***Curriculum Vitae*, Iris Lindberg, Ph.D.**

 **Date**: Sept. 15, 2014

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**Education**

        1975 A.B.  Biochemistry, University of California at Berkeley

        1980 Ph.D. Pharmacology   Univ. of Wisconsin-Madison Medical School

**Post-Graduate Education and Training**

   1981 ‐ 1984     Staff Fellow, NRSA Postdoctoral Fellow

                           and Pharmacology Research Associate Trainee (PRAT program)

                                     Laboratory of Preclinical Pharmacology,

 NIMH, St. Elizabeth’s Hospital, Washington D.C.

**Employment**

        1984 ‐ 1989     Assistant Professor, Dept. of Biochemistry and Molecular Biology

 Louisiana State University Medical School

 New Orleans, LA

1989 ‐ 1994     Associate Professor (tenured), Dept. of Biochemistry and Molecular Biology,

Louisiana State University Health Sciences Center (name changed)

 New Orleans, LA

        1994 ‐ 2007   Professor, Dept. of Biochemistry and Molecular Biology

Louisiana State University Health Sciences Center

 New Orleans, LA

 2006 - 2007 LSUHSC Cancer Center Member

 2007 - present Professor, Department of Anatomy and Neurobiology

 University of Maryland Medical School

Baltimore, MD

Secondary Appointment: Department of Biochemistry

Member, Greenebaum Cancer Center

**Professional Society Memberships**

1978 ‐ present Society for Neuroscience

1982-present Winter Conference on Brain Research

1985 ‐ 2005; 2011-pres. American Society for Biochemistry and Molecular Biology

1999 ‐2005 American Society for Cell Biology

2001 ‐ present The Endocrine Society

2013- present American Society for Bone and Mineral Research

**Career Development Awards**

1981 NIH Individual Postdoctoral Fellowship (switched to PRAT)

1981‐1983 Pharmacology Research Associate Traineeship (PRAT)

1988‐1993 Research Career Development Award (NIDDK)

1993‐1998 Research Scientist Development Award (NIDA)

1998‐2003 Research Scientist Development Award (NIDA)

**Administrative Service**

***Institutional Service (Committees)***

1985-2007 LSUHSC Neuroscience Center Executive Steering Committee

1986-1988 Biochemistry Dept. Graduate Recruitment Committee

1992-1997 LSUHSC Graduate Council

1996-2000 LSUHSC Neuroscience Center Faculty Recruitment Committee

1997-2002 Neuroscience Center Graduate Program Recruitment Committee

2001 LSU School of Medicine Research Retreat Committee

2003-2004 Emergency Preparedness Faculty Committee, LSUHSC

2003-2005 LSUHSC Research Council

2004 Biochemistry Dept. Graduate Recruitment Committee

2004-2005 Faculty Search Committee, Biochemistry Department

2004-2005 Graduate Advisor, Biochemistry Department

2004-2005 LSUHSC Graduate Council

2005-2007 Faculty Assembly, LSUHSC

2007- present Program in Neuroscience Seminar Committee, University of Maryland

2007- 2012 Program in Neuroscience Training Committee, University of Maryland

2007- present Dept. Anatomy & Neurobiology Promotions Committee;

**Chair, 2010- 2014**

2008- present Dept. Anatomy & Neurobiology Faculty Search Committee

2008- 2011 Proteomics Core Steering Committee, University of Maryland

2009- present Radiation Safety Institutional Committee, University of Maryland

2009- 2010 Pharmacology Head Search Committee, University of Maryland

2009- present Departmental Representative to School of Medicine Council

2009- present **Organizer**, Departmental “Second Monday” Work-in-Progress seminar series

2010, 2012 Qualifying Exam Committee, Program in Neuroscience

2010- 2014 **Chair,** Program in Neuroscience Retreat Committee

2011 Univ. of Maryland Strategic Plan Subcommittee (Research)

2012- present Univ. of Maryland Program in Neurosciences Postdoctoral Training Grant Steering Committee

