

CURRICULUM VITAE

Douglas T. Carrell, Ph.D., H.C.L.D.

II. EDUCATION AND BOARD CERTIFICATION

- Undergraduate: Bachelor of Science (Zoology) - April 1985, Brigham Young University
- Graduate: Master of Science (Cellular and Developmental Biology) - August 1989, Brigham Young University
- Doctor of Philosophy (Physiology) - August 1995, University of Utah
- Board Certification: High Complexity Laboratory Director (Andrology)- American Board of Bioanalysis, 1998.
- Board Certification: High Complexity Laboratory Director (Embryology)- American Board of Bioanalysis, 1998.

III. PROFESSIONAL EXPERIENCE

- Positions: Associate Professor of Surgery (Urology), Obstetrics and Gynecology, and Physiology, University of Utah School of Medicine, February 2002-Present.
- Assistant Professor of Surgery (Division of Urology), Univ. of Utah School of Medicine, May 1996-February 2002.
- Adjunct Assistant Professor of Physiology, Univ. of Utah School of Medicine, October 1996-2006
- Adjunct Associate Professor of Physiology, Univ. of Utah School of Medicine, October 2006 - Present
- Adjunct Assistant Professor of OB-GYN, Univ. of Utah School of Medicine, October 1997-Present
- Laboratory (IVF and Andrology) Manager, University of Utah School of Medicine, Division of Urology, 1988-May 1996

Laboratory Supervisor, University of Utah School of Medicine, Division of Urology, 1987-1988

Laboratory Manager, Reproductive Medical Technologies, Inc., 1983-1987

Laboratory Technician, University of Utah School of Medicine, Division of Urology, 1981-1986

Consulting: CEO and Laboratory Consultant, Specialized Biotechnology Services, 1986-present

Editorial: Associate Editor, Fertility and Sterility, 2009-Present

Editorial Board, Journal of Andrology, 2008 - Present

Associate Editor, Systems Biology in Reproductive Medicine, 2007-Present

Editorial Board, The Open Reproductive Science Journal, 2007-Present

Editorial Board, Archives of Andrology/ Systems in Reproductive Medicine, 2006-2007

Editorial Board, Archives of Andrology, 1999- 2003

Editorial Board, Journal of Experimental and Clinical Assisted Reproduction, 2003-Present

Editorial Board (Ad Hoc), Fertility and Sterility, 1998-Present

Editorial Board, Advances in Andrology, 2000-2003

Ad Hoc Reviewer:

Journal of the Society of Gynecological Investigation, Human Reproduction, Journal of Urology, Archives of Physiology and Biochemistry, Biology of Reproduction, Journal of Andrology, Int J Andrology, Human Reproduction Update, Fertility and Sterility, Asian J Andrology, New England Journal of Medicine, Journal of Reproductive Immunology, Obstetrics and Gynecology, Human Molecular Genetics, Reproduction, Clinical Human Genetics, Clinical Obstetrics and Gynecology, Molecular Human Reproduction, Systems Biology in Reproductive Medicine, Journal of IVF and Genetics

Research Awards:

Prize Journal Paper, Assisted
Reproductive Technologies/Andrology, Presented at
Annual Meeting, 1997.

Honorary Lectureship, ARTA Annual Meeting, Cairo,
Egypt, 1997.

Finalist, Prize Poster Presentation, American Society of
Reproductive Medicine Annual Meeting, 1997.

Royen Institute Andrology Research Prize 2001, Carrell
DT, Liu L (2001): Altered protamine 2 expression is
uncommon in donors of known fertility, but common
among men with poor fertilizing capacity and may reflect
other abnormalities of spermiogenesis. *J Andrology*
22:604-610.

In-Training Research Award Paper (2004): Chohan KR,
Griffin JT, LaFromboise M, De Jonge CJ, Carrell DT.
“Sperm DNA damage relationship with embryo quality
and pregnancy outcome in IVF patients.” American
Society for Reproductive Medicine Annual Meeting,
Philadelphia, PA

SREI Prize Paper at the ASRM Annual Meeting, 2007,
“Effect of weight loss after Roux-en-Y gastric bypass
surgery on the male reproductive hormone profile.”

