

# Peter C. Hart, Ph.D.

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## Education

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**Fall 2011 – Fall 2015** University of Illinois at Chicago College of Medicine, Ph.D. in Pathology  
**Fall 2004 – Spring 2008** University of Illinois at Chicago, B.A. in Psychology

## Academic Experience

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**Roosevelt University**, Schaumburg IL – College of Pharmacy **Oct 2019 – Present**  
Assistant Professor of Pharmacology

- Establishing an independent research program focused on tumor:stromal signaling in the tumor micro-environment of ovarian cancer, with a focus on the effects of cell metabolism on stromal reprogramming.
- Teaching duties include courses for fundamental lectures in basic and clinical pharmacology, as well as the medicinal pharmacology component in a team-based integrated systems approach for multiple disease states.

**University of Chicago**, Chicago IL – Section of Gynecologic Oncology **Jan 2016 – Oct 2019**  
Postdoctoral Scholar

- Identified a metabolic target of the drug metformin from patient samples and evaluated this metabolite and its regulatory pathway as a novel biomarker for sensitivity/resistance to metformin's cytotoxic effects.
- Used unbiased approaches (genomics, proteomics and metabolomics) to evaluate convergent pathways that modulate stromal activation resulting from tumor:stromal crosstalk in the ovarian tumor microenvironment, which led to a first authorship published in *Cell Reports*.
- Coordinated with surgical pathology, lab technicians and external research coordinators to acquire and curate specimen from a phase II clinical trial (NCT02122185). Collaborating with Max Planck Institute Biochemistry to conduct proteomics analysis of laser capture micro-dissected specimen. Study is ongoing.

**University of Illinois at Chicago**, Chicago IL – Department of Pathology **Aug 2011 – Dec 2015**  
PhD Candidate

- Investigated the role of mitochondrial redox homeostasis in cellular metabolism, identifying that a mitochondrial antioxidant could bolster tumor growth via enhancement of glycolysis to meet biosynthetic demands
- Discovered a novel role of a canonical mitochondrial enzyme, and delineated its unusual ability to migrate out towards the nucleus and initiate transcriptional programs required for tumor progression. Study is ongoing.
- Initiated and maintained collaborations within the University of Illinois as well as other institutions that led to manuscripts published in *Nature*, *PNAS* and *Free Radical Research*

**Tulane University**, New Orleans LA – Department of Pharmacology **Jan 2010 – May 2011**  
Research Assistant

- Assisted in the development of technology for behavioral phenotyping of zebrafish in models of anxiety
- Managed husbandry for large colonies of mice and zebrafish. Trained and supervised students in behavioral phenotyping of mice and zebrafish in models of stress, anxiety, depression as well as learning and memory
- Responsible for purchasing and maintaining an inventory of laboratory equipment, reagents and specimen.

## Honors and Awards

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- 2020 Laboratory Equipment Donation Program Award for ELAN DRC II, awarded by the U.S. Dept. of Energy
- 2020 National Institutes of Health Loan Repayment Program Award COI awarded by the NCI
- 2019 HHMI Summer Institute on Scientific Teaching Scholarship awarded by University of Chicago
- 2018 National Institutes of Health Loan Repayment Program Award awarded by the NCI
- 2018 American Association for Cancer Research Scholar-in-Training Award
- 2017 Colleen's Dream Young Investigator Award
- 2016 University of Chicago Institute for Translational Medicine Core Subsidy Award
- 2015 Young Scientist Program Fellowship (YSP) awarded by the International Union of Biochemistry and Molecular Biology (IUBMB-SBBq)
- 2014 Pre-doctoral Education in Translational and Clinical Science (PECTS) Training Program awarded by Center for Clinical and Translational Science (CCTS), University of Illinois at Chicago
- 2013 Travel award and invitation for oral presentation to Society for Free Radical Biology and Medicine (SFRBM) 20<sup>th</sup> Annual Meeting awarded by SFRBM
- 2012 Travel award to Society for Free Radical Biology and Medicine (SFRBM) 19<sup>th</sup> Annual Meeting awarded by Seahorse Bioscience

## Publications

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### Peer-reviewed Journal Articles:

