CURRICULUM VITAE

Jay M. Baltz

Associate Director and Senior Scientist, Ottawa Health Research Institute, Ottawa Hospital
Professor of Obstetrics and Gynecology, and Cellular and Molecular Medicine, University of Ottawa
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EDUCATION:

▪ **B.A. in Physics (Honors)**	The University of Pennsylvania, Philadelphia, PA	1975-1978
▪ **Ph.D. in Biophysics**	The Johns Hopkins University, Baltimore, MD	1978-1986

POSITIONS HELD:

▪ **Associate Director**	2005-present	Ottawa Health Research Institute
▪ **Head**	2004-present	Reproduction and Development Theme, Ottawa Health Research Institute
▪ **Associate Chair (Research)**	2003-present	Department of Obstetrics and Gynecology University of Ottawa Faculty of Medicine
▪ **Professor**	2003-present	Departments of Obstetrics and Gynecology and Cellular and Molecular Medicine (Cross-Appointed), University of Ottawa Faculty of Medicine
▪ **Associate Professor**	1999-2003	
▪ **Assistant Professor**	1993-1999	
▪ **Senior Scientist**	1999-present	Ottawa Health Research Institute (formerly Loeb Research Institute), Hormones, Growth, and Development Program
▪ **Scientist**	1993-1999	
▪ **Associate Scientific Director**	1995-present	Human In Vitro Fertilization Laboratory The Ottawa Hospital
▪ **Member**	1994-present	Faculty of Graduate and Postdoctoral Studies University of Ottawa
▪ **Instructor**	1991-1993	Department of Obstetrics, Gynecology and Reproductive Biology, Harvard Medical School
▪ **Research Associate**	1986-1991	Department of Cellular and Molecular Physiology and Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School Supervisor: Dr. John D. Biggers

GRANT HISTORY:

current funding:

2006-2011 "Novel organic osmolyte transport and cell volume regulation mechanisms in oocytes and preimplantation embryos" from **CIHR** (Operating Grant).

2005-2010 "Transport-mediated processes in oocyte growth and maturation" from **CIHR** (Operating Grant).

2003-2008 "Program on Oocyte Health" from **CIHR** (Strategic Initiative on Healthy Gametes and Great Embryos; Director, with 14 Principal Applicants).

2002-2007 "Regulation of sperm acrosome reaction" from **NSERC** (Group Grant; Principal Investigator, with John Ngsee).

previous funding:

2003-2006 "Novel organic osmolyte transport mechanisms in preimplantation embryos" from **CIHR** (Operating Grant).

2004-2005 "Identification and characterization of a novel betaine/proline transporter that functions in volume regulation in mouse eggs and early embryos" from the **Lalor Foundation.**

2000-2005 "The function of changes in mammalian embryo physiology before implantation," a **Premier's Research Excellence Award from the Government of Ontario**.

1999-2004 "Transport-mediated processes in oocyte maturation, fertilization, and preimplantation embryo development" from **CIHR** (Operating Grant).

2002 "Workshop on Oocyte Maturation: Planning a Proposal for the Strategic Initiative on Healthy Gametes and Great Embryos" from **CIHR**.

2002 "Novel organic osmolyte transport mechanisms in preimplantation embryos" from **CIHR** (Direct Operating Grant from Institute of Human Development, Child and Youth Health).

1998-2002 "Signaling exocytosis in mammalian spermatozoa" from **NSERC** (Group Grant; Principal Investigator, with John Ngsee).

1996 "Role of trophectoderm cell chloride transporters in blastocoel formation and maintenance" from the **Lalor Foundation**.

1996-1999 "Transport-mediated processes in fertilization and preimplantation embryo development" from **MRC** (Operating Grant).

1996-2001 MRC Studentship Voucher (5 years).

1996 "Confocal microscope facility" from **MRC** (Multiuser Equipment Grant), co-investigator, with Leo Renaud, Principal Investigator, and 8 others.

1995-1998 "Development of an integrated imaging system for measuring rheogenic and electroneutral transport in early mammalian embryos" from the **Whitaker Foundation for Biomedical Engineering**.

1993-1998 MRC Scholarship (salary support).

1993-1996 "Preimplantation embryo pH and ion regulation" from **MRC**.

1993-1997 "Preimplantation embryo pH and ion regulation" from **NIH** (RO1 Operating Grant).

1992-1994 Shannon Award from NIH.