 2010-present Junior faculty mentoring committees, Drs. Elizabeth Powell; Marta Lipinski

***Other Institutional Service***

1990, 1992, 1995, 1997 LSUHSC Design & production of Biochemistry Dept. recruitment brochure

1997-2002 LSUHSC Neuroscience Center brochure production

2004- 2006 LSUHSC Grantsmanship presentations to faculty and students

2008 Presentation to UMB graduate students: “How to Succeed in Grad School”

2010 “Getting an RSDA” (Wendy Sanders’ Professional Skills program)

***Ph.D. Thesis Committees***

**Louisiana State University Health Sciences Center:** Minetta Gardinier, Jeremy Springhorn, Richard Shen, Yi Zhou, John Mathis,  Tamim Shaikh,

Erik Pakarinen, Joomyeong Kim, Virginia Strand, Astrid Roy, Ping Wei, Mary Breslin,

Neva West, Yolanda Fortenberry, Mike Serou,  Changning Gong, Bin Tu, Peimin Zhu,

Yuri Peterson, Faramarz Taheri, Eleanor Park, and Tanya Roy

**University of Maryland-Baltimore**:

Amanda Elson, Zhongping Liu, Akina Hoshino, Adam Clark, Erik Martin, Alexandra Winters,

and Patricia Cunfer

***Other Service***

1985‐86, 1988‐89 *Secretary,* Greater New Orleans Society for Neuroscience

2005‐2006 *President,* Greater New Orleans Society for Neuroscience

 In 2005-06, my major duty was to organize the distribution of

$100,000 in Katrina relief funds from the national Society for Neuroscience to local neuroscience graduate students.

2008-2011 Winter Conference on Brain Research, *Scientific Board*

2012-2013 *President*, Greater Baltimore Society for Neuroscience

***National Service***

***Ad hoc* and regular grant reviewer:**

1987 Study section reviewer, NLS1

1989, 1997 Study section reviewer, NIDA Biochemistry

1989, 1990 Special emphasis panel member, NIDDK

1990- present *Ad hoc* reviewer, *J. Biol. Chem., J. Neurochem., Peptides, J. Neurosci., Analyt. Biochem., FEBS Lett., Protein Eng., Design and Selection,* *Proc. Natl Acad Sci, Endocrine Rev., Diabetes, Molecular Medicine and Metabolism, Mol. Cell. Endocrinol., J. Endocrinol., Endocrinol, PLoS ONE,* and others

1991 Study section reviewer, NIMH career awards

1994 Special emphasis panel member, NINDS

1995 Study section reviewer, NLS1

1995, 1996, 1998 Study section and special emphasis panel reviewer, NIDDK

1996, 1997, 2002 Study section reviewer, NLS1

1996-2000 **Regular member, Endocrinology study section**

1998, 2000 Advisory Committee Member, Gordon Conference: *Hormonal and Neural Peptide Synthesis*

1999 Study section reviewer, ACS

2000-2005 **Editorial Board Member, *Journal of Biological Chemistry***

2000 NIMH Career Awards study section reviewer

2000-2005 Endocrinology study section  reviewer ( about 1 panel per year)

2002 Vice‐Chair, Gordon Conference:*Hormonal and Neural Peptide Synthesis*

2004 **Chair, Gordon Conference: *Proprotein Processing, Trafficking, and  Secretion***

2006-2010 Advisory Committee Member, Gordon Conference: *Proprotein Processing, Trafficking, and Secretion*

