
Robert G. Thorne, Ph.D.
Curriculum Vitae

Division of Pharmaceutical Sciences, University of Wisconsin-Madison School of Pharmacy, Office: 5113 Rennebohm Hall (Laboratories: 5222/5224). W: 608-890-3508; L: 608-263-2577; F: 608-262-5345
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Current Position

Assistant Professor (tenure-track). UNIVERSITY OF WISCONSIN-MADISON SCHOOL OF PHARMACY, Division of Pharmaceutical Sciences (Drug Delivery Core). Jun 2010 - Present. *Research:* targeted central nervous system (CNS) drug delivery; transport processes for distribution within the CNS; optimization of vectors for CNS applications; blood-brain barrier science and applications. *WEB:* <http://www.pharmacy.wisc.edu/sopdir/PersonDetails.cfm?ID=556>

Employment

Instructor (Faculty Member). NYU SCHOOL OF MEDICINE, Department of Physiology and Neuroscience. Apr 2008 - Mar 2010. *Research:* Study of macromolecule and nanoparticle transport in brain tissue working with collaborator/mentor Charles Nicholson.

Education/ Training

Postdoctoral Fellowship (Assistant Research Scientist). NEW YORK UNIVERSITY SCHOOL OF MEDICINE. Jul 2002 - Mar 2008. *Research:* Study of dextran, protein and nanoparticle transport in the *in vitro* (acute slices) and *in vivo* (anesthetized rodents) CNS. Mentor: Charles Nicholson, Ph.D. (Professor, Department of Physiology and Neuroscience).

Ph.D. in Pharmaceutics (May 2002). UNIVERSITY OF MINNESOTA (Minneapolis). Mar 1991 - Aug 1993; Jan 1998 - Jun 2002. *Thesis Title:* The nasal pathway for drug delivery to the central nervous system: studies with protein tracers and therapeutics. *Collateral Field:* Neuroscience. Advisor: William H. Frey, II, Ph.D. (Graduate program in Neuroscience; Departments of Pharmaceutics and Neurology).

Postbaccalaureate Study. UNIVERSITY OF WASHINGTON (Seattle). Sept 1993 - May 1997. Course honors: Physiology, Biochemistry, Human Nervous System.

B.S. in Chemical Engineering (June 1990). UNIV. OF WASHINGTON. Sept 1985 - Jun 1990.

Work-related

International Organizing Committee & Scientific Program Committee Member. 8th Cerebral Vascular Biology International Conference, Sendai, Japan. Jun 28 - Jul 2, 2009.

Neuroscience Seminar Series Co-organizer. NYU School of Medicine (SOM). Fall 2006 - Spring 2009. Organize / manage SOM neuroscience seminars (duties: selecting/inviting speakers of interest to Dept; planning and hosting visits; managing schedule and budget). Oversaw reorganization of Series through participation on Steering Committee (Fall 2008 - Fall 2009).

Ad Hoc Scientific Reviewer; Project Assessment Committee Scientist. Michael J. Fox Foundation for Parkinson's Research. Provide review of individual grants / on-going management of a major MJFF-funded *Linked Efforts to Accelerate Parkinson's Solutions (LEAPS)* project. Jul 2008 - present.

Assistant Research Scientist. NYU School of Medicine. Jul 2002 - Mar 2008 (Nicholson Lab).

Founding Council Member. International Brain Barriers Society (www.ibbsoc.org). 2006 - present.

Ad Hoc Reviewer. *Biopharmaceutics & Drug Disposition, Current Pharmaceutical Design, Experimental Neurology, Journal of Controlled Release, Journal of Neuroimmunology, Journal of Neuroscience, Journal of Pharmaceutical Sciences, Molecular Pharmaceutics*

Work-related

Radiation Safety Committee Member. Regions Hospital, MN. 1999 - 2000.

Research Ethics Advocates Committee Member. University of Minnesota. 1999 - 2000.

Student Representative, Dept of Pharmaceutics. University of Minnesota, elected 1999 - 2000.

Research Assistant. Alzheimer's Research Center, Regions Hospital, MN. Oct 1997 - Jun 2002.

Research Assistant. Univ. of Washington (Dept of Biological Structure). Jul - Sep 1997. Developed web content for 'The Digital Anatomist Interactive Brain Atlas' and on-line course syllabi.

Research Assistant. University of Washington Bioethics Education Project. Jul - Sept 1997. Developed bioethics topic summaries and researched web resources.

Committee on Admissions Member. Univ. of WA School of Medicine. Spring 1994 - Spring 1997.