HONORS:

2006 Appointed to Institute Advisory Board, Canadian Institutes of Health Research Institute of Human Development, Child and Youth Health
2000 Premier's Research Excellence Award from the Government of Ontario
1996 MRC Studentship Voucher Award
1993 MRC Scholarship Award, Medical Research Council, Canada
1992 Shannon Award, National Institutes of Health, USA

PROFESSIONAL SOCIETIES:

American Association for the Advancement of Science
American Physiological Society
American Society for Cell Biology
Association of Professors of Obstetrics and Gynecology (Canada)
Biophysical Society
Canadian Fertility and Andrology Society
Society for the Study of Reproduction

PUBLICATIONS:

1. MKI Anas, MA Hammer, M Lever, JAL Stanton, and **JM Baltz** (in press). The organic osmolytes betaine and proline are transported by a shared system in early preimplantation mouse embryos. J. Cell. Physiol.

2. G FitzHarris and **JM Baltz** (2006). Granulosa cells regulate intracellular pH of the murine growing oocyte via gap junctions: development of independent homeostasis during oocyte growth. Development 133:591-599.

3. S Erdogan, G FitzHarris, AP Tartia, and **JM Baltz** (2005). Mechanisms regulating intracellular pH are activated during growth of the mouse oocyte coincident with acquisition of meiotic competence. Dev. Biol. 286:352-360.

4. DM Hutt, **JM Baltz** and JK Ngsee. (2005). Synaptotagmin VI and VIII and Syntaxin 2 are essential for the mouse sperm acrosome reaction. J. Biol. Chem. 280:20197-20203.

5. CL Steeves and **JM Baltz**. (2005). Regulation of intracellular glycine as an organic osmolyte in early

preimplantation mouse embryos. J. Cell. Physiol. 204:273-279.

6. T Hadi, MA Hammer, C Algire, T Richards, and **JM Baltz**. (2005). Similar effects of osmolarity, glucose and phosphate on cleavage past the 2-cell stage in mouse embryos from outbred and F_1 hybrid females. Biol. Reprod. 72:179-187.

7. Y Sheng, L Wang, XS Liu, V Montplaisir, M Tiberi, **JM Baltz**, and XJ Liu. (2005). A serotonin receptor antagonist induces oocyte maturation in both frogs and mice: evidence that the same G protein-coupled receptor is responsible for maintaining meiosis arrest in both species. J. Cell. Physiol. 202: 777-786.

8. C St. Germain, G Croissandeau, Janice Mayne, **JM Baltz**, M Chrétien, and M Mbikay. (2005). Expression and transient nuclear translocation of Proprotein Convertase 1 (PC1) during mouse preimplantation embryonic development. Molec . Reprod. Devel. in press.

9. CL Steeves, MA Hammer, GB Walker, D Rae, NA Stewart, and **JM Baltz**. (2003). The glycine neurotransmitter transporter GLYT1 is an organic osmolyte transporter regulating cell volume in cleavage-stage embryos. Proc. Nat. Acad. Sci. (USA) 100:13982-13987.

10. MA Hammer and **JM Baltz**. (2003). β-alanine but not taurine can function as an organic osmolyte in preimplantation mouse embryos cultured from fertilized eggs. Molec . Reprod. Devel. 66:153-161.

11. KP Phillips, MAF Petrunewich, JL Collins, and **JM Baltz**. (2002). The intracellular pH-regulatory HCO_3^-/Cl^- exchanger in the mouse oocyte is inactivated during first meiotic metaphase and reactivated after egg activation via the MAP kinase pathway. Mol. Biol. Cell. 13:3800-3810.

12. MA Hammer and **JM Baltz**. (2002). Betaine is a highly effective organic osmolyte but does not appear to be transported by established organic osmolyte transporters in mouse embryos. Molec. Reprod. Devel. 62:195-202.

13. KP Phillips, MAF Petrunewich, JL Collins, RA Booth, XJ Liu, and **JM Baltz**. (2002). Inhibition of MEK or cdc2 kinase parthenogenetically activates mouse eggs and yields the same phenotypes as *mos*$^{-/-}$ parthenogenotes. Dev. Biol. 247:210-223.

14. DM Hutt, RA Cardullo, **JM Baltz**, and JK Ngsee. (2002). Synaptotagmin VIII is localized to the mouse sperm head and may function in acrosomal exocytosis. Biol. Reprod. 66:50-56.

15. M Kolajova, MA Hammer, JL Collins, **JM Baltz**. (2001). Developmentally regulated cell cycle dependence of swelling-activated anion channel activity in the mouse embryo. Development. 128:3427-3434.

16. CL Steeves, M Lane, BD Bavister, KP Phillips, **JM Baltz**. (2001). Differences in intracellular pH regulation by Na^+/H^+ antiporter among 2-cell mouse embryos derived from females of different strains. Biol. Reprod. 65:14-22.

17. KP Phillips, M-C Léveillé, P Claman, **JM Baltz**. (2000). Intracellular pH regulation in human preimplantation embryos. Human Reprod. 15:896-904.