* 1. **Regular member, Molecular and Cellular Endocrinology study section**

2010 Special Emphasis Panel reviewer, NIDDK 2/2010

2011 *EUREKA* NIH review panel member

2012-2017 **Editorial Board Member, *Journal of Biological Chemistry***

2013 SBIR Study Section, 3/4/2013

***International Review Service***

2002 Finnish National Academy of Sciences Review Panel, Helsinki, Finland

2002, 2009 Canada Research Chairs, College of Reviewers, applicant reviewer

2003 Chair, Finnish National Academy of Sciences Review Panel

2005 Foundation for Scientific Research‐ Flanders, Belgium, grant reviewer

2006 Wellcome Trust grant reviewer

2008-2010 Foundation for Scientific Research‐ Flanders, Belgium, grant reviewer

2011 Medical Research Council (U.K.), grant reviewer

2013 Canadian Institutes of Health, grant reviewer

2014 Danish Agency for Science Technology and Innovation

***Teaching Service***

1985‐ 1986   Dental Biochemistry (17 lecture h per year) - 85 students

1985‐2005  One lecture in “Methods in Neuroscience”  - 15 students

 (course given at Tulane University in alternate years

 on protein expression methods) (2 h)

1987 ‐1999   Medical Biochemistry (17 h) -150 students

1991, fall   Graduate seminar in the cell biology of protein targeting (20 h) 8 students

1995 ‐ 2001  Neuroscience Survey (2 h) 8 students

1997   Endocrinology (on radioimmunoassay and opioid peptides) (2 h) 10 students

1998‐ 2004   Molecular Neuroscience (on neurotransmitters) (4 h) 8 students

2000   Nursing Biochemistry (20 h) 80 students

2001 Graduate Seminar in Protein Motifs (20 h) 7 students

2001, 2002   Special Topics Graduate Seminar in Methods in Biochemistry;

 (Protein Expression and Purification) (2 h); 8 students

2003, 2005   Endocrinology - Bioactive peptides and radioimmunoassay (4 h and 2h); 12 students

2003‐2005 Graduate Seminar-    “Professional Skills”.

 Graduate student mentoring: giving talks, preparing grants,

 manuscripts, career choices (30 h); 12 students

2006  Dental Biochemistry (4 h); 85 students

2006  Molecular Neuroscience ‐ Neuropeptides (4 h) and Grantsmanship (1 h)

2006, 2007  Endocrinology Graduate course   “Radioimmunoassay and other

 hormone‐measurement techniques” (2 h); 25 students (included Allied Heath

 students)

2008- present (**UMB)** Professional Skills course in Molecular Medicine “How to Write/Review Grants” (1 h) ; 20 students

2008- present GPILS Core Course “Posttranslational Modifications” (1 h); 50 students

2009- present Ethics Class, Discussion Leader (1.5 h) twice a year (small group of 6-10)

 2010 -2014 Neuroscience (GPILS 641) “Peptides and Modulators” (1 1/2 h);

 10-12 students

2010- present Structure and Development “Endocrine Systems” (2 h); 180 students

**Students and postdoctoral fellows supervised**

***Graduate Students supervised  (rotation students not listed)***

1. Fu‐sheng Shen (1986‐ 1988) (Ph.D. 1990, from Institute of Physiology, Beijing)

2. John Mathis (1988‐ 1994) Ph.D. 1994

3. Yi Zhou (1990‐ 1994) Ph.D. 1994

4. Yolanda Fortenberry (1997‐ 2001) Ph.D. 2001

5. Maria Sayah (3/00‐ 12/00) (Master’s thesis; French practical training)

6. Valery Iattignon (1/04‐ 4/04) (Master’s thesis; French practical training)

7. Akina Hoshino (11/07- 4/2012)

8. Alexandra Winters (2013-present) (co-mentor with Dr. Toni Pollin)

***Postdoctoral Fellows supervised***

1.  Dr. Nympha B. DʹSouza (1987‐1988)

2. Dr. Steven F. Roberts (1988‐ 1991)

3.  Dr. Joseph Irvine (1989‐ 1991)

4. Dr. Fu‐sheng Shen (1991‐ 1992)

5.  Dr. Osvaldo Vindrola (1991‐ 1993)

6. Dr. Nazarius Lamango (1994‐ 1996)

7. Dr. Xiaorong Zhu (1994‐ 1997) (NRSA fellow)

8. Dr. Karla Johanning (1994‐ 1998)

9.  Dr. Laurent Muller (1996‐ 1999)

10. Dr. Ekaterina Apletalina (1997‐ 2000)

11. Dr. Jae‐Ryoung Hwang (1998‐ 2001)

12. Dr. Angus Cameron (1999‐ 2000)

13. Dr. Virginie Laurent (1999‐2002)

14. Dr. Ashok Dubey (2000‐ 2001)

15. Dr. Miroslav Sarac (2000‐ 2003)

16. Dr. Emmanuel Prodhomme (2001‐2002)

17. Dr. Weidong Liu (2001‐2002)

18. Dr. Sang‐Nam Lee (2002‐ 2007)

19. Dr. Juan Ramon Peinado (2003‐2004)

20. Dr. Magdalena Kacprzak (2003‐ 2005)

21. Dr. Bainan Liu (2004‐ 2005)

22. Dr. Dorota Kowalska (2005) and (2008-2009)

23. Dr. Wagner Judice (2006- 2007) (NIDA INVEST Fellow)

24. Dr. Jin Liu (2006‐ 2008)

25. Dr. Akihiko Ozawa (2006‐ 2011)

26. Dr. Michael Helwig (2009- 2012) (supported by Leopoldina Fellowship)

27. Dr. Mirella Vivoli (2010- 2012)

28. Dr. Indrani Dasgupta (2011-2013)

29. Dr. Laura Sanglas (2011-2012) (supported by Danish Academy Fellowship)

30. Dr. Hiroyuki Yamamoto (2013; Visiting Assistant Professor, Shizuoka, Japan)

31. Dr. Elias Blanco (2013- present)

32. Dr. Yogikala Prabhu (2011; 2013)

33. Dr. Juan Ramon Peinado, (2013; Visiting Assistant Professor, Ciudad Real University)

34. Dr. Bruno Ramos Molina (2014- present)

**Grant Support**

 ***Ongoing Research Support***

**Opioid Peptide Synthesizing Enzymes**  04/01/88- 2/28/15

R01 DA05084-27 I. Lindberg (P.I) (30% effort)

 NIH/NIDA $337, 751 current year total costs

This grant is to identify regulatory mechanisms for PC1/3 activity; to identify small molecule convertase inhibitors using combinatorial compound screening; and to crystallize PC1/3.

 **The Secretory Chaperone 7B2 as an Endogenous Regulator of Amyloid Pathology**

1R21AG045741-01 I. Lindberg, P.I. (20% effort) 09/01/14- 4/30/16

NIH/NIA $199,950 current year total costs

This grant is to explore the idea that brain 7B2 levels modulate the pathologic aggregation of beta amyloid-derived peptides.

***Completed Research Support (Competing applications and other grants. R01s shown in yellow.)***

1/85 ‐ 12/86 I. Lindberg, PI

 “Pharmacologic control of opioid peptide biosynthesis.”

  Pharmaceutical Manufacturer’s Association Starter Grant

4/85 ‐ 11/88   I. Lindberg, PI  (30% effort)

   “Biosynthesis of enkephalin in the adrenal medulla.”

 R01 DK35199‐01

4/88 ‐ 3/91 I. Lindberg, PI (30% effort)

 ʺOpioid peptide‐synthesizing enzymesʺ

 R01 DA05084‐01

 7/88 ‐ 6/93     I. Lindberg, PI (90% salary)

       Research Career Development Award

 K04 DK01868  (salary award)

 12/88 ‐ 11/91  I. Lindberg, PI    (30% effort)

    “Biosynthesis of enkephalin in the adrenal medulla.”

 R01 DK35199‐04

 4/91 ‐ 3/94   I. Lindberg, PI  (30% effort)

1. ʺOpioid peptide‐synthesizing enzymesʺ
2. R01 DA05084-04

 10/93‐ 9/98  I. Lindberg, PI (75% salary)

      Research Scientist Development Award

 K02 DA00204‐01  (salary award)

 4/94 ‐ 3/99  I. Lindberg, PI  (30% effort)

1. ʺOpioid peptide‐synthesizing enzymesʺ
2. R01 DA05084-07

 7/96‐ 3/02    I. Lindberg, PI   (30% effort)