- Hart, P.C., Kenny, H.A., Grassl, N., Watters, K.M., Litchfield, L.M., Coscia, F., Blaženović, I., Ploetzky, L., Fiehn, O., Mann, M., Lengyel, E., Romero, I.L. Mesothelial cell HIF1 $\alpha$  expression is metabolically downregulated by metformin to prevent oncogenic tumor-stromal crosstalk. **Cell Rep.**, 2019. Dec;29(12):4086-4098.
- He, C., Danes, J.M., Hart, P.C., Zhu, Y., Huang, Y., de Abreu, A.L., O'Brien, J., Mathison, A.J., Tang, B., Frasor, J., Wakefield, L., Ganini, D., Stauder, E., Zielonka, J., Gantner, B.N., Urrutia, R.A., Gius, D., Bonini, M.G. SOD2 acetylation on lysine 68 promotes stem cell reprogramming in breast cancer. **Proc. Natl. Acad. Sci.**, 2019. Nov;116(47):23534-23541.
- McGuire, S., Kara, B., Hart, P.C., Montag, A., Wroblewski, K., Fazal, S., Huang, X.Y., Lengyel, E., Kenny, H.A. Inhibition of fascin in cancer and stromal cells blocks ovarian cancer metastasis. **Gyn Onc**, 2019. May;153(2):405-415.
- Hart, P.C., Chiyoda, T., Curtis, M., Liu, X., Chang, C.Y., McGregor, S., Lastra, R., Locasale, J., Lengyel, E., Romero, I.L. SPHK1 is a novel target of metformin in ovarian cancer. **Mol Can Res**, 2019. Apr;17(4):870-881. *Manuscript featured as Editor's Choice.*
- Lee, J., Yesilkanal, A., Frankenberger, C., Liu, J., Yan, J., Elbaz, M., Rabe, D., Rustandy, F., Tiwari, P., Grossman, E., Hart, P.C., Kang, C., Sanderson, S., Nomura, D., Bonini, M.G., Locasale, J., Rosner, M.R. Effective combination therapy for breast cancer targeting BACH1 and mitochondrial metabolism. **Nature**, 2019. Apr;568(7751):254-258.
- Kenny, T.C., Hart, P.C., Ragazzi, M., Serasinghe, M., Chipuk, J., Sagar, A., Eliceiri, K., LaFramboise, T., Gradhi, S., Santos, J., Riar, A.K., Papa L., D'Aurello, M., Manfredi, G., Bonini, M.G., Germain, D., Selected mitochondrial DNA landscapes activate the SIRT3 axis of the UPRmt to promote metastasis. **Oncogene** 2017. Aug;36(31):4393-4404.
- Ekou, D.N., Bera, S., Weinberg, F., Anson, E., Hart, P.C., Zaichick, S., Domann, F., Bonini, M.G., Diamond, A.M. Allele-specific interaction between glutathione peroxidase 1 and manganese superoxide dismutase affects the levels of Bcl-2, Sirt3 and E-Cadherin. **Free Radic Res** 2017. Jun;51(6):582-590.

