

Evelyn Maizels

Science Education

B.S., Chemistry, University of California at Los Angeles, 1972

M.D., Harvard Medical School, Boston, MA, 1976

Ph.D., Biochemistry, Northwestern University, Chicago IL, 1983

Thesis: *Cyclic AMP-binding proteins and calmodulin-dependent protein phosphorylation in soluble and nuclear fractions of the prepubertal rat ovary.*

Advisor: Richard A. Jungmann, Ph.D.

M.S., Biomedical Visualization, University of Illinois at Chicago, 2010

Project Research: *Development and use of the multimedia presentation and evaluation program CEVL (Computer-Enhanced Visual Learning): building a three-dimensional digital model of the pediatric inguinal region.*

Advisor: Christine Young, MA, CMI, FAMI

Award: Alan W. Cole Scholarship, 2009, Vesalius Trust, Association of Medical Illustrators

Professional History

Post-doctoral research, 1985-1989, laboratory of Mary Hunzicker-Dunn, Ph.D., Dept. of Molecular Biology, Northwestern University Medical School, Chicago IL

Research Associate, 1989-1994, laboratory of Mary Hunzicker-Dunn, Ph.D., Dept. of Cell, Molecular and Structural Biology, Northwestern University Medical School, Chicago IL

Research Assistant Professor, 1994-2001, Dept. of Cell and Molecular Biology, Northwestern University Medical School, Chicago IL

Research Associate Professor, 2001-2007, Dept. of Cell and Molecular Biology, Feinberg School of Medicine of Northwestern University, Chicago IL

Visiting Research Associate Professor, 2007-2009, laboratory of Geula Gibori Ph.D., Dept. of Physiology and Biophysics, University of Illinois at Chicago, Chicago IL

3D Medical Artist, 2010-present, contractor to CEVL for Healthcare, Chicago IL

Adjunct Instructor, 2012-present, Biomedical Visualization Program, Dept. of Biomedical and Health Sciences, College of Applied Health Sciences, University of Illinois at Chicago, Chicago IL, to teach BVIS 560 Molecular Pharmacology for Illustrators

Publications / Presentations

Symposium proceedings/book chapters:

1. Ruderman NB, Berger M, Hagg S, Taylor S, Goodman MN and **Maizels E** (1977) Muscle glucose metabolism in starvation IN *Muskelstoffwechsel, Koperliche Leistungsfahigkeit und Diabetes Mellitus*, eds: K. Jahnke, H. Mehnert, H.E. Reis, F.K. Schattauer, Verlag, Stuttgart and New York, 1977, pp. 81-87.

2. **Maizels ET** and Jungmann, RA (1983) Rat ovarian protein phosphorylation: evidence of calmodulin-dependent systems IN *Factors Regulating Ovarian Function*, Eds: G. Greenwald and P. Terranova, Raven Press, New York, (proceedings of the Fourth Ovarian Workshop, Madison, WI, July 17-19, 1982) pp. 363-367.
3. **Maizels ET**, Ekstrom RC, Miller JB and Hunzicker-Dunn M (1989) Protein phosphorylation in the corpus luteum. *J. Reprod. Fert., Suppl.* 37, 311-317.
4. **Maizels ET**, Jackiw V, Miller JB, Cutler RE Jr, Carney EM and Hunzicker-Dunn M (1991) Variant diacylglycerol-dependent protein phosphotransferase activity in ovarian tissues. IN *Regulatory Processes and Gene Expression in the Ovary*, Ed. G. Gibori, Serono Symposia USA, Norwell MA (proceedings of the VIII Ovarian Workshop, Maryville, TN, July 12-14,1990) pp. 54-67.