1. “Control of peptide hormone biosynthesis by PC2 and 7B2”
2. R01 DK49703-01

10/98‐ 9/03    I. Lindberg, PI (75%)

      Research Scientist Development Award

 K02 DA00204‐06  (salary award renewal)

4/99‐ 3/04 I. Lindberg, PI (30% effort)

  “Opioid peptide‐synthesizing enzymesʺ

 R01 DA05084-12

4/02- 3/07 I. Lindberg, PI (30% effort)

 “Control of peptide hormone biosynthesis by PC2 and 7B2”

 R01 DK49703-06

2004  I. Lindberg, PI Gordon Conference support grant

      “Proprotein processing, trafficking and secretion”

 5R13DK061936

2004 I. Lindberg, PI NSF Conference Support: received $2,000 for

 a poster award program for the same Gordon Conference cited above

 4/04-3/09 I. Lindberg, PI (30% effort)

 “Opioid peptide‐synthesizing enzymesʺ

 R01 DA05084-17

9/02‐8/05   I. Lindberg, PI (20% effort)

       “Blockade of anthrax toxin cytotoxicity using furin inhibitors”

 R21 AI 053517-01

8/03-8/06 P. Sunkara, PI (5% effort)

 “Hexa-D-Arg: a furin inhibitor for anthrax biodefense”

 Subcontract, Molecular Therapeutics

 SBIR R43 A1056850

9/04-3/06 S. Pincus, PI (5% effort)

 “Furin Inhibition in HIV Disease”

 R21 AI058714-01

3/06‐6/06  I. Lindberg, PI (10% effort)

  “Furin as an Anti-Cancer Target”

Louisiana Cancer Research Consortium

6/09- 5/11 I. Lindberg, PI (20% effort)

 “Identification of Novel Peptide Hormones”

 R21 DK084481-01

09/09- 03/14 I. Lindberg (P.I.) (30% effort)

 “Control of Peptide Hormone Biosynthesis by PC2 and 7B2”

 R01 DK49703-12

07/09-06/14 I. Lindberg and B. Roth (co-P.I.s) (30% effort)

 “De-Orphanizing the Peptidome”

 R01 DA027170-01

**ARRA Supplement** received in 2010 for purchase of AKTA FPLC ($70,000)

Contributed sections to several **COBREs**and**equipment grants** awarded to LSUHSC faculty; also contributed to various **ARRA Equipment Supplement/** **Multi-User** **Equipment** applications at the University of Maryland)

***Research Support as Mentor***

7/95‐6/98Mentor to Dr. Xiaorong Zhu, NRSA postdoctoral fellowship

10/97‐8/00 Mentor to Ms. Yolanda Fortenberry, NRSA predoctoral fellowship

12/06-12/07    Mentor to Dr. Wagner Judice,  NIDA INVEST fellowship

08/10-present Mentor to Dr. Michael Helwig, Leopoldina fellowship

06/11-6/2012 Co-mentor to Dr. Laura Sanglas, Danish Academy fellowship

**Patents**

1. Patent # 6,548,736 on the 7B2 null mouse as a model for pituitary Cushing’s was granted to C.H. Westphal, **I. Lindberg,** and P. Leder.

2. Patent # 7,033,991 on polyarginine furin inhibitors in inhibiting bacterial disease and cancer was granted on April 25, 2006 to **I. Lindberg**, A. Cameron, J. Appel, and R.A. Houghten.

**Publications**

***Peer-Reviewed Journals***

1. **Lindberg,** I., Smythe, S., and Dahl, J.L. (1979) Distribution of enkephalin in bovine brain. Brain Research, 168, 200-203.

2. **Lindberg, I.,** and Dahl, J.L. (1981) Characterization of enkephalin release from rat striatum. J. Neurochem. 36, 506-512.

3. Epstein, M., **Lindberg, I.,** and Dahl, J.L. (1981) Development of enkephalinergic neurons in the gut of the chick. Peptides 2, 271-276.