18. MA Hammer, M Kolajova, M-C Léveillé, P Claman, **JM Baltz**. (2000). Glycine transport by single

human and mouse embryos. Human Reprod. 15:419-426.

19. M Lane, **JM Baltz**, BD Bavister. (1999). Bicarbonate/chloride exchange regulates intracellular pH of embryos but not oocytes of the hamster. Biol. Reprod. 61:452-457.

20. KP Phillips and **JM Baltz**. (1999). Intracellular pH regulation by HCO_3^-/Cl^- exchange is activated during early mouse zygote development. Dev. Biol. 208:392-405.

21. M Lane, **JM Baltz**, and BD Bavister. (1999). Na^+/H^+ antiporter activity in hamster embryos is activated during fertilization. Dev. Biol. 208:244-252.

22. JL Collins and **JM Baltz**. (1999). Estimates of mouse oviductal fluid tonicity based on osmotic responses of embryos. Biol. Reprod. 60:1188-1193.

23. M Kolajova and **JM Baltz**. (1999). Volume-regulated anion and organic osmolyte channels in mouse zygotes. Biol. Reprod. 60:964-972.

24. M Lane, **JM Baltz**, and BD Bavister. (1998). Regulation of intracellular pH in hamster preimplantation embryos by the Na^+/H^+ antiporter. Biol. Reprod. 59:1483-1490.

25. KP Phillips, W-L Zhou, and **JM Baltz**. (1998). Fluorophore toxicity in mouse eggs and zygotes. Zygote 6:113-123.

26. KM Dawson, JL Collins, and **JM Baltz**. (1998). Osmolarity-dependent glycine accumulation indicates a role for glycine as an organic osmolyte in early preimplantation mouse embryos. Biol. Reprod. 59:225-232.

27. TL Herring, I Slotin, **JM Baltz**, and CE Morris. (1998). Neuronal swelling and surface area regulation: elevated intracellular calcium is not a requirement. Am. J. Physiol.: Cell Physiol. 43:C272-C281.

28. Dawson, **JM Baltz**, and P Claman. (1997). Culture with Matrigel inhibits development of mouse zygotes. J. Assist. Reprod. Genetics 14:543-548.

29. Y Zhao, PA Doroshenko, SL Alper, and **JM Baltz**. (1997). Routes of Cl^- transport across the trophectoderm of the mouse blastocyst. Dev. Biol. 189:148-160.

30. **JM Baltz**, SS Smith, JD Biggers, and C Lechene (1997). Intracellular ion concentrations and their maintenance by Na^+/K^+ ATPase in preimplantation mouse embryos. Zygote 5:1-9.

31. DG Séguin and **JM Baltz** (1997). Cell volume regulation by the mouse zygote: mechanism of recovery from a volume increase. Am. J. Physiol.: Cell Physiol. 41:C1854-C1861.

32. KM Dawson and **JM Baltz** (1997). Organic osmolytes and embryos: substrates of the Gly and β transport systems protect mouse zygotes against the effects of raised osmolarity. Biol. Reprod. 56:1550-1558.

33. DA Begg, GK Wong, D Hoyle, **JM Baltz** (1996). Stimulation of cortical actin polymerization in the sea urchin egg cortex by NH_4Cl, procaine, and urethane. Elevation of cytoplasmic pH is not the

common mechanism of action. Cell Motil. Cytoskel. 35:210-224.

34. Y Zhao and **JM Baltz** (1996). Bicarbonate/chloride exchange and intracellular pH throughout preimplantation mouse embryo development. Am. J. Physiol.: Cell Physiol. 40:C1512-C1520.

35. KP Phillips and **JM Baltz** (1996). Intracellular pH change does not accompany egg activation in the mouse. Molec. Reprod. Devel. 45:52-60.

36. GT Erbach, P Bhatnagar, **JM Baltz**, and JD Biggers (1995). Zinc is a possible contaminant of silicone oil in microdrop cultures of preimplantation mouse embryos. Human Reprod. 10:3248-3254.

37. Y Zhao, PJ-P Chauvet, SL Alper and **JM Baltz** (1995). Expression and function of bicarbonate/chloride exchangers in the preimplantation mouse embryo. J. Biol. Chem. 270:24428-24434.

38. **JM Baltz**, JD Biggers and C Lechene (1993). A novel H^+ permeability dominating intracellular pH regulation in the early mouse embryo. Development 118:1353-1361.

39. PG Allen, **JM Baltz** and DA Begg (1992). Fertilization alters the orientation of pigment granule saltations in *Arbacia* eggs. Cell Motil. Cytoskel. 21:223-234.