Institutional Review Board Committee Member (Health Sciences). Univ. of MN. Jul 1991 - Jun 1993.

Vice President, University of Minnesota Biomedical Engineering Society. Elected 1991-92, 92-93.

Research Assistant. University of Minnesota Graduate School. Mar 1991 - Jun 1993.

Teaching

Conference Leader - Brain & Behavior Course. NYU School of Medicine (SOM). Led case discussions on neurophysiology (axons/action potentials; synaptic transmission; neuronal integration) & neuroanatomy (spinal cord; vestibular system; brainstem; cerebrum) for first year medical students. Apr - Jun 2005; Apr - May 2006; Apr - May 2007.

Instructor - Brain & Behavior Laboratory. NYUSOM. Lectured, organized, instructed and tested 1/3 medical school class (>50 students) on all aspects of human neuroanatomy using whole brains, sections and slices. Apr - Jun 2009.

Lab Instructor - Foundation for Medicine: Nervous System. NYUSOM. Lectured, organized, instructed and tested 1/3 medical school class (>50 students) on human neuroanatomy topics including surface structures, the brainstem and cranial nerves, brainstem sections, the cerebrum and cerebellum, and forebrain sections, in addition to conducting review sessions and practice practical examinations. Jan - Mar 2010.

Section Leader - Science Ethics Course. NYUSOM. Lectured on topics including: Human subjects; animal research; data management, analysis & reporting; conflicts of interest; authorship & peer review; IP. Led discussion for Ph.D. and M.D./Ph.D. students. Feb - Apr 2005.


Teaching Assistant. University of Washington.

Human Biology 532 – Human Nervous System (School of Medicine). Lectured on "The Chemical Senses: Taste and Smell." Spring 1997.

Biostructure 431 – Introduction to Neuroanatomy (Occupational Therapy, Physical Therapy & Dental Schools). Lectured on "The Limbic System" and "The Olfactory System." Winter 1997.

Human Biology 532 – Human Nervous System (School of Medicine). Spring 1995.

Publications

- Thorne, R.G.**, A. Lakkaraju, E. Rodriguez-Boulan, and C. Nicholson. *In vivo* diffusion of lactoferrin in brain extracellular space is regulated by interactions with heparan sulfate. *Proceedings of the National Academy of Sciences USA* 105 (24): 8416-8421 (2008). *Citing articles** - 8
- Thorne, R.G.**, L.R. Hanson, T.M. Ross, D. Tung and W.H. Frey II. Delivery of interferon- β to the monkey nervous system following intranasal administration. *Neuroscience* 152 (3): 785-797 (2008). *Citing articles** - 18
- Thorne, R.G.** and C. Nicholson. *In vivo* diffusion analysis with quantum dots and dextrans predicts the width of brain extracellular space. *Proceedings of the National Academy of Sciences USA* 103 (14): 5567-5572 (2006).  *Recommended reading - Faculty of 1000 Biology. Citing articles** - 51
- Thorne, R.G.**, S. Hrabetova, and C. Nicholson. Diffusion measurements for drug design [Correspondence]. *Nature Materials* 4 (10): 713 (2005).
- Thorne, R.G.**, S. Hrabetova, and C. Nicholson. Diffusion of epidermal growth factor in rat brain extracellular space measured by integrative optical imaging. *Journal of Neurophysiology* 96 (6): 3471-3481 (2004). *Cover - December 2004. Citing articles** - 36
- Thorne, R.G.**, G.J. Pronk, V. Padmanabhan, and W.H. Frey II. Delivery of insulin-like growth factor-I to the rat brain and spinal cord along olfactory and trigeminal pathways following intranasal administration. *Neuroscience* 127 (2): 481-496 (2004). *Citing articles** - 117
- Ross, T.M., P.M. Martinez, J.C. Renner, **R.G. Thorne**, L.R. Hanson, and W.H. Frey II. Intranasal administration of interferon beta bypasses the blood-brain barrier to target the central nervous system and cervical lymph nodes: a non-invasive treatment strategy for multiple sclerosis. *Journal of Neuroimmunology* 151 (1-2): 66-77 (2004). *Citing articles** - 50
- Thorne, R.G.** and W.H. Frey II. Delivery of neurotrophic factors to the central nervous system: Pharmacokinetic considerations [Review]. *Clinical Pharmacokinetics* 40 (12): 907-946 (2001). *Citing articles** - 104
- Liu, X.F., J.R. Fawcett, **R.G. Thorne**, and W.H. Frey II. Non-invasive intranasal insulin-like growth factor-I reduces infarct volume and improves neurologic function in rats following middle cerebral artery occlusion. *Neuroscience Letters* 308 (2): 91-94 (2001). *Citing articles** - 47
- Liu, X.F., J.R. Fawcett, **R.G. Thorne**, T.A. DeFor and W.H. Frey II. Intranasal administration of insulin-like growth factor-1 bypasses the blood-brain barrier and protects against focal cerebral ischemic damage. *Journal of the Neurological Sciences* 187 (1-2): 91-97 (2001). *Citing articles** - 69
- Frey, W.H. II, J. Liu, X.Q. Chen, **R.G. Thorne**, J.R. Fawcett, T.A. Ala, Y-E. Rahman. Delivery of 125I-NGF to the brain via the olfactory route. *Drug Delivery* 4: 87-92 (1997). *Citing articles** - 57
- Thorne, R.G.**, C.R. Emory, T.A. Ala, W.H. Frey, II. Quantitative analysis of the olfactory pathway for drug delivery to the brain. *Brain Research* 692 (1-2): 278-282 (1995). *Citing articles** - 73
- Frey, W.H. II, J. Liu, **R.G. Thorne**, Y-E. Rahman. Chapter 37: Intranasal delivery of 125I-NGF to the brain via the olfactory route [Book Chapter]. *In: Research Advances in Alzheimer's Disease and Related Disorders*. Chichester: John Wiley pp. 329-335 (1995).

- Teaching Awards** 1996 - 1997 "Award for Teaching Assistant." Univ of WA School of Dentistry.
Nomination for teaching award by 1st year students (1997). Univ of WA School of Medicine.
- Research Awards** *Best Poster* – Among the top three selected from all posters presented during the 'Barriers of the CNS' Gordon Research Conference. Tilton, NH. Jun 2008.
Postdoc Paper Award – First Place for Thorne and Nicholson. *PNAS* 103:5567-5572. NYU Post-doctoral Association/Sackler Institute. Jun 2006.
CVB 2005 Poster Award. VIth Conference on Cerebral Vascular Biology. Munster, Germany. Jun 2005.
Best Poster – Session on Physiology and Pathophysiology of the Blood-CSF Barrier. Gordon Research Conference ('Barriers of the CNS'). Tilton, NH. Jun 2004.
Best Poster – Overall. 6th Annual Biomedical Engineering Society Spring Poster Symposium. University of Minnesota, Minneapolis, MN. May 1999.
Best Poster – Drug Delivery. 6th Annual Biomedical Engineering Society Spring Poster Symposium. University of Minnesota, Minneapolis, MN. May 1999.
Junior Investigator Travel Fellowship. 6th Int. Conf. on Alzheimer's Disease & Related Disorders. Jul 1998.
Medical Scientist Research Training Program. Univ of WA School of Medicine. Jun-Aug 1994.
Best Poster – Master's Division. 1st Annual Biomedical Engineering Spring Symposium (University of Minnesota Graduate School). Jun 1993.
Junior Investigator Travel Fellowship. 3rd Int. Conf. on Alzheimer's Disease & Related Disorders. Jul 1992.
- Additional Study** "MATLAB Fundamentals and Programming Techniques." New York, NY. Nov 11-12, 2002.
"Advances in Controlled Release Technology: Polymeric Delivery Systems for Drugs, Pesticides and Foods." (Course chair - Robert Langer, Ph.D.) MIT. Jul 12-16, 1999.
- Electronic Media** Created and developed content for the "Neuroanatomy Interactive Syllabus" (<http://www9.biostr.washington.edu/da.html>). Dept. of Biological Structure, University of Washington.
• Chapter 13: Eye Movements and Vestibular System Drawings & Text (8 frames)
• Chapter 18: Visceral Afferents: Cranial Nerves I, VII, IX and X – Olfactory Epithelium Schematic & Text (1 frame); Olfactory System Schematic & Text (1 frame)
Invited contributor to original content for site launch of pd Online Research (Michael J. Fox Foundation for Parkinson's Research), May 2009; On-going contributor to content.
• *Research Question*: Is nasal delivery a viable option for trophic factor delivery to the brain?
<http://www.pdonlineresearch.org/research-questions/nasal-delivery-viable-option-trophic-factor-delivery-brain>
Response: Nose-to-brain drug delivery
<http://www.pdonlineresearch.org/responses/2763/180/nose-brain-drug-delivery>
• *Response to Research Question* (How can we improve brain delivery of trophic factors?): More factors affecting distribution during and after infusion
<http://www.pdonlineresearch.org/responses/3608/180/more-factors-affecting-distribution-during-and-after-infusion>
- Press/ Memberships** *Press profiles of research*: *Biophotonics International*, Jun 2006, pp. 54-55; *NYU Physician*, Fall 2006, p. 6.
Professional Memberships: AAPS, Society for Neuroscience, International Brain Barriers Society.