4. **Lindberg, I**., Yang, H.-Y.T., and Costa, E. (1982) An enkephalin-generating enzyme in bovine adrenal medulla. Biochem. Biophys. Res. Commun. 106, 186-1934.

5. Dahl, J.L., Epstein, M.L., Silva, B.W., and **Lindberg, I.** (1982) Multiple forms of met5- and leu5-enkephalin in fetal and neonatal rat brain and gut. Life Sci. 31, 1853-1856.

6. **Lindberg**, I., Yang, H.-Y.T., and Costa, E. (1982) Characterization of a partially purified trypsin-like enkephalin-generating enzyme in bovine adrenal medulla. Life Sci. 31, 1713-1716.

7. **Lindberg, I.,** Yang, H.-Y.T., and Costa, E. (1983) A high molecular weight form of met5-enk-arg6-gly7-leu8 in rat brain and bovine adrenal chromaffin granules. Life Sciences 33 Supp. I., 5-8.

8. **Lindberg, I.,** and Yang, H.-Y.T. (1984) Distribution of met5-enk-arg6-gly7-leu8-immunoreactive peptides in rat brain: presence of multiple immunoreactive forms. Brain Research 299, 73-78.

9. **Lindberg, I.,** Yang, H.-Y.T., and Costa, E. (1984) Further characterization of an enkephalin-generating enzyme from bovine adrenal chromaffin granules. J. Neurochem. 42, 1411-1419.

10. **Lindberg, I**., Yang, H.-Y.T., and Costa, E. (1985) Release of multiple immunoreactive forms of met5-enk-arg6-gly7-leu8 from rat brain. Neuropeptides 5, 541-544.

11. **Lindberg, I**., and White, L. (1986) Reptilian enkephalins: implications for the evolution of proenkephalin. Arch. Biochem. Biophys. 245, 1-7.

12. Wang, Y.N. and **Lindberg, I.** (1986) Distribution and characterization of met-enk-arg-gly-leu in the gastrointestinal tract of the rat. Cell and Tiss. Res. 244, 77- 85.

13. **Lindberg, I.,** and White, L. (1986) Distribution of immunoreactive Peptide B in the rat brain. Biochem. Biophys. Res. Commun. 139, 1024-1032.

14. **Lindberg, I.** (1986) Reserpine-induced alterations in the processing of proenkephalin in cultured chromaffin cells: increased amidation. J. Biol. Chem. 261, 16317- 16323.

15. Panula, P., and **Lindberg, I.** (1987) Pituitary enkephalins: biochemical and immunohistochemical observations. Endocrinology 121, 48-58.

16. Byrd, J., Naranjo, J., and **Lindberg, I.** (1987) Proenkephalin gene expression in the PC12 cell line: stimulation by sodium butyrate. Endocrinology 121, 1299-1305.

17. D'Souza, N. and **Lindberg, I.** (1988) Evidence for the phosphorylation of a proenkephalin-derived peptide, Peptide B. J. Biol. Chem. 263, 2548-2552.

18. Shen, F.S. and **Lindberg, I.** (1988) Characterization of enkephalin-immunoreactive peptides generated from plasma proteins by peptic digestion. Endocrinology 122, 2905-2910.

19. Shen, F-S., and **Lindberg, I.** (1989) Purification and assay of opioid activity of low molecular weight enkephalin-immunoreactive peptides generated by peptic digestion of rat plasma proteins. Neuropeptides 13, 23-28.

20. Shen, F.-S., Roberts, S.F., and **Lindberg, I.** (1989) A putative processing enzyme for proenkephalin in bovine adrenal chromaffin granules- purification and characterization. J. Biol. Chem. 264, 15600-15605 (1989).

21. **Lindberg, I**., and Thomas, G. (1990) Cleavage of proenkephalin by a chromaffin granule processing enzyme. Endocrinology 126, 480-487.

22. Irvine, J., Roberts, S.F., and **Lindberg, I.** (1990) Electrophoretic analysis of proteinases in sodium dodecyl sulfate polyacrylamide gels containing copolymerized radiolabelled protein substrates: application to proenkephalin processing enzymes. Analyt. Biochem.190, 141-146.