SMRU Award at the ASRM Annual Meeting, 2007 for:
“Emery BR, Sun Y, **Carrell DT**. Combined effects of the
experimental left varicocele and lead or nicotine in the rat
testis.”

SMRU Award at ASRM Annual Meeting, 2008 for:
“Genome-wide epigenetic characterization of human
sperm reveals distinctive chromatin states that poise genes
to guide embryo development.”

IV. ADMINISTRATIVE DUTIES

Co-Director, University of Utah Andrology and IVF Laboratories, 1996-1997

Director, University of Utah Andrology and IVF Laboratories, 1997-Present

Director, Abbott Northwestern Hospital, Center for Reproductive Medicine, IVF and Andrology Laboratories (1997-Present)

Director, Andrology Laboratory, St. Paul Center of Reproductive Medicine (1999-Present)

V. PROFESSIONAL AND SCIENTIFIC COMMITTEES

Co-chairman, Travel Committee, 1997 AUA Western Section Annual Meeting.

Co-chairman, 1997 Partus Medical Clinic Symposium on Advanced Reproductive Techniques.

Co-chairman, 2001 Partus Symposium on Intracytoplasmic Sperm Injection and IVF.

Member, Allina Health Systems Committee on Reproductive Ethics (1997-2002)

Member, Congressional Liaison Committee, American Society of Cell Biology (2001-Present)

Member, Publicity Committee, American Society of Reproductive Medicine (2002-2005)

Member, Clinical Outreach Committee, Society for the Study of Reproduction (2004-Present)

Chairman, Organizing Committee, Utah International Symposium on the Genetics of Male Infertility (2005-2006)

Chairman, Local Arrangements Committee, Utah International Symposium on the Genetics of Male Infertility (2005-2006)

Co-Chairman, Organizing Committee, International Symposium on the Genetics of Male Infertility, Florence Italy, Sept 20-23, 2007.

Member, Publications Committee, American Society of Andrology (2006-Present)

Member, Development Committee, American Society of Andrology (2006-2007)

Chairman, Organizing Committee, The Utah-Florence International Symposium on the Genetics of Male Infertility, 2010.

Member, Abstract Committee, American Society of Reproductive Medicine (RBPG) Annual Meeting, 2008

Bioengineering 6010, Physiology for Biology and Engineering
Graduate Students, Endocrinology Section, (2001-2003)

Physiology Proseminar, (Grad Students),
Reproductive Biology Laboratory Techniques, (1996-Present)

Ad hoc Lectures, (Residents), Dept. of Ob-Gyn and Division of
Urology (1996-Present)

Reproductive Endocrinology (Phys 7930), Course Director,
(Graduate Students) 2003-Present

Principles of Physiology (Phys 5200), Endocrine Section Lecturer,
2004-Present.

Graduate Students:

Vincent Aoki, Ph.D. (2002-2005)
Ph.D., Completed November 2005,
Dept. of Physiology, University of Utah School of Medicine
(Graduate Advisor, Committee Chairman)
Thesis: Characterization of Human Sperm Protamine Deficiency
and the Implications for Human Male Infertility

Gregory Christensen, Ph.D. (1998-2006)
Ph.D. Completed December 2006
Dept. of Physiology, University of Utah School of Medicine
(Graduate Advisor, Committee Chairman)
Thesis: Genetic Determinants of Male Infertility: The Role of
Antizyme 3.

Benjamin Emery
M.Phil. Completed 2008
Dept. of Physiology, University of Utah School of Medicine
(Graduate Advisor, Committee Chairman)
Thesis: Protein interactions in abnormal protamine expression.

Matthew Sanderson
Ph.D. Candidate (Expected 2009)
Dept. of Physiology, University of Utah School of Medicine
(Graduate Advisor, Committee Chairman)
Thesis: Abnormal meiotic recombination in infertile males.

