odham High School, Sells, AZ), Summer Institute on Medical Ignorance (SIMI) Program, College of Medicine, University of Arizona, 2013.
2. Ms. Vivian Figueroa (San Miguel High School, Tucson, AZ), Summer Institute on Medical Ignorance (SIMI) Program, College of Medicine, University of Arizona, 2021.

DEVELOPMENT OF ONLINE INSTRUCTIONAL MATERIALS

- ***Transporter Knowledge for New Frontiers (eCourse offered by the American Association of Pharmaceutical Scientists).***
 - **Description:** Transporters are critical determinants of both drug disposition and drug efficacy. Recent advances in molecular pharmacology have shown that transport systems are extremely dynamic and can be modulated by disease and by drugs themselves. Furthermore, genetic differences in transporters can contribute to vastly different pharmacokinetic and/or pharmacodynamics profiles within human populations. Transporters can also contribute to clinically significant drug-drug interactions. However, many concepts in transporter pharmacology are new to many pharmaceutical scientists, suggesting a significant training gap. This course will provide up-to-date information on drug transporters in ADMET for those new to the field and for pharmaceutical scientists seeking a refresher in transporter pharmacology. Course objectives include highlighting involvement of transporters in drug disposition into key organs including the intestine, liver, kidney, and brain, and providing detailed information on regulation of transporters in response to pathophysiological and pharmacological stressors. The course also highlights the current FDA guidance on the study of transporters in the drug discovery and drug development process.
 - **Role:** Team Leader and Lecturer
 - **Launch Date:** February 22, 2017