

# PAMELA K. KREEGER, Ph.D.

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Massachusetts Institute of Technology  
Room: 56-291  
Cambridge, MA 02139

Phone: 617-253-8644  
Fax: 617-258-0204  
kreeger@mit.edu

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## EDUCATION

- Ph.D.                      Chemical Engineering, Northwestern University, June 2005  
Thesis title: Alginate Matrices for the *in vitro* Culture of Ovarian Follicles:  
Regulation by Extracellular Matrix and Follicle Stimulating Hormone
- Summer Program       Frontiers in Reproduction, Marine Biological Laboratory, 2002
- B.S.                        Chemistry, Valparaiso University, May 2000  
Minors: Biology, Mathematics, and History  
*Summa cum laude*

## RESEARCH EXPERIENCE

- 8/05 – present           Post-Doctoral Fellow, Biological Engineering Division, MIT  
Principal Investigator: Douglas A. Lauffenburger  
*Research Areas:* Quantitative investigations, both experimental and  
computational, of malignant transformation of EGF signaling in ovarian cancer.
- 9/00 – 7/05              Graduate Student, Chemical and Biological Engineering Department,  
Northwestern University  
Principal Investigator: Lonnie D. Shea  
*Research Areas:* Development of a three-dimensional system for *in vitro* ovarian  
follicle culture that allows for the examination of fundamental questions about  
the roles of cell-cell and cell-matrix interactions in follicle development.
- 5/99-8/99  
and 5/00-8/00           Intern, Beams Division, Fermi National Accelerator Laboratory  
Supervisor: Maurice Ball  
*Research Areas:* Examination of the causes of copper corrosion in a low  
conductivity water cooling system, resulting in the implementation of  
instrumentation to monitor conditions.
- 5/98-9/98                Undergraduate Research Assistant, Department of Chemistry, Valparaiso  
University  
Principal Investigator: A. Gilbert Cook  
*Research areas:* Synthesis and characterization of enamines and ketoamides to  
examine the role of thermodynamic versus kinetic control in chemical reactions.
- 5/97-9/97                Undergraduate Research Assistant, Department of Chemistry, Valparaiso  
University  
Principal Investigator: Michael Bradley  
*Research areas:* Characterization of the dissolution of enteric coatings using  
fluorescence spectroscopy.

## PUBLICATIONS

1. S.K. Bristol-Gould, P.K. Kreeger, C.G. Selkirk, S.M. Kilen, K.E. Mayo, L.D. Shea, and T.K. Woodruff. "Fate of the Initial Follicle Pool: Empirical and Mathematical Evidence Supporting its Sufficiency for Fertility." *Developmental Biology*. In press.
2. S.K. Bristol-Gould, P.K. Kreeger, C.G. Selkirk, S.M. Kilen, R.W. Cook, J.L. Kipp, L.D. Shea, K.E. Mayo, and T.K. Woodruff. "Postnatal Regulation of Germ Cells by Activin: the Establishment of the Initial Follicle Pool." *Developmental Biology*. In press.
3. M. Xu, P.K. Kreeger, L.D. Shea, and T.K. Woodruff. "Tissue Engineered Follicles Produce Live, Fertile Offspring." *Tissue Engineering*. In press.
4. P.K. Kreeger, J.W. Deck, T.K. Woodruff, and L.D. Shea. "The *In Vitro* Regulation of Ovarian Follicle Development Using Alginate-Extracellular Matrix Gels." *Biomaterials*. 27, p 714-723, 2006.
5. P.K. Kreeger, N.N. Fernandes, T.K. Woodruff, and L.D. Shea. "Regulation of Mouse Follicle Development by Follicle Stimulating Hormone in a Three-Dimensional *In Vitro* Culture System is Dependent on Follicle Stage and Dose." *Biology of Reproduction*. 73, p 942-950, 2005.
6. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Murine Granulosa Cell Morphology and Function are Regulated by a Synthetic Arg-Gly-Asp Matrix." *Molecular and Cellular Endocrinology*. 205, p 1-10, 2003.
7. P.K. Kreeger and L.D. Shea. "Scaffolds for Directing Cellular Responses and Tissue Formation." In *Biomimetic Materials and Design: Interactive Biointerfacial Strategies, Tissue Engineering and Drug Delivery*. Marcel Dekker, Inc, 2002.
8. A.G. Cook and P.K. Kreeger. "Reaction of Morpholine with t-Butyl Acetoacetate: A Study of Kinetic vs. Thermodynamic Control, Product Identification, and Molecular Modeling." *Journal of Chemical Education*. 77, p 90-2, 2000.

