

Curriculum Vitae, Iris Lindberg, Ph.D.

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Education

1975 A.B. Biochemistry University of California at Berkeley

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

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

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|-------------------------|---------------------------------------------------------|
| 1982- present | Winter Conference on Brain Research |
| 1985 - 2005; 2011-pres. | American Society for Biochemistry and Molecular Biology |
| 2013- 2014 | American Society for Bone and Mineral Research |
| 2001 - present | The Endocrine Society |

Career Development Awards

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|-----------|-----------------------------------------------------------|
| 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)

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|---------------|-----------------------------------------------------------------------------------------------------|
| 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- 2015 | Program in Neuroscience Seminar Committee, University of Maryland |
| 2007- 2012 | Program in Neuroscience Training Committee, University of Maryland |
| 2008-2013 | Dept. Anatomy & Neurobiology Faculty Search Committee |
| 2008- 2011 | Proteomics Core Steering Committee, University of Maryland |
| 2009- 2010 | Pharmacology Head Search Committee, University of Maryland |
| 2009- 2016 | Departmental Representative or Alternate, School of Medicine Council |
| 2010, 2012 | Qualifying Exam Committee, Program in Neuroscience |
| 2010- 2014 | Chair , Program in Neuroscience Retreat Committee |
| 2012- 2015 | Univ. of Maryland Program in Neurosciences Postdoctoral Training Grant Steering Committee |
| 2011 | Univ. of Maryland Strategic Plan Subcommittee (Research) |
| 2010- 2015 | Junior faculty mentoring committees, Drs. Elizabeth Powell; Marta Lipinski |
| 2007- present | Dept. Anatomy & Neurobiology APT Committee; Chair, 2010- 2014 |
| 2009- present | Biomedical Research Radiation Safety Committee, University of Maryland; Chair, 2016- present |

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

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, Patricia Cunfer (Young), Alexandra Winters, and Julia Peters

Other Local 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.

 2012-2013 *President*, Greater Baltimore Society for Neuroscience
 2014- present *Treasurer*, Greater Baltimore Society for Neuroscience

National Service

Journal Manuscript Review

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*, *Mol. Biol. Cell*, *Eur. J. Cell Biol.*, and many others

 2000-2005 Editorial Board Member, *Journal of Biological Chemistry*
 2012-2017 Editorial Board Member, *Journal of Biological Chemistry*

Gordon Conference Service

1998, 2000 Advisory Committee Member, Gordon Conference:

- Hormonal and Neural Peptide Synthesis*
- 2002 Vice-Chair, Gordon Conference: *Hormonal and Neural Peptide Synthesis*
- 2004 **Chair, Gordon Conference: Proprotein Processing, Trafficking, and Secretion**
- 2006-2016 Advisory Committee Member, Gordon Conference: *Proprotein Processing, Trafficking, and Secretion*

National Society Service

- 2008-2011 Winter Conference on Brain Research, *Scientific Board*
- 2017 Society for Neuroscience, travel application review committee

Grant Reviewer, NIH:

- 1987 Study section reviewer, NLS1
- 1989, 1997 Study section reviewer, NIDA Biochemistry
- 1989, 1990 Special emphasis panel member, NIDDK
- 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 **Standing member, Endocrinology study section**
- 1999 Study section reviewer, ACS
- 2000 NIMH Career Awards study section reviewer
- 2000-2005 Endocrinology study section reviewer (about 1 panel per year)
- 2007-2010 **Standing member, Molecular and Cellular Endocrinology study section**
- 2010 Special Emphasis Panel reviewer, NIDDK 2/2010
- 2011 *EUREKA* NIH review panel member
- 2013 SBIR study section, 3/2013
- 2015 MCE study section *ad hoc* service 6/2015; SBIR *ad hoc* service 10/2015
- 2016 Special Emphasis Panel *ad hoc* service 6/2016
- 2018 NIH Site Visit, May 2018