Saher (Sue) El-Khechen Hammoud
Ph.D. Candidate (Expected 2010)
Dept. of Physiology, University of Utah School of Medicine
(Graduate Advisor, Committee Chairman)

Thesis: Etiology of abnormal protamine expression in male infertility.

Timothy Jenkins
Ph.D. Candidate
Dept. of Physiology, University of Utah School of Medicine
(Graduate Advisor, Committee Chairman)

Jahnvi Purwar
Ph.D. Candidate, Dept of Molec Biol, Univ. of Utah

Charles Cornwell (Committee Member)
M.Sc. Embryology (2001), Danube Univ. of Krems
Thesis: Influence of hCG on Granulosa Cell Apoptosis.

Post-Doctoral Fellows:

Ji Wu, M.D., (1999-2001)
Research Topic: In vitro Maturation of Porcine Preantral Follicles.
Current Employment: Shanghai University, China

Sergey Moskovtsev, M.D., (2000-2002)
Research Topic: In vitro Maturation of Human Preantral Follicles.
Current Employment: Mt. Sinai Hospital, Toronto Ontario

Kazim Chohan, Ph.D., (2001-2004)
Research Topic: The Role of Chromatin Abnormalities in Male Infertility.
Current Employment: SUNY Upstate Medical University, Syracuse, New York

Ki Aston, Ph.D. (2007-Present)
Research Topic: Epigenetic Changes in Gametes

Laszlo Nanassy, Ph.D. (2007-Present)
Research Topic: Copy number Variations and Embryogenesis

Reproductive Endocrine Fellows:

Ivan Huang, M.D. (2003-2006) (Research Advisor)

Ahmad Omar Hammoud, M.D. (2005-2008) (Research Adviser)

Colleen Milroy, M.D. (2008-Present) (Research Advisor)

Visiting Trainees:

Yong Ding, M.D., China, Oct-Dec 2001.

Blazej Meczekalski, M.D., Poland, Dec 2001- March 2002.

Nickolai Kuznetsov, M.D., Russia, May 2006

IX. PEER-REVIEWED PUBLICATIONS

1. Urry RL, **Carrell DT**, Hull DB, Middleton RG, Wiltbank MC (1983) Penetration of zona-free hamster ova and bovine cervical mucus by fresh and frozen human spermatozoa. *Fertil Steril* 39:690.
2. Yang HT, Hammer RL, Sellers TL, **Carrell DT**, Winder WW (1988) Adrenodemedullation affects endurance but not hepatic fructose 2,6-bisphosphate. *Am J Physiol* 254 (Regulatory Integrative Comp. Physiol.) 572-577.
3. **Carrell DT**, Bradshaw WS, Jones KP, Middleton RG, Peterson CM, Urry RL (1992) An evaluation of various treatments to increase sperm penetration capacity for potential use in an in vitro fertilization program. *Fertil Steril* 57:134.
4. **Carrell DT**, Odell WD (1992) A bacterial binding site which binds human chorionic gonadotropin but not human luteinizing hormone. *Endocrine Research* 18:51.
5. Odell WD, Griffin J, Grover S, **Carrell DT**: Human chorionic gonadotropin-like proteins: secretion in nonpregnant humans and production by bacteria. In: Jackson DP (ed), *Trans Am Clin Clim Assoc*, Waverly Press, Baltimore, 1992, 238-254.
6. **Carrell DT**, Hammond E, Odell WD (1993) Evidence for an autocrine/paracrine function of chorionic gonadotropin in *Xanthomonas maltophilia*. *Endocrinology* 132:1085-1089.
7. Grover S, Woodward SR, Caticha O, **Carrell DT**, Odell WD (1993) Partial nucleotide sequence of the *Xanthomonas maltophilia* chorionic gonadotropin-like receptor. *Biochem Biophys Res Comm* 190:371-376.
8. **Carrell DT**, Middleton RG, Peterson CM, Jones KP, Urry RL (1993) The role of the cumulus in the selection of morphologically normal sperm and induction of the acrosome reaction during human in vitro fertilization. *Arch Androl* 31:133-137.
9. Yanagimachi R, Katayose H, Killian G, Lee CN, **Carrell DT**, Huang TTF (1993) Moderate heat treatment increases the penetrability of zonae pellucidae of salt-stored eggs by sperm. *Zygote* 1:345-351.
10. **Carrell DT**, Zobell RL, Middleton RG, Urry RL (1994) A functional analysis and the potential clinical significance of seven categories of sperm morphology. *J Urol* 151:376-380.
11. Urry RL, **Carrell DT**, Starr NT, Snow BW, Middleton RG (1994) The incidence of antisperm antibodies in infertility patients with a history of cryptorchidism. *J Urol* 151:381-383.