**Invited
Talks**

DELAWARE VALLEY DRUG METABOLISM DISCUSSION GROUP MEETING: EMERGING TECHNOLOGY AND TRENDS IN DRUG DISCOVERY AND DEVELOPMENT: "CNS drug delivery and the challenge of the blood-brain barrier." (invited speaker) Dec 7, 2010. Langhorne, PA.

FOURTH EUROPEAN BRAINS FOR BRAIN MEETING: WORKSHOP ON BRAIN AND NEURODEGENERATIVE LYSOSOMAL STORAGE DISEASES: "Transport and movement of macromolecules in the brain interstitium." (invited speaker) Mar 5 - 7, 2010. Frankfurt, Germany.

PHARMACEUTICAL SCIENCES DIVISION SEMINAR: "Delivering proteins, oligonucleotides, and gene therapy vectors to the central nervous system: potential, challenges and possibilities." Dec 1, 2009. Long Island University, Brooklyn, NY.

VIIIth INTERNATIONAL CONFERENCE ON CEREBRAL VASCULAR BIOLOGY: Symposium Session - "Importance of kinetic approaches for understanding CNS drug distribution." (invited speaker) Jun 28 - Jul 2, 2009. Sendai, Japan.

DEPARTMENT OF PHARMACEUTICAL SCIENCES COLLOQUIUM: "CNS drug delivery and distribution: Methods, mechanisms and pathways." Jan 24, 2008. Northeastern University, Boston, MA.

DRUG DELIVERY WORKSHOP: "Diffusion of molecules through extracellular space." (invited speaker) Jan 16, 2008. Michael J. Fox Foundation & Kinetics Foundation, San Mateo, CA.

DEPARTMENT OF BIOLOGY SEMINAR SERIES: "Extracellular diffusion of macromolecules and nanoparticles within the living brain." Dec 3, 2007. Long Island University, Brooklyn, NY.

FORUM PRESENTATION: "Extracellular diffusion of macromolecules and nanoparticles in the living brain: Implications for drug delivery." Jan 26, 2007. J&J/Centocor/Alza, Palo Alto, CA.

SEMINAR PRESENTATION: "Diffusion of proteins, dextrans and quantum dots in the living brain." Oct 23, 2006. Biogen Idec, Cambridge, MA.

GORDON RESEARCH CONFERENCE ('BARRIERS OF THE CNS'): "Nasal pathways for CNS drug delivery." (invited speaker) Jun 26, 2006. Tilton, NH.

FORUM PRESENTATION: "Measuring diffusion of macromolecules and nanoparticles in brain tissue by real-time integrative optical imaging." Feb 6, 2006. Medtronic Inc., Minneapolis, MN.

SOCIETY FOR NEUROCHEMISTRY (INDIA) LECTURE: "Diffusion of macromolecules and nanoparticles in brain tissue." Jan 19, 2006. Univ. of Hyderabad School of Life Sciences, Hyderabad, India.

Vth CONFERENCE ON CEREBRAL VASCULAR BIOLOGY: "*In vivo* diffusion analysis with quantum dots and dextrans estimates the width of brain extracellular space." (selected poster) Jun 26, 2005. Munster, Germany.

GORDON RESEARCH CONFERENCE ('BARRIERS OF THE CNS'): "*In vivo* transport of macromolecules in rat cerebral cortex measured by real-time integrative optical imaging." (selected poster) Jun 28, 2004. Tilton, NH.

BIOCHEMISTRY & MOLECULAR BIOLOGY DEPARTMENT SEMINAR: "The Nasal Pathway for Drug Delivery to the Central Nervous System: Studies with Protein Tracers and with Insulin-like Growth Factor-1." Sept 22, 2000. University of Minnesota-Duluth, Duluth, MN.

GERIATRIC RESEARCH, EDUCATION & CLINICAL CENTER SEMINAR SERIES: "Cerebrospinal Fluid Physiology and the Olfactory System: Implications for CNS Delivery of Neurotrophic Factors." May 24, 2000. VA Medical Center, Minneapolis, MN.

NEUROLOGY GRAND ROUNDS: "The Olfactory System and Cerebrospinal Fluid Circulation: Implications for CNS Drug Delivery." Jan 29, 1998. Regions Hospital, Saint Paul, MN.