8. Chiyoda, T., Hart, P.C., Eckert, M.A., McGregor, S.M., Lastra, R., Hamamoto, R., Nakamura, Y., Yamada, S.D., Olopade, O.I., Lengyel, E., Romero, I.L. Loss of BRCA1 in the cells of origin of ovarian cancer induces glycolysis: A window of opportunity for ovarian cancer chemoprevention. **Cancer Prev Res** 2017. Apr;10(4):255-266.
9. He, C., Hart, P.C., Germain, D., Bonini, M.G. SOD2 and the mitochondrial UPR: partners regulating cellular phenotypic transitions. **Trends Biochem Sci** 2016. Jul; 41(7):568-77.
10. Hart, P.C., Minshall, R.D., Bonini, M.G. Caveolin-1 regulates cancer cell metabolism via scavenging Nrf2 and suppressing MnSOD-driven glycolysis. **Oncotarget** 2016. Jan 5;7(1): 308-22.
11. Baig, M., Zaichik, S., Mao, M., Abreu, A.D., Bakshi, F., Saqib, U., Deng, J., Hart, P.C., Chatterjee, S., Block, M., Vogel, S., Malik, A., Consolaro, M., Christman, J., Minshall, R., Gantner, B., Bonini, M. NOS1-derived nitric oxide promotes NF $\kappa$ B transcriptional activity through inhibition of suppressor of cytokine signaling (SOCS-1). **J Exp Med** 2015 Sep 21;212(10):1725-1738.
12. Hart, P.C., Mao, M., Abreu, A.L., Ansenberger-Fricano, K., Ekou, D.N., Ganini, D., Kajdacsy-Balla, A., Diamond, A.M., Minshall, R.D., Consolaro, M.E.L., Santos, J.H., Bonini, M.G. MnSOD upregulation sustains the Warburg effect via mitochondrial ROS and AMPK-dependent signalling in cancer. **Nat Commun** 2015. Feb 5;6:6053.
13. Bonini, M.G., Consolaro, M.E., Hart, P.C., Mao, M., Abreu, A.L., Master, A. Redox control of enzymatic functions: the electronics of life's circuitry. **IUBMB Life** 2014 Mar 26;66(3):167-181.
14. Stewart, A., Wu, N., Cachat, J., Hart, P., Gaikwad, S., Wong, K., Utterback, E., Gilder, T., Kyzar, E., Newman, A., Carlos, D., Chang, K., Hook, M., Rhymes, C., Caffery, M., Greenberg, M., Zadina, J., Kalueff, A. Pharmacological modulation of anxiety-like phenotypes in adult zebrafish. **Prog Neuropsychopharmacology Biol Psychiatry** 2011; 1:35(6): 1421-31.
15. Stewart, A., Riehl, R., Wong, K., Green, J., Cosgrove, J., Vollmer, K., Kyzar, E., Hart, P., Allain, A., Cachat, J., Utterback, E., Gaikwad, S., Hook, M., Rhymes, K., Newman, A., Chang, K., Kalueff, A. Behavioral effects of MDMA ("Ecstasy") on adult zebrafish. **Behav Pharmacol** 2011; 22(3): 275-80.
16. Grossman, L., Stewart, A., Gaikwad, S., Utterback, E., Wu, N., DiLeo, J., Frank, K., Cachat, J., Howard, H., Hart, P., Kalueff, A. Behavioral effects of piracetam on adult zebrafish. **Brain Res Bull** 2011; 85(1-2): 58-63.
17. Stewart, A., Wong, K., Cachat, J., Gaikwad, S., Kyzar, E., Wu, N., Hart, P., Piet, V., Utterback, E., Elegante, M., Tien, D., Kalueff, A. Zebrafish models to study drug abuse-related phenotypes. **Rev Neurosci** 2011; 22(1): 95-105.
18. Cachat, J., Stewart, A., Grossman, L., Gaikwad, S., Kadri, F., Min Chung, K., Wu, N., Wong, K., Roy, S., Suci, C., Goodspeed, J., Elegante, M., Bartels, B., Elkhayat, S., Tien, D., Tan, J., Denmark, A., Gilder, T., Kyzar, E., DiLeo, J., Frank, K., Chang, K., Utterback, E., Hart, P., Kalueff, A. Measuring behavioral and endocrine responses to novelty stress in adult zebrafish. **Nat Protoc** 2010; 5(11): 1786-99.
19. Gaikwad, S., Stewart, A., Hart, P., Wong, K., Cachat, J., Kalueff, A. Acute stress disrupts cued and spatial memory in zebrafish: the utility of fish models to study stress-memory interplay. **Behav Processes** 2011; 87(2): 224-30.
20. LaPorte, J., Egan, R., Hart, P., Bergner, C., Cachat, J., Canavello, P., and Kalueff, A. Qui non proficit, deficit: experimental models for 'integrative' research of affective disorders. **J Affect Disord** 2010; 121: 1-9.
21. Cachat, J., Canavello, P., Elegante, M., Bartels, B., Hart, P., Bergner, C., Egan, R., Duncan, R., Tien, D., Chung, A., Wong, K., Goodspeed, J., Tan, J., Grimes, C., Elkhayat, S., Suci, C., Rosenberg, M., Chung, K., Kadri, F., Roy, S., Gaikwad, S., Stewart, A., Zapolsky, I., Gilder, T., Mohnot, S., Beeson, E., Amri, H., Zukowska, Z., Soignier, R., and Kalueff, A. Modeling withdrawal syndrome in zebrafish. **Behav Brain Res** 2010; 208: 371-6.
22. Egan, R., Bergner, C., Hart, P., Cachat, J., Canavello, P., Glasgow, E., Amri, H., Zukowska, Z., and Kalueff, A. Understanding behavioral and physiological phenotypes of stress and anxiety in zebrafish. **Behav Brain Res** 2009; 205: 38-44.