International Review Service

- 2002 Finnish National Academy of Sciences Review Panel, Helsinki, Finland
- 2002, 2009, 2016 Canada Research Chairs, College of Reviewers
- 2003 Chair, Finnish National Academy of Sciences Review Panel
- 2005 Foundation for Scientific Research- Flanders, Belgium, grant reviewer
- 2006 Wellcome Trust grant reviewer
- 2008-2016 Foundation for Scientific Research- Flanders, Belgium, grant reviewer
- 2011 Medical Research Council (U.K.), grant reviewer
- 2013, 2016 Canadian Institutes of Health, grant reviewer
- 2014 Danish Agency for Science Technology and Innovation, grant reviewer

Teaching Service

LSUHSC

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|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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, 2006,2007 | 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) |

University of Maryland-Baltimore

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|---------------|---------------------------------------------------------------------------------------------------------|
| 2008- 2010 | (UMB) Professional Skills course in Molecular Medicine "How to Write/Review Grants" (1 h) ; 20 students |
| 2008- present | GPILS Core Course "Posttranslational Modifications" (2 h); 50 students |
| 2009- 2016 | Ethics Class, Discussion Leader (1.5 h) twice a year (small group of 6-10) |
| 2010 -present | Systems Neuroscience (GPILS 641) "Peptides and Modulators" (2 h); 10-12 students |
| 2010- present | Structure and Development "Thyroid, Parathyroid, and Adrenal" (1 h); 180 students |
| 2015- present | Medical Neuroscience "Catecholamines" and "Peptide Neuromodulators" (2h); 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) Ph.D. 2012
8. Alexandra Winters (2013-2016) (co-mentor with Dr. Toni Pollin) Ph.D. 2016

Postdoctoral Fellows supervised

1. Dr. Nympha D'Souza (1987-1988)
2. Dr. Steven 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 Fellowship**)
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- 2015) (**stipend from Chilean government**)
32. Dr. Yogikala Prabhu (2011; 2013)
33. Dr. Juan Ramon Peinado (2013; **Visiting Assistant Professor, Ciudad Real University**)
34. Dr. Bruno Ramos-Molina (2014- 2015)
35. Dr. Timothy Jarvela (2015-present) (**UMB SOM Diabetes Training Grant 2016-2017**)
36. Dr. Tomas Bachor (2017- 2018)

Grant Support

Ongoing Research Support

Opioid Peptide Synthesizing Enzymes

07/01/17- 6/30/22

R01 DA042351-01A1 I. Lindberg (P.I) (33% effort)

NIH/NIDA

This grant is to investigate the role of human *PCSK1* mutations and polymorphisms in peptide-mediated obesity mechanisms.

Completed Research Support (Competing NIH applications and other grants)

- 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)
 "Opioid peptide-synthesizing enzymes"
 R01 DA05084-01
- 7/88 - 6/93 I. Lindberg, PI (90% salary)
 Research Career Development Award
 K04 DK 01868 (salary award)
- 12/88 - 11/91 I. Lindberg, PI (30% effort)
 "Biosynthesis of enkephalin in the adrenal medulla."
 R01 DK 35199-04
- 4/91 - 3/94 I. Lindberg, PI (30% effort)
 "Opioid peptide-synthesizing enzymes"
 R01 DA 05084-04
- 10/93- 9/98 I. Lindberg, PI (75% salary)
 Research Scientist Development Award
 K02 DA 00204-01 (salary award)
- 4/94 - 3/99 I. Lindberg, PI (30% effort)
 "Opioid peptide-synthesizing enzymes"
 R01 DA 05084-07
- 7/96- 3/02 I. Lindberg, PI (30% effort)
 "Control of peptide hormone biosynthesis by PC2 and 7B2"
 R01 DK 49703-01
- 10/98- 9/03 I. Lindberg, PI (75%)
 Research Scientist Development Award
 K02 DA 00204-06 (salary award renewal)
- 4/99- 3/04 I. Lindberg, PI (30% effort)
 "Opioid peptide-synthesizing enzymes"
 R01 DA 05084-12
- 4/02- 3/07 I. Lindberg, PI (30% effort)
 "Control of peptide hormone biosynthesis by PC2 and 7B2"
 R01 DK 49703-06
- 2004 I. Lindberg, PI Gordon Conference support grant
 "Proprotein processing, trafficking and secretion"
 5R13 DK061936
- 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 enzymes"
R01 DA 05084-17
- 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 AI 056850
- 9/04-3/06 S. Pincus, PI (5% effort)
"Furin Inhibition in HIV Disease"
R21 AI 058714-01
- 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
- 9/09- 3/14 I. Lindberg (P.I.) (30% effort)
"Control of peptide hormone biosynthesis by PC2 and 7B2"
R01 DK49703-12
- 7/09-6/14 I. Lindberg and B. Roth (co-P.I.s) (30% effort)
"De-orphanizing the peptidome"
R01 DA027170-01
- 4/09-3/14 I. Lindberg, PI (30% effort)
"Opioid peptide-synthesizing enzymes"
R01 DA 05084-22
- 4/15-6/17 I. Lindberg (P.I.) (20% effort)
"Opioid Peptide Synthesizing Enzymes"
R56 DA05084-28A1
- 9/14-4/18 I. Lindberg (P.I.) (20% effort)
"The Secretary Chaperone 7B2 as an Endogenous Regulator of Amyloid
Pathology"
R21 AG045741-02