23. **Lindberg, I.,** Shaw, E., Finley J., Leone, D., and Deininger, P. (1991) Posttranslational modifications of recombinant rat proenkephalin overexpressed in Chinese hamster ovary cells. Endocrinology 128, 1849-1856.

24. Irvine, J.W., and **Lindberg, I.** (1991) Partial purification and characterization of a putative prohormone processing enzyme complex from bovine pituitary. Endocrinology, 128, 2345- 2352.

25. **Lindberg, I.,** and Shaw, E. (1992) Posttranslational processing of proenkephalin in a human neuroblastoma cell line, SK-N-MC. J. Neurochem. 58, 458-453.

26. Roberts, S.F., Irvine, J.W., and **Lindberg, I.** (1992) Proteolytic activity in bovine adrenal chromaffin granules visualized using [35S]methionine-labelled proenkephalin copolymerized into SDS-PAGE. J. Neurochem. 58, 593-599.

27. **Lindberg, I.,** Lincoln, B., and Rhodes, C.J. (1992) Fluorometric assay of a calcium-dependent, paired basic processing endopeptidase present in insulinoma granules. Biochem. Biophys. Res. Commun. 183, 1-7.

28. Vindrola, O., and **Lindberg, I.** (1992) Biosynthesis of the prohormone convertase mPC1 in AtT-20 cells. Mol. Endocrinol. 6, 1088-1094.

29. Mathis, J., and **Lindberg, I.** (1992) Posttranslational processing of proenkephalin in AtT-20 cells: evidence for cleavage at a Lys-Lys site. Endocrinology 131, 2287-2296*.*

30. Zhou, Y., and **Lindberg, I.** (1993) Purification and characterization of the prohormone convertase PC1 (PC3) J. Biol. Chem. 268, 5615- 5623.

31. Shen, F.S., Seidah, N.G., and **Lindberg, I.** (1993) Biosynthesis of the prohormone convertase PC2 in Chinese hamster ovary cells and in rat insulinoma cells. J. Biol. Chem. 268, 24910-24915.

32. Breslin, M., **Lindberg, I.**, Benjannet, S., Lazure, C., Mathis, J.P., and Seidah, N.G. (1993) Processing of proenkephalin by PC1(PC3), PC2, and furin. J. Biol. Chem. 268, 27084-27093.

33. Vindrola, O., and **Lindberg, I.** (1993) Release of the prohormone convertase PC1 from AtT-20 cells. Neuropeptides 25, 151-160.

34. Hornby, P.J., Rosenthal, S.D., Mathis, J.P., Vindrola, O., and **Lindberg, I.** (1993) Immunocytochemical analysis of the neuropeptide-synthesizing enzyme PC1 in AtT-20 cells. Neuroendocrinol. 58, 555-563.

35. Dupuy, A., **Lindberg,I.,** Zhou, Y., Akil, H., Lazure, C., Chretien, M., Seidah, N.G., and Day, R. (1994) Processing of prodynorphin by the prohormone convertase PC1 results in high molecular weight intermediate forms: cleavage at a single arginine. FEBS Lett. 337:60-65*.*

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**Research Interests**

My research focuses on the molecules within the secretory pathway required for the successful production of bioactive peptide hormones and neuropeptides from precursor proteins. These include chaperones; abundant secretory proteins such as granins; and precursor processing enzymes- in particular, the proprotein convertases furin, PC1/3 and PC2. We study how these convertases are regulated within the cell; we are attempting their crystallization; and we are working on identifying activators and inhibitors through various pharmacological collaborations. Two new projects focus on a) endogenous secretory chaperone proteins which block the aggregation of neuronal and endocrine proteins; and b) the interesting secretory biology of the bone hormone FGF23. The widespread involvement of proprotein convertases in the physiology of nearly every tissue means that our work is directly linked to pathological processes occurring in Alzheimer’s and other neurodegenerative diseases; obesity and diabetes; cancer; and bone disease.