Peer-review journal articles:

1. Yamagishi FG, Rayner D, **Zwicker ET** and Cram DJ (1973) Stereochemistry of sulfur compounds. V. Stereochemical reaction cycles that involve cyclic sulfoxides, sulfimides and sulfoximides. *J. Amer. Chem. Soc.* 95:1916-1925.
2. **Maizels EZ**, Ruderman NB, Goodman MN and Lau D (1977) Effect of acetoacetate on glucose metabolism in the soleus and extensor digitorum longus muscles of the rat. *Biochem J.* 162:557-568.
3. **Maizels ET** and Jungmann, RA, (1982) Ca²⁺-dependent phosphorylation of rat ovary proteins. *Biochem. Biophys. Res. Commun.*, 107:32-37.
4. **Maizels ET** and Jungmann RA, (1983) Ca²⁺-calmodulin-dependent phosphorylation of soluble and nuclear proteins in the rat ovary. *Endocrinology* 112:1895-1902.
5. Hunzicker-Dunn M, Jungmann RA, Evely L, Hadawi GL, **Maizels ET** and West, DE, (1984) Modulation of soluble ovarian adenosine 3'5'-monophosphate-dependent protein kinase activity during prepubertal development of the rat. *Endocrinology* 115:302-311.
6. Hunzicker-Dunn M, Lorenzini N, Cutler RE, Ekstrom RC and **Maizels ET** (1989) Modulation of soluble ovarian adenosine 3'5'-monophosphate-dependent protein kinase activity during prepubertal development in the rat. II. Evaluation of the catalytic subunit inhibitory activity. *Biol. Reprod.* 40:486-494.
7. Hunzicker-Dunn M, **Maizels ET**, Kern LC, Ekstrom RC and Constantinou AI (1989) Separation of the complexes formed between the regulatory and catalytic subunits of cyclic adenosine monophosphate dependent protein kinase and topoisomerase I activity in preovulatory follicle-enriched immature rat ovaries. *Mol. Endocrinol.* 3:780-789.
8. **Maizels ET**, Miller JB, Cutler RE Jr, Jackiw V, Carney EM, Kern L and Hunzicker-Dunn M (1990) Calcium-independent phospholipid/diolein-dependent phosphorylation of a soluble ovarian M_r = 80,000 substrate protein. Biochemical characteristics. *Biochim. Biophys. Acta* 1054:285-296.
9. Hunzicker-Dunn M, Cutler RE Jr, **Maizels ET**, DeManno DA, Lamm MLG, Erlichman J, Sanwal BD and LaBarbera AR (1991) Isozymes of cAMP-dependent protein kinase present in the rat corpus luteum. *J. Biol. Chem.* 266:7166-7175.
10. DeManno DA, **Maizels ET**, and Hunzicker-Dunn M (1992) Hormonal regulation of the type III isoform of C-kinase in porcine ovarian tissues. *Mol. Cell. Endocrinol.* 86:157-166.
11. **Maizels ET**, Miller, JB, Cutler RE Jr, Jackiw, V, Carney, EM, Mizuno, K, Ohno, S, and Hunzicker-Dunn M (1992) Estrogen modulates Ca²⁺-independent lipid-stimulated kinase in the rabbit corpus luteum of pseudopregnancy. Identification of luteal estrogen-modulated lipid-stimulated kinase as protein kinase C delta. *J. Biol. Chem.* 267:17061-17068.
12. Cutler RE Jr, **Maizels ET**, Brooks, EJ, Mizuno, K, Ohno, S, and Hunzicker-Dunn M (1993) Regulation of delta protein kinase C during ovarian differentiation. *Biochim. Biophys. Acta* 1179:260-270.
13. Lamm, ML, Ekstrom, RC, **Maizels ET**, Rajagopalan RM, and Hunzicker-Dunn M (1994) The effect of protein kinases on desensitization of the porcine follicular membrane luteinizing hormone/chorionic gonadotropin-sensitive adenylcyclase. *Endocrinology* 134:1745-1754.