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

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|---------------|--------------------------------------------------------------------------|
| 7/95-6/98 | Mentor 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 |
| 08/10-08/12 | Mentor to Dr. Michael Helwig, Leopoldina fellowship |
| 06/11-6/12 | Co-mentor to Dr. Laura Sanglas, Danish Academy fellowship |
| 05/16-present | Mentor to Dr. Timothy Jarvela, UMSOM Diabetes and Obesity Training Grant |

Patents

1. Patent # 6,548,736 on the 7B2 null mouse as a model for pituitary Cushing's was granted in 1999 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.
36. O'Hara, B.F., Donovan, D., **Lindberg, I.**, Brannock, M.T., Ricker, D.D., Moffatt, C.A., Klaunberg, B.A., Schindler, C., Chang, T.S.K., Nelson, R.J., and Uhl, G.R. (1994) Proenkephalin transgenic mice: a short promoter confers high testis expression and reduced fertility. *Mol. Reprod. and Devel.* **38**, 275-284.
37. Martens, G.M., Braks, A.M., Eib, D., Zhou, Y., and **Lindberg, I.** (1994) The neuroendocrine polypeptide 7B2 is a naturally occurring inhibitor of the prohormone convertase PC2. *Proc. Nat. Acad. Sci.* **91**, 5784-5785.
38. **Lindberg, I.** (1994) Evidence for cleavage of the PC1/PC3 prosegment in the endoplasmic reticulum. *Mol. Cell. Neurosci.* **5**, 263-268.
39. Zhou, Y., and **Lindberg, I.** (1994) Enzymatic properties of carboxy-terminally truncated prohormone convertase 1 (PC1/PC3). *J. Biol. Chem.* **269**, 18408-18413.
40. **Lindberg, I.**, Ahn, S.C., and Breslin, M.B. (1994) Cellular distributions of the prohormone processing enzymes PC1 and PC2. *Mol. Cell. Neurosci.* **5**, 614-622.
41. **Lindberg, I.**, Van den Hurk, W.H., Bui, C.B., and Batie, C.J. (1995) Enzymatic characterization of immunopurified prohormone convertase PC2: potent inhibition by a 7B2 peptide fragment. *Biochemistry* **34**, 5486- 5493.
42. Rothenberg, M.E., Eilertson, C.D., Klein, K., Zhou, Y., **Lindberg, I.**, McDonald, J.K., and Noe, B.D. (1995) Processing of mouse proglucagon by recombinant PC1 and PC2. *J. Biol. Chem.* **270**, 10136-10146.
43. Van Horssen, A. M., Van den Hurk, H., Bailyes, E.M., Hutton, J.C., Martens, G.J.M., and **Lindberg, I.** (1995) Identification of the region within the neuroendocrine polypeptide 7B2 responsible for the inhibition of prohormone convertase 2. *J. Biol. Chem.* **270**, 14292-14296.
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