## PRESENTATIONS

1. P.K. Kreeger, S.K. Bristol-Gould, C.G. Selkirk, S.M. Kilen, K.E. Mayo, L.D. Shea, and T.K. Woodruff. "The Fate of the Initial Follicle Pool: Empirical and Mathematical Evidence Supporting its Sufficiency for Fertility." *Endocrine Society*. Boston, MA. June 2006.
2. S.K. Bristol-Gould, P.K. Kreeger, C.G. Selkirk, S.M. Kilen, R.W. Cook, J.L. Kipp, L.D. Shea, K.E. Mayo, and T.K. Woodruff. "Postnatal Regulation of Germ Cells by Activin: Establishment of and Optimal and Necessary Quantity of Follicles Prior to Puberty." *Endocrine Society*. Boston, MA. June 2006.
3. M. Xu, P.K. Kreeger, L.D. Shea, and T.K. Woodruff. "Tissue Engineered Follicles Produce Live, Fertile Offspring." *Endocrine Society*. Boston, MA. June 2006.
4. E.R. West, P.K. Kreeger, J.W. Deck, T.K. Woodruff, and L.D. Shea. "Alginate Hydrogel Mechanics Regulate Follicle Growth in a Three-Dimensional *In Vitro* Culture System." *American Institute of Chemical Engineers*. Cincinnati, OH. Nov. 2005.

5. E.R. West, P.K. Kreeger, J.W. Deck, T.K. Woodruff, and L.D. Shea. "Alginate Hydrogel Mechanics Regulate Follicle Growth in a Three-Dimensional *In Vitro* Culture System." *Northwestern University Reproductive Mini-Symposium*. Evanston, IL. Oct. 2005.
6. P.K. Kreeger, N.N. Fernandes, J.W. Deck, T.K. Woodruff, and L.D. Shea. "Extracellular Matrix Regulation of Follicle Development in an *In Vitro* Culture System." *European Society for Human Reproduction Campus: Mammalian Oogenesis and Folliculogenesis*. Paris, France. Mar. 2005 (selected for podium presentation)
7. P.K. Kreeger, N.N. Fernandes, T.K. Woodruff, and L.D. Shea. "Alginate-Extracellular Matrix Gels to Promote Maturation of Ovarian Follicles." *American Institute of Chemical Engineers*. Austin, TX. Nov. 2004.
8. K.E. Mayo, S.K. Bristol-Gould, J.L. Kipp, J. Weck, S.M. Kilen, A. Burkart, C. Matulis, P.K. Kreeger, and T.K. Woodruff. "Regulation and Actions of Inhibin and Activin in the Ovary." *Serono Ovarian Workshop*. Vancouver, Canada. July 2004.
9. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Alginate Matrices for the *In Vitro* Culture of Immature Murine Ovarian Follicles." *Midwest Microscopy and Microanalysis Society*, Evanston, IL. Mar. 2004. (invited)
10. T.K. Woodruff, P.K. Kreeger, C.B. Berkholtz, J. Roh, S. Kalra, J. Zhang, R. Kazer, and L.D. Shea. "TGF $\beta$  Family Members that Impact on Follicle Development and Oocyte Growth." *Updates in Infertility Treatment*, Marco Island, FL. Jan. 2004.
11. P.K. Kreeger, C.B. Berkholtz, T.K. Woodruff, and L.D. Shea. "Alginate Matrices for the Culture of Immature Murine Ovarian Follicles." *American Institute of Chemical Engineers*, San Francisco, CA. Nov. 2003.
12. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Collagen Type I Improves Survival and Stimulates Granulosa-Oocyte Complex Growth *In Vitro*." *Northwestern University Reproductive Mini-Symposium*. Evanston, IL. Oct. 2003. Constance Campbell Award.
13. P.K. Kreeger, C.B. Berkholtz, T.K. Woodruff, and L.D. Shea. "*In Vitro* Maturation of Granulosa-Oocyte Complexes in Synthetic Scaffolds." *Society for Biomaterials*. Reno, NV. Apr. 2003.
14. P.K. Kreeger and L.D. Shea. "Tissue Engineering: General Principles and Application in Ovarian Biology." *Valparaiso University*. Valparaiso, IN. Mar. 2003. (invited)
15. P.K. Kreeger, C.B. Berkholtz, T.K. Woodruff, and L.D. Shea. "A Novel System for *In Vitro* Culture of Immature Granulosa-Oocyte Complexes." *Northwestern University Reproductive Mini-Symposium*. Evanston, IL. Oct. 2002. Constance Campbell Award.
16. S.A. Pangas, H. Saudye, P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Hydrogel Scaffolds for the Culture of Primary Ovarian Follicles." *American Institute of Chemical Engineers*. Reno, NV. Nov. 2001.

## POSTER SESSIONS

1. P.K. Kreeger, S.K. Bristol-Gould, C.G. Selkirk, S.M. Kilen, K.E. Mayo, L.D. Shea, and T.K. Woodruff. "The Fate of the Initial Follicle Pool: Mathematical Modeling Demonstrates Its Sufficiency for Adult Fertility." *ENDO*. Boston, MA. June 2006.
2. S.K. Bristol-Gould, P.K. Kreeger, C.G. Selkirk, S.M. Kilen, R.W. Cook, J.L. Kipp, L.D. Shea, K.E. Mayo, T.K. Woodruff. "Postnatal Regulation of Germ Cells by Activin: Establishment of an Optimal and Necessary Quantity of Follicles Prior to Puberty." *ENDO*. Boston, MA. June 2006.
3. S.K. Bristol-Gould, P.K. Kreeger, C.G. Hutten, S.M. Kilen, R.W. Cook, J.L. Kipp, L.D. Shea, K.E. Mayo, T.K. Woodruff, "Postnatal Regulation of Germ Cells by Activin." *Northwestern University Reproductive Mini-Symposium*. Evanston, IL. Oct. 2005.
4. P.K. Kreeger, J.W. Deck, N.N. Fernandes, T.K. Woodruff, and L.D. Shea. "Reconstructed Basement Membrane Regulation of Murine Follicle Maturation in a Three-Dimensional Culture System." *Society for the Study of Reproduction*. Vancouver, Canada. Aug. 2004. USDA Merit Award.
5. P.K. Kreeger, N.N. Fernandes, C.B. Berkholtz, T.K. Woodruff, and L.D. Shea. "Gonadotropin Supplementation Enhances Development for Murine Preantral Follicles Cultured in a Three-Dimensional System." *Society for the Study of Reproduction*. Vancouver, Canada. Aug. 2004.
6. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Reconstructed Basement Membrane and Gonadotropin Regulation of Murine Follicle Maturation in a Three-Dimensional Culture System." *Serono Ovarian Workshop*. Vancouver, Canada. July 2004. Cornelia Channing Award.
7. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Alginate Scaffolds for the Culture of Ovarian Follicles in a Stage Specific Manner." *American Institute of Chemical Engineers*. Austin, TX. Nov. 2004.
8. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Three-Dimensional Culture of Murine Follicles *In Vitro*: Extracellular Matrix Effects." *Gordon Research Conference: Reproductive Tract Physiology*, New London, CT. June 2004. Gramm Award.
9. P.K. Kreeger, C.B. Berkholtz, T.K. Woodruff, and L.D. Shea. "A Novel Three-Dimensional System for the *In Vitro* Culture of Immature Murine Ovarian Follicles." *Society for the Study of Reproduction*. Cincinnati, OH. July 2003.
10. C.B. Berkholtz, P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Follicle Size Increases in a Synthetic Stroma." *Northwestern University Reproductive Mini-Symposium*. Evanston, IL. Oct. 2002.
11. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Alginate Matrices to Regulate Granulosa Cell Morphology and Steroid Production." *Biomedical Engineering Society*. Houston, TX. Oct. 2002.
12. P.K. Kreeger, T.K. Woodruff, and L.D. Shea. "Synthetic Scaffolds to Regulate Granulosa Cell Adhesion and Spreading." *Northwestern University Reproductive Mini-Symposium*. Evanston, IL. Oct. 2001. Constance Campbell Award.