**Book Chapters:**

1. Bonds, J., Hart, P.C., Minshall, R.D., Lazarov, O., Haus, J.M., Bonini, M.G. "Type 2 diabetes mellitus as a risk factor for AD." In: *Genes, Environment and Alzheimer's Disease*. Eds. O. Lazarov and G. Tesco. Oxford Academic Press. 2016: 387-414.
2. Hart, P., Bergner, C., Dufour, B., Smolinsky, A., Egan, R., LaPorte, J., Kalueff, A. "Analysis of Abnormal Repetitive Behaviors in Experimental Animal Models." In: *Translational Neuroscience and Its Advancement of Animal Research Ethics*. Eds. J. Warnick and A. Kalueff. Nova Science, NY. 2010: 71-82.
3. Hart, P., Bergner, C., Smolinsky, A., Dufour, B., Egan, R., and Kalueff, A. Experimental models of anxiety for drug discovery and brain research. In: *Mouse Models for Drug Discovery*. Eds. G. Proetzel and M. Wiles. Humana Press. *Methods Mol Biol*, NY. 2010; 602: 299-321.
4. Dow, E., Piet, V., Stewart, A., Gaikwad, S., Cachat, J., Hart, P., Wu, N., Kyzar, E., Utterback, E., Newman, A., Hook, M., Rhymes, K., Carlos, D., Kalueff, A. "Modeling mouse anxiety and sensorimotor integration: phenotypes in the Suok test." In: *Mood and Anxiety Related Phenotypes in Mice: Characterization Using Behavioral Tests*, Vol. II. Ed. T. Gould, Humana Press, NY. 2010.
5. Egan, R., Smolinsky, A., Bergner, C., LaPorte, J., Hart, P., and Kalueff A. "Hybridizing experimental paradigms to increase high throughput of neurobehavioral data." In: *Translational Neuroscience in Animal Research: Advancements, Challenges, and Research Ethics*. Eds. J.E. Warnick and A.V. Kalueff. Nova Science, NY. 2010: 113-123.
6. Bergner, C., Smolinsky, A., Hart, P., Dufour, B., Egan, R., and Kalueff, A. "Mouse models for studying depression-like states and antidepressant drugs." In: *Mouse Models for Drug Discovery*. Eds. G. Proetzel and M. Wiles. Humana Press. *Methods Mol Biol*. 2010; 602:267-282.
7. Bergner, C., Smolinsky, A., Dufour, B., LaPorte, J., Hart, P., Egan, R., and Kalueff, A. "Phenotyping and genetics of rodent grooming and barbering: utility for experimental neuroscience research." In: *Neurobiology of Grooming Behavior*. Eds. A.V. Kalueff, J.L. LaPorte, and C.L. Bergner. Cambridge University Press. 2010: 46-66.
8. Canavello, P., Cachat, J., Elkhayat, S., Bartels, B., Hart, P., Elegante, M., Beeson, E., Laffon, A., Haymore, W., Tien, D., Tien, A., Mohnot, S., Kalueff, A. "Video-aided analysis of zebrafish locomotion and anxiety-related behavioral responses." In: *Zebrafish Neurobehavioral Protocols*. Eds. A. Kalueff and J. Cachat, Humana Press, NY. 2010: 1-15.
9. Stewart, A., Cachat, J., Suci, C., Hart, P., Gaikwad, S., Utterback, E., DiLeo, J. Kalueff, A. "Intraperitoneal injections as a method of psychotropic drug delivery in adult zebrafish." In: *Zebrafish Neurobehavioral Protocols*. Eds. A. Kalueff and J. Cachat, Humana Press, NY. 2010: 169-181.
10. Cachat, J., Stewart, A., Utterback, E., Kyzar, E., Hart, P., Carlos, D., Gaikwad, S., Hook, M., Rhymes, K., Kalueff, A. "Deconstructing adult zebrafish behavior with swim trace visualizations." In: *Zebrafish Neurobehavioral Protocols*. Eds. A. Kalueff and J. Cachat, Humana Press, NY. 2010: 191-203.
11. Canavello, P., Cachat, J., Beeson, E., Laffoon, A., Grimes, C., Haymore, W., Elegante, M., Bartels, B., Hart, P., Elkhayat, S., Tien, D., Mohnot, S., Amri, H., Kalueff, A. "Measuring endocrine (cortisol) responses of zebrafish to stress." In: *Zebrafish Neurobehavioral Protocols*. Eds. A. Kalueff and J. Cachat, Humana Press, NY. 2010: 135-143.
12. Stewart, A., Maximino, C., Marques de Brit, T., Herculano, A., Gouveia, A., Morato, S., Cachat, J., Gaikwad, S., Elegante, M., Hart, P., Kalueff, A. "Neurophenotyping of adult zebrafish using the light/dark box paradigm." In: *Zebrafish Neurobehavioral Protocols*. Eds. A. Kalueff and J. Cachat, Humana Press, NY. 2010: 157-168.
13. Cachat, J., Canavello, P., Elegante, M., Bartels, B., Elkhayat, S., Hart, P., Tien, A., Tien, D., Beeson, E., Mohnot, S., Laffoon, A., Haymore, W., Kalueff, A. "Modeling Stress and Anxiety in Zebrafish." In: *Zebrafish Models in Neurobehavioral Research*. Eds. A. Kalueff and J. Cachat, Humana Press. 2010: 73-89.
14. Smolinsky, A., Bergner, C., Hart, P., Egan, R., and Kalueff, A. "The utility of genetically modified animals in modeling OCD-spectrum disorders." In: *Transgenic and Mutant Tools to Model Brain Disorders*. Eds. A.V. Kalueff and A.N. Smolinsky. Humana Press. 2009: 139-149.