14. Cutler RE, **Maizels ET** and Hunzicker-Dunn M (1994) Delta protein kinase-C in the rat ovary: estrogen regulation and localization. *Endocrinology* 135:1669-1678.
15. Das S, **Maizels ET**, DeManno D, St Clair E, Adam SA and Hunzicker-Dunn M (1996) A stimulatory role of cyclic adenosine 3',5'-monophosphate in follicle stimulating hormone-activated mitogen-activated protein kinase signaling pathway in rat ovarian granulosa cells. *Endocrinology* 137:967-974.
16. **Maizels ET**, Shanmugam M, Lamm ML and Hunzicker-Dunn M (1996) Hormonal regulation of PKC-delta protein and mRNA levels in the rabbit corpus luteum. *Mol. Cell. Endocrinol.* 122:213-221.
17. Van der Zee EA, Kronforst-Collins MA, **Maizels ET**, Hunzicker-Dunn M, and Disterhoft JF (1997) Gamma isoform-selective changes in PKC immunoreactivity after trace eyeblink conditioning in the rabbit hippocampus *Hippocampus* 7:271-285.
18. Shanmugam M, Krett NL, Peters CA, **Maizels ET**, Murad FM, Kawakatsu H, Rosen ST and Hunzicker-Dunn M (1998) Association of PKC delta and active Src in PMA-treated MCF-7 human breast cancer cells. *Oncogene* 16:1649-1654.
19. **Maizels ET**, Peters CA, Kline M, Cutler RE Jr, Shanmugam M, and Hunzicker-Dunn M (1998) Heat-shock protein-25/27 phosphorylation by the delta isoform of protein kinase C. *Biochem. J.* 332:703-712.
20. **Maizels ET**, Cottom J, Jones JC and Hunzicker-Dunn M (1998) Follicle stimulating hormone (FSH) activates the p38 mitogen-activated protein kinase pathway, inducing small heat shock protein phosphorylation and cell rounding in immature rat ovarian granulosa cells. *Endocrinology* 139:3353-3356.
21. DeManno DA, Cottom JE, Kline MP, Peters CA, **Maizels ET** and Hunzicker-Dunn M (1999) Follicle-stimulating hormone promotes histone H3 phosphorylation on serine-10. *Mol. Endocrinol.* 13:91-105.
22. Shanmugam M, Krett NL, **Maizels ET**, Cutler RE Jr, Peters CA, Smith LM, O'Brien ML, Park-Sarge OK, Rosen, ST and Hunzicker-Dunn M (1999) Regulation of protein kinase C delta by estrogen in the MCF-7 human breast cancer cell line. *Mol. Cell. Endocrinol.* 148:109-118.
23. Peters CA, **Maizels ET** and Hunzicker-Dunn M (1999) Activation of PKC delta in the rat corpus luteum during pregnancy. Potential role of prolactin signaling. *J. Biol. Chem.* 274:37499-37505.
24. Peters CA, **Maizels ET**, Robertson MC, Shiu RP, Soloff MS and Hunzicker-Dunn M (2000) Induction of relaxin messenger RNA expression in response to prolactin receptor activation requires protein kinase C delta signaling. *Mol. Endocrinol.* 14:576-590.
25. Peters CA, Cutler RE Jr, **Maizels ET**, Robertson MC, Shiu RP, Fields P and Hunzicker-Dunn M (2000) Regulation of PKC delta expression by estrogen and rat placental lactogen-1 in luteinized rat ovarian granulosa cells. *Mol. Cell. Endocrinol.* 162:181-191.
26. Mukherjee S, Gurevich VV, Jones JC, Casanova JE, Frank SR, **Maizels ET**, Bader MF, Kahn RA, Palczewski K, Aktories K and Hunzicker-Dunn M (2000) The ADP ribosylation factor nucleotide exchange factor ARNO promotes beta-arrestin release necessary for luteinizing hormone/choriogonadotropin receptor desensitization. *Proc. Natl. Acad. Sci. USA.* 97:5901-5906.
27. **Maizels ET**, Mukherjee A, Sithanandam G, Peters CA, Cottom J, Mayo KE and Hunzicker-Dunn M (2001) Developmental regulation of mitogen-activated protein kinase-activated kinases -2 and -3 (MAPKAPK-2/-3) *in vivo* during corpus luteum formation in the rat. *Mol. Endocrinol.* 15:716-733.
28. Salvador LM, Mukherjee S, Kahn RA, Lamm ML, Fazleabas AT, **Maizels ET**, Bader MF, Hamm H, Rasenick MM, Casanova JE and Hunzicker-Dunn M (2001) Activation of the luteinizing hormone/choriogonadotropin hormone receptor promotes ADP ribosylation factor 6 activation in porcine ovarian follicular membranes. *J. Biol. Chem.* 276:33773-33781.
29. Shanmugam M, Krett NL, **Maizels ET**, Murad FM, Rosen ST and Hunzicker-Dunn M (2001) A role for protein kinase C delta in the differential sensitivity of MCF-7 and MDA-MB 231 human breast cancer cells to phorbol ester-induced growth arrest and p21(WAF1/CIP1) induction. *Cancer Lett.* 172:43-53.
30. Salvador LM, Park Y, Cottom J, **Maizels ET**, Jones JC, Schillace RV, Carr DW, Cheung P, Allis CD, Jameson JL and Hunzicker-Dunn M (2001) Follicle-stimulating hormone stimulates protein kinase A-mediated histone H3 phosphorylation and acetylation leading to select gene activation in ovarian granulosa cells. *J. Biol. Chem.* 276:40146-40155.

31. Duan WR, Ito M, Park Y, **Maizels ET**, Hunzicker-Dunn M and Jameson JL (2002) GnRH regulates early growth response protein 1 transcription through multiple promoter elements. *Mol. Endocrinol.* 16:221-233.
32. Salvador LM, **Maizels E**, Hales DB, Miyamoto E, Yamamoto H and Hunzicker-Dunn M (2002) Acute signaling by the LH receptor is independent of protein kinase C activation. *Endocrinology* 143:2986-2994.
33. Cottom J, Salvador LM, **Maizels ET**, Reierstad S, Park Y, Carr DW, Davare MA, Hell JW, Palmer SS, Dent P, Kawakatsu H, Ogata M and Hunzicker-Dunn M (2003) Follicle-stimulating hormone activates extracellular signal-regulated kinase but not extracellular signal-regulated kinase kinase through a 100-kDa phosphotyrosine phosphatase. *J. Biol. Chem.* 278:7167-7179.
34. Van der Zee EA, Palm IF, O'Connor M, **Maizels ET**, Hunzicker-Dunn M and Disterhoft JF (2004) Aging-related alterations in the distribution of Ca(2+)-dependent PKC isoforms in rabbit hippocampus. *Hippocampus* 14:849-860.
35. Alam H, **Maizels ET**, Park Y, Ghaey S, Feiger ZJ, Chandel NS and Hunzicker-Dunn M (2004) Follicle-stimulating hormone activation of hypoxia-inducible factor-1 by the phosphatidylinositol 3-kinase/AKT/Ras homolog enriched in brain (Rheb)/mammalian target of rapamycin (mTOR) pathway is necessary for induction of select protein markers of follicular differentiation. *J. Biol. Chem.* 279:19431-19440.
36. Salvador LM, Flynn MP, Avila J, Reierstad S, **Maizels ET**, Alam H, Park Y, Scott JD, Carr DW and Hunzicker-Dunn M (2004) Neuronal microtubule-associated protein 2D is a dual A-kinase anchoring protein expressed in rat ovarian granulosa cells. *J. Biol. Chem.* 279:27621-27632.
37. Park Y, **Maizels ET**, Feiger ZJ, Alam H, Peters CA, Woodruff TK, Unterman TG, Lee EJ, Jameson JL and Hunzicker-Dunn M (2005) Induction of cyclin D2 in rat granulosa cells requires FSH-dependent relief from FOXO1 repression coupled with positive signals from Smad. *J. Biol. Chem.* 280:9135-9148.
38. Hunzicker-Dunn M and **Maizels ET** (2006) FSH Signaling Pathways in Immature Granulosa Cells that Regulate Target Gene Expression: Branching out from Protein Kinase A. *Cell. Signal.* 18:1351-1359.
39. Flynn MP, **Maizels ET**, Karlsson AB, McAvoy T, Ahn JH, Nairn AC and Hunzicker-Dunn M (2008) Luteinizing hormone receptor activation in ovarian granulosa cells promotes protein kinase A-dependent dephosphorylation of microtubule-associated protein 2D. *Mol. Endocrinol.* 22:1695-1710.
40. Alam H, Weck J, **Maizels E**, Park Y, Lee EJ, Ashcroft M and Hunzicker-Dunn M (2009) Role of the PI3-kinase and ERK pathways in the induction of HIF-1 activity and the HIF-1 target VEGF in ovarian granulosa cells in response to follicle stimulating hormone. *Endocrinology* 150:915-928.
41. Maizels M, Mickelson J, Yerkes E, **Maizels E**, Stork R, Young C, Corcoran J, Holl J, and Kaplan WE (2009) Computer-Enhanced Visual Learning Method: A Paradigm to Teach and Document Surgical Skills. *J. Grad. Med. Educ.* 1: 109-113.
42. Karlsson AB, **Maizels ET**, Flynn MP, Jones JC, Shelden EA, Bamburg JR, Hunzicker-Dunn M. (2010) Luteinizing hormone receptor-stimulated progesterone production by preovulatory granulosa cells requires protein kinase A-dependent activation/dephosphorylation of the actin dynamizing protein cofilin. *Mol. Endocrinol.* 24:1765-1781.
43. Marks A, Maizels M, Mickelson J, Yerkes E, Anthony Herndon CD, Lane J, Ben-Ami T, **Maizels E**, Stoltz RS, Dixon S, Liu D, Chaviano T, Hagerty J, Kaplan W. (2011) Effectiveness of the computer enhanced visual learning method in teaching the Society for Fetal Urology hydronephrosis grading system for urology trainees. *J. Pediatr. Urol.* 7:113-117.
44. Devi YS, Seibold A, Shehu A, **Maizels E**, Helparin J, Le J, Binart N, Bao L, Gibori G. (2011) Inhibition of MAPK by prolactin signaling through the short form of its receptor in the ovary and decidua: involvement of a novel phosphatase. *J. Biol. Chem.* 286:7609-7618.
45. Le JA, Wilson HM, Shehu A, Mao J, Devi YS, Halperin J, Aguilar T, Seibold A, **Maizels E**, Gibori G. (2012) Generation of mice expressing only the long form of the prolactin receptor reveals that both isoforms of the receptor are required for normal ovarian function. *Biol. Reprod.* 86:86, 1-13.
46. Bauschard M, Maizels M, Kirsch A, Koyle M, Chaviano T, Liu D, Stoltz RS, **Maizels E**, Prasad M, Marks A, Bolnick D. (2012) Computer-Enhanced Visual Learning Method to Teach Endoscopic