40. **JM Baltz**, JD Biggers and C Lechene (1991). Relief from alkaline load in two-cell stage mouse embryos by bicarbonate/chloride exchange. J. Biol. Chem. 266:17212-17217.

41. RA Cardullo and **JM Baltz** (1991). Metabolic regulation in mammalian sperm: mitochondrial volume determines sperm length and flagellar beat frequency. Cell Motil. Cytoskel. 19:180-188.

42. **JM Baltz** and JD Biggers (1991). Oxygen transport to embryos in microdrop cultures. Mol. Reprod. Devel. 28:351-355.

43. **JM Baltz**, JD Biggers and C Lechene (1991). Two-cell stage mouse embryos appear to lack mechanisms for alleviating intracellular acid loads. J. Biol. Chem. 266:6052-6057.

44. **JM Baltz**, PO Williams and RA Cone (1990). Dense fibers protect mammalian sperm against damage. Biol. Reprod. 43:485-491.

45. **JM Baltz**, JD Biggers and C Lechene (1990). Apparent absence of Na/H antiport activity in two-cell mouse embryos. Dev. Biol. 138:421-429.

46. **JM Baltz** and RA Cone (1990). The strength of non-covalent biological bonds and adhesions by multiple independent bonds. J. Theor. Biol. 142:163-178.

47. **JM Baltz** and RA Cardullo (1989). On the number and rate of formation of sperm-*zona* bonds in the mouse. Gamete Res. 24:1-8.

48. **JM Baltz**, DF Katz and RA Cone (1988). Mechanics of sperm-egg interaction at the *zona pellucida*. Biophys. J. 54:643-654.

Reviews and invited:

1. M Lane, **JM Baltz** and DK Gardner. (2003). Analysis of intracellular ions in embryos: pH and calcium. Ch. 7. In: Laboratory Guide to Mammalian Embryology. (ed. DK Gardner, M Lane, and AJ Watson). Oxford University Press. New York and Oxford. pp.125-138.

2. **JM Baltz**. (2003). pH-regulatory mechanisms in the mammalian oocyte and early embryo. Ch. 8. In: The Sodium-Hydrogen Exchanger. From Molecule to its Role in Disease. (ed. M Karmazyn, M Avkiran, and L Fliegel). Kluwer Academic Publishers, Boston. pp. 123-136.

3. BD Bavister and **JM Baltz**. (2002). Influences of culture media on embryo development. Ch. 8. In: ART—Today and beyond (ed. CJ De Jonge and CLR Barratt). Cambridge University Press., Cambridge. pp. 127-143.

4. **JM Baltz**. (2001). Osmoregulatory pathways in the mouse zygote. Ch. 2. In: Curr. Topics Dev. Biol. vol. 52 (ed. GP Schatten). Academic Press, San Diego. pp. 55-106.

5. **JM Baltz** and KP Phillips. (1999). Intracellular ion measurements in single eggs and embryos using ion-sensitive fluorophores. In: A Comparative Methods Approach to the Study of Oocytes and Embryos (ed. JD Richter), Advances in Molecular Biology Series. Oxford University Press, New York and Oxford. pp. 39-82.

6. **JM Baltz**, Y Zhao, and KP Phillips (1995). Intracellular pH and its regulation during fertilization and early embryogenesis. Theriogenology. 44:1133-1144.

7. **JM Baltz**, JD Biggers and C Lechene (1993). Intracellular pH regulation by the preimplantation embryo. In: Preimplantation Embryo Development (ed. B. Bavister). Serono Symposia, USA. Springer-Verlag, NY. pp. 97-111.

8. **JM Baltz** (1993). Intracellular pH regulation in the early embryo. BioEssays. 15:523-530.

9. JD Biggers, **JM Baltz** and C Lechene (1991). Ions in preimplantation development. In: Animal Applications of Basic Research in Mammalian Development (ed. R. Pederson). Cold Spring Harbor Laboratory Press. pp. 121-146.

10. RN Clarke, **JM Baltz**, C Lechene and JD Biggers (1989). Use of ultramicrofluorometric methods for the study of single preimplantation embryos. Poultry Sci. 68:972-978.

11. JD Biggers, JE Butler, **JM Baltz** and C Lechene (1989). Studies on the ultramicro-chemistry of single preimplantation mammalian embryos. In: Proceedings of NCRR Conference on Comparative Reproduction. Inst. of Primate Res., Nairobi. pp 146-154.

12. DF Katz, EZ Drobnis, GN Cherr, **JM Baltz**, AI Yudin, RA Cone and LY Cheng (1987). The biophysics of sperm penetration of the cumulus and *zona pellucida*. In: New Horizons in Sperm Cell Research (ed. H Mohri). Japan Scientific Society Press, Tokyo, & Gordon and Branch Scientific Publishers, NY. pp 275-285.