15. Egan, R., Bergner, C., Hart, P., LaPorte, J., Kalueff, A. “Genetic animal models of anxiety.” In: *Transgenic and Mutant Tools to Model Brain Disorders*. Eds. A. Kalueff and C. Bergner. Humana Press. 2009: 179-189.
16. Bergner, C., Egan, R., Hart, P., Cachat, J., Canavello, P., Kalueff, A. “Mutant and Transgenic Zebrafish in Modeling Neurobehavioral Disorders.” In: *Transgenic and Mutant Tools to Model Brain Disorders*. Eds. A. Kalueff and C. Bergner, Humana Press. 2009: 3-12.
17. Canavello, P., Egan, R., Bergner, C., Hart, P., Cachat, J., Kalueff, A. “Genetic Animal Models of Depression.” In: *Transgenic and Mutant Tools to Model Brain Disorders*. Eds. A. Kalueff and C. Bergner, Humana Press. 2009: 191-200.

### **Invited Talks and Oral Presentations**

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Hart, P.C. Metformin targets mesothelial cells to impede ovarian cancer metastasis. *University of Illinois at Chicago Department of Pathology Lecture Series*. July 12<sup>th</sup>, 2018.

Hart, P.C., Litchfield, L., Sheikh, S., Lengyel, E., Romero I.L. Metformin inhibits TGF $\beta$ -induced stromal ECM remodeling to impede invasion in ovarian cancer. *AACR Annual Meeting, 2017*. Washington, D.C. April 3<sup>rd</sup>, 2017 – AMA PRA Category 1.

Hart, P.C., Yamada, D., Fleming, G., Romero, I., Lengyel, E. Repurposing metformin as a metabolically targeted therapeutic for ovarian cancer. *Mayo Clinic and University of Chicago SPORE Annual Meeting*. October 25<sup>th</sup>, 2016.