- Correction of Vesicoureteral Reflux: An Invitation to Residency Training Programs to Utilize the CEVL Method. *Adv. Urol.* 2012:831384 (8 pages).
47. Hunzicker-Dunn ME, Lopez-Biladeau B, Law NC, Fiedler SE, Carr DW, **Maizels ET**. (2012) PKA and GAB2 play central roles in the FSH signaling pathway to PI3K and AKT in ovarian granulosa cells. *Proc. Natl. Acad. Sci. USA.* 109:E2979-88
 48. Flynn MP, Fiedler SE, Karlsson AB, Carr DW, **Maizels ET**, Hunzicker-Dunn M. (2016) Dephosphorylation of MAP2D enhances its binding to vimentin in preovulatory ovarian granulosa cells. *J Cell Sci.* 129:2983-96.
 49. Sojka AC, Brennan KM, **Maizels ET**, Young CD. (2017) The Science behind G Protein-Coupled Receptors (GPCRs) and Their Accurate Visual Representation in Scientific Research. *Journal of Biocommunication*, 41(1) doi:<http://dx.doi.org/10.5210/jbc.v41i1.7309>

Recent Presentations (2015-2017):

1. Poster presentation coauthor:
VIZBI 2015, the 6th international meeting on Visualizing Biological Data, March 25-27, at the Broad Institute of MIT and Harvard, Cambridge MA, USA - Visualizing Biological Data Poster Session. March 26, 2015, Cambridge, MA
Title: “Communicating Research using Visual Molecular Dynamics”. Grace Hsu, Evelyn Maizels, Deborah Milkowski
2. Workshop copresenter:
“Introduction to the Protein Data Bank and the Visual Molecular Dynamics Software”
Kevin M. Brennan, Evelyn Maizels, Amy Sojka, half day workshop July 22, 2015, at Association of Medical Illustrators 70th Annual Meeting, Cleveland Ohio, July 22-25, 2015
3. Workshop copresenter:
“Mining 3D & Knowledge from Biological Databases: PDB and beyond”
Kevin Brennan, Evelyn Maizels, Christine Young; half day workshop July 20, 2016, at Association of Medical Illustrators 71st Annual Meeting, Atlanta, GA, July 20-23, 2016