## PATENTS

T.K. Woodruff, S.A. Pangas, P.K. Kreeger, H. Saudye, R. Kazer, J. Zhang, and L.D. Shea. "3-Dimensional Cell Maturation Systems and Related Methods of Use." Patent pending.

## TECHNICAL SKILLS

Cell and organ culture (primary cell/tissue isolation, proliferation/viability assays)  
Microscopy (transmission, fluorescence, and confocal)  
Biomaterials development and characterization  
Histology (embedding, sectioning, staining)  
ELISA, Western blotting, iodination  
Software: Adobe InDesign & Photoshop, JMP Statistics Software, Kaleidagraph, Microsoft Office

## FELLOWSHIPS

Anna Fuller Fund Fellowship in Molecular Oncology	2006
Northwestern University Fellow	2004-2005
Alpha Lambda Delta Graduate Fellowship	2004-2005
Metz Scholarship in Reproductive Biology	2002
National Defense Science and Engineering Graduate Fellowship	2001-2004
National Science Foundation Fellowship (declined)	2001
Cabell Fellowship, Northwestern University	2000-2001

## AWARDS

USDA Merit Travel Fellowship Award	2004
Gramm Travel Fellowship Award	2004
Student Travel Award, Biomedical Engineering Society	2002
Teaching Assistant of the Year, Department of Chemical Engineering	2001

## TEACHING EXPERIENCE

9/03-12/03	<u>Teaching Apprenticeship Program</u> , Undergraduate Equilibrium Separations, Northwestern University
4/02-6/02	<u>Teaching Assistant</u> , Undergraduate Kinetics and Reactor Design, Northwestern University
1/01-3/01	<u>Teaching Assistant</u> , Undergraduate Heat Transfer, Northwestern University
9/97-5/00	<u>Teaching Assistant</u> , Undergraduate General Chemistry, Valparaiso University

## STUDENTS MENTORED

Rebecca Kusko	Undergraduate in Biological Engineering, 2006-present
Ann Breckenkamp	Undergraduate in Chemical Engineering, 2006-present
Jason Deck	Undergraduate in Biomedical Engineering, 2003-2005
Melissa Chamberlin	Integrated Biological Sciences Program Rotation Student, 2003
Courtney Berkholtz	Integrated Biological Sciences Program Rotation Student, 2002
Stephen Sung	Undergraduate in Chemical Engineering, 2002 - 2003
Amy Lewis	Undergraduate in Chemical Engineering, 2001 - 2002

## ACTIVITIES

Faculty Search Committee, Chemical and Biological Engineering	2002, 2004
Graduate Recruitment Committee, Chemical and Biological Engineering	2003
Co-President of Chemical Engineering Graduate Student Fellowship	2001

## **PROFESSIONAL SOCIETIES**

Endocrine Society

American Institute of Chemical Engineers (AIChE)

Society for the Study of Reproduction (SSR)

European Society of Human Reproduction and Embryology (ESHRE)