Hart, P.C., Minshall, R.D., Bonini, M.G. Caveolin-1 loss in human breast cancer is associated with increased tumor aggressiveness and mortality. *SBBQ Young Scientist Program - Satellite Conference for IUBMB, 2015*. São Paulo, SP, Brazil. August 21<sup>st</sup>, 2015.

Hart, P.C., Minshall, R.D., Bonini, M.G. Caveolin-1 loss in human breast cancer is associated with increased tumor aggressiveness and mortality. *American Society for Investigative Pathology: Special Session, Highlights: Graduate Student Research in Pathology; at Experimental Biology, 2015*. Boston, Massachusetts. March 28, 2015 and March 30<sup>th</sup>, 2015.

Hart, P.C., Mao, M., Abreu, A.L., Chen, A.J., Minshall, R.D., Bonini, M.G. Caveolin-1-dependent regulation of cellular metabolism: Role of Nrf-2 and SOD2. *Society for Free Radical Biology and Medicine, 2013*. San Antonio, Texas. November 21<sup>st</sup>, 2013.

### **Service and Other Activities**

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#### **Mentorship Experience:**

May Albreheem – PharmD Candidate – Roosevelt University, Schaumburg IL  
 Jillian Snow – Research Assistant – DePauw University, Greencastle IN  
 Shermeen Sheikh – Undergraduate – University of Chicago, Chicago IL  
 Briana Turner – Undergraduate – University of Chicago, Chicago IL  
 Rachel Loth – Lab Technician – University of Chicago, Chicago IL  
 Betul Kara – Lab Technician – University of Chicago, Chicago IL  
 Andre Abreu – PhD Candidate – University of Illinois at Chicago, Chicago IL  
 Christie Kang – PhD Candidate – University of Illinois at Chicago, Chicago IL

**Pedagogical Training:**

Integrated Sequence I: Musculoskeletal, Immune and Pulmonary Disorders. *Roosevelt University College of Pharmacy PHAR531*. Schaumburg, Illinois. Course instructor from March 6<sup>th</sup> 2020 to May 22<sup>nd</sup> 2020.

Integrated Sequence II: Endocrine Systems. *Roosevelt University College of Pharmacy PHAR532*. Schaumburg, Illinois. Course instructor from March 6<sup>th</sup> 2020 to May 22<sup>nd</sup> 2020.

Principles of Drug Action. *Roosevelt University College of Pharmacy PHAR530*. Schaumburg, Illinois. Course instructor from December 2<sup>nd</sup> 2019 to February 28<sup>th</sup> 2020.

Integrated Sequence VI: Gastrointestinal and Hepatobiliary Systems. *Roosevelt University College of Pharmacy PHAR632*. Schaumburg, Illinois. Course instructor from December 2<sup>nd</sup> 2019 to February 28<sup>th</sup> 2020.

Epithelial-to-mesenchymal transition and back: extrinsic regulation by the tumor microenvironment. *University of Chicago BIOS25326 Undergraduate Course in Tumor Microenvironment and Metastasis*. Chicago, Illinois. Guest instructor on April 3<sup>rd</sup> 2019 and April 14<sup>th</sup> 2020.

Howard Hughes Medical Institute – Summer Institute on Scientific Teaching, hosted at the University of San Diego. San Diego, California. June 17<sup>th</sup> through 21<sup>st</sup>, 2019.

Cancer metabolism: glycolysis and tumor progression. *University of Illinois at Chicago PATH511 Graduate Course in Pathobiology of Cancer*. Chicago, Illinois. Guest instructor on February 22<sup>nd</sup> 2015.

**Other Activities:**

Committee Member	Roosevelt University College of Pharmacy: Admissions Committee [2019 to present]
Committee Member	Roosevelt University College of Pharmacy: Integrated Sequence Committee [2019 to present]
Postdoctoral Advisor	University of Chicago Postdoctoral Association Advisory Board [2018 – 2019]
Peer-Reviewer	Molecular Cancer Research   International Journal of Molecular Sciences Oncotarget   Aging   Journal of Pharmacology and Therapeutics
Guest Editor	International Journal of Molecular Sciences

**Professional Societies:**

American Association for Cancer Research | Society for Redox Biology and Medicine