12. Blackburn CW, Peterson CA, Hales HA, Peterson CM, **Carrell DT**, Jones KP, Urry RL (1994) Nicotine, but not cotinine, has a direct toxic effect on ovarian function in the immature gonadotropin-stimulated rat. *Reprod Toxic* 8:325-331.
13. Peterson CM, Jolles CJ, **Carrell DT**, Straight RC, Jones KP, Poulson AM, Hatasaka HH (1994) GnRH agonist therapy in human ovarian epithelial carcinoma (OVCAR-3) heterotransplanted in the nude mouse is characterized by latency and transience. *Gynecologic Oncology* 52:26-30.
14. Peterson CM, Hatasaka HH, Jones KP, Poulson AM, **Carrell DT** (1994) Ovulation induction with gonadotropins and intrauterine insemination compared with in vitro fertilization and no therapy: a prospective, nonrandomized, cohort study and meta-analysis. *Fertil Steril* 62:535-544.
15. **Carrell DT**, Peterson CM, Urry RL (1995) The binding of recombinant human relaxin to human spermatozoa. *Endocrine Res* 21:697-707.
16. **Carrell DT**, Wilcox AL, Urry RL (1996) Effect of fluctuations in temperature encountered during handling and shipping of human cryopreserved semen. *Andrologia* 28:315-319.
17. **Carrell DT**, Urry RL (1996) Sperm penetration assay modifications for improved prediction of sperm fertilization capacity. *Assisted Reprod Rev* 6(4):170-174.
18. **Carrell DT**, Woods ME, Griffin J, Odell WD (1997) Identification of a CG/LH binding site in two strains of *Mycobacterium vaccae*. *Endocrine Res*. 23:59-68.
19. **Carrell DT**, Peterson CM, Hatasaka HH, Jones KP, Urry RL (1997) Abnormal sperm morphology affects embryo quality and pregnancy rates during IVF, but not during ICSI. *J Assisted Reproduction and Technology/Andrology* 9:182-192.
20. **Carrell DT**, Kuneck P, Peterson CM, Hatasaka HH, Jones KP, Campbell B, Thorp C, Urry RL (1998) A randomized, prospective analysis of five sperm preparation techniques prior to artificial insemination. *Fertil Steril* 69:122-126.
21. **Carrell DT**, Emery BR, Peterson CM (1998) The correlation of sperm chromatin decondensation following in vitro exposure to heparin and sperm penetration rates. *J Assisted Reprod Genet* 15: 560-564.
22. **Carrell DT**, Udoff LC, Hatasaka HH, Jones KP, Peterson CM (1998) Predictability/variability of a modified sperm penetration assay (SPA): review of 1033 patients undergoing zona-free hamster oocyte sperm penetration analyses/IVF. *Adv Reprod* 1:45-56.
23. **Carrell DT**, Emery B, Liu L (1999) Characterization of aneuploidy rates, protamine levels, ultrastructure, and functional ability of round-headed sperm from two siblings and implications for intracytoplasmic sperm injection (ICSI). *Fertil Steril* 71(3):511-516.

24. **Carrell DT**, Erickson LE, Baldinger S, Smith S, Court H, Tucker MJ (1999) Potential causes of multi-pronuclear development and cleavage arrest during in vitro fertilization with intracytoplasmic sperm injection. *Advances in Reproduction* 3:211-218.
25. **Carrell DT**, Peterson CM, Jones KP, Hatasaka HH, Udoff LC, Cornwell CE, Thorp C, Kuneck P, Erickson L, Campbell B (1999) A simplified coculture system using autologous, attached cumulus tissue results in improved embryo morphology and pregnancy rates during in vitro fertilization. *J Assisted Reprod and Genetics* 16:344-349.
26. **Carrell DT** (1999): Semen Analysis at the turn of the Century: An Evaluation of Potential Uses of New Sperm Function Assays. *Arch Androl* 44:65-75.
27. **Carrell DT**, Peterson CM, Jones KP, Hatasaka HH (1999) Autologous cumulus cell co-culture improves embryo quality and blastocyst growth in ICSI-derived embryos. *Advances in Reproduction* 5:89-94
28. Escudero T, Lee M, **Carrell D**, Blanco J, Munne S (2000) Analysis of chromosome abnormalities in sperm and embryos from two 45,XY,t(13;14)(q10;q10) carriers. *Prenat Diagn*, 20,599-602 619.
29. Wu J, Emery BR, **Carrell DT** (2001): In vitro growth, maturation, fertilization, and embryonic development of oocytes from porcine preantral follicles. *Biol Reprod*. 64:375-381.
30. **Carrell DT**, Liu L (2001): Altered protamine 2 expression is uncommon in donors of known fertility, but common among men with poor fertilizing capacity and may reflect other abnormalities of spermiogenesis. *J Andrology* 22:604-610.
31. Pryor JL, Blatz SM, Cornwell CE, Kuneck PH, **Carrell DT** (2001): Delayed timing of intrauterine insemination results in a significantly improved pregnancy rate in female partners of the spinal cord injured male. *Fertil Steril* 76:1130-5.
32. **Carrell DT**, Wilcox AL, Udoff LC, Thorp C, Campbell B (2001): Chromosome 15 aneuploidy in the sperm and conceptus of a sibling with variable familial expression of round-headed sperm syndrome. *Fertil Steril* 76:1258-60.
33. **Carrell DT**, Jones KP, Peterson CM, Aoki V, Emery BR, Campbell BR (2001): Body mass index (BMI) is inversely related to intra-follicular hCG levels, embryo quality, and IVF outcome. *Reproductive Biomed* 3:109-11.
34. Emery BR, Miller RL, **Carrell DT** (2001): Hamster oocyte resting membrane potential and ion permeability vary with preantral cumulus cell attachment and developmental stage. *BMC Devel Biol* 1:14-19.

35. Wu J, Wilcox A, **Carrell DT** (2001): Development of in vitro matured oocytes from porcine preantral follicles following Intracytoplasmic sperm injection. *Biol Reprod* 65:1579-85.
36. **Carrell DT**, Liu L (2002): Heparin binding sites are present at a higher concentration on sperm of sub-fertile men than donors of known fertility. *Arch Androl* 48:175-182.
37. **Carrell DT**, Cartmill D, Jones KP, Hatasaka HH, Peterson CM(2002): Prospective, randomized, blind evaluation of donor semen quality provided by seven commercial sperm banks. *Fertil Steril* 78:16-21.
38. Moskovtsev SI, Griffin JT, Peterson CM, **Carrell DT** (2002): Primordial and preantral follicles are not commonly observed in IVF aspirates. *Hum Reprod* 17:1783-7.
39. Christensen G, **Carrell DT** (2002): Animal models of genetic causes of male infertility. *Asian J Androl* 4:213-219.
40. **Carrell DT**, Cartmill D (2002): A brief review of current and proposed federal government regulation of assisted reproduction laboratories in the United States. *J Androl* 23:610-7.
41. **Carrell DT**, Wilcox AL, Lowy L, Peterson CM, Jones, KP, Erickson L, Campbell B, Branch DW, Hatasaka HH (2003): Elevated sperm chromosome aneuploidy and apoptosis in patients with unexplained recurrent pregnancy loss. *Obstet Gynecol* 101(6):1229-35.
42. **Carrell DT**, Moskovtsev S, Chohan KR, Peterson, CM. (2003): Ovarian folliculogenesis: The emerging role of in vitro maturation of oocytes follicles and follicles in clinical practice. *Clinical Obstetrics and Gynecology* 46:239-53.
43. **Carrell DT**, Emery BR, Hamilton B (2003): Seminal infection with *Ralstonia picketti* and cytolysosomal spermophagy in a previously fertile man. *Fertil Steril* 79(Supp3):1665-7.
44. **Carrell DT**, Pryor JL, Kuneck PH (2003): Timing of intrauterine insemination. *Fertil Steril* 78:1347-1348.
45. Aoki V, **Carrell DT** (2003): Human protamines and the developing spermatid: their structure, function, expression, and relationship with male infertility. *A JA* 5:315-24.
46. **Carrell DT**, Liu L, Peterson CM, Hatasaka HH, Jones KP, Erickson L, Campbell B (2003): Sperm DNA fragmentation is increased in couples with unexplained recurrent pregnancy loss. *Arch Androl* 49:65-71.
47. Peterson CM, Reading JC, Hatasaka HH, Jones KP, Udoff LC, Adashi EY, Kuneck P, Erickson L, Malo JW, Campbell B, **Carrell DT** (2004): The use of outcomes-based

data in reducing high order multiple pregnancies: the role of age, embryo score. *Fertil Steril* 81:1534-41.

48. **Carrell DT**, Emery BR, Willcox AL, Campbell B, Erickson L, Hatasaka HH, Jones KP, Peterson CM (2004): Sperm chromosome aneuploidy as related to male factor infertility and some ultrastructure defects. *Arch Androl* 50:181-5

49. Chohan KR, Griffin JT, **Carrell DT** (2004): Evaluation of chromatin integrity in human sperm using acridine orange staining with different fixatives and after cryopreservation. *Andrologia* 36:321-6.

50. Emery BR, Thorp C, Malo JW, **Carrell DT** (2004): Pregnancy from intracytoplasmic sperm injection of a sperm head and detached tail. *Fertil Steril* 81:686-688.

51. Aoki VW, Wilcox AL, Thorp C, **Carrell DT** (2004): Improved in vitro fertilization embryo quality and pregnancy rates with intracytoplasmic sperm injection of sperm from fresh testicular biopsy samples vs. frozen biopsy samples. *Fertil Steril* 82(6):1532-5.

52. Tanaka M, Kihara M, Hennebold JD, Eppig JJ, Viveiros MM, Emery BR, **Carrell, DT**, Kirkman NJ, Meczekalski B, Zhou J, Bondy CA, Becker M, Schultz RM, Misteli T, De La Fuente R, King GJ, Adashi EY (2005): H1FOO is coupled to the initiation of oocytic growth. *Biol Reprod* 72:135-

53. Aoki VW, Peterson CM, Jones KP, Hatasaka HH, Gibson M, Huang I, **Carrell DT** (2005): Correlation of sperm penetration assay score with polyspermy rate in in-vitro fertilization. *J Emb Clin Assis Reprod*, 2(1):3-7.

54. Aoki VW, Liu L, **Carrell DT** (2005): Identification and evaluation of a novel sperm protamine abnormality in a population of infertile males. *Hum Reprod* 20:1298-1306.

55. **Carrell DT**, Liu L, Huang I, Peterson CM (2005). Comparison of maturation, meiotic competence, and chromosome aneuploidy of oocytes derived from two protocols for in vitro culture of mouse secondary follicles. *J Assist Reprod Genet*;22(9-10):347-54.

56. Emery BR, Wilcox AL, Aoki VW, Peterson CM, **Carrell DT** (2005). In vitro oocyte maturation and subsequent delayed fertilization is associated with increased embryo aneuploidy. *Fertil Steril*;84(4):1027-1029.

57. Aoki VW, Moskovtsev S, Willis J, Liu L, Mullen JBM, **Carrell DT** (2005). DNA integrity is compromised in protamine-deficient sperm. *J Androl*;26(6):741-748.

58. Mizukami A, Peterson CM, Huang I, Cook C, Boyak LM, Emery BR, **Carrell DT** (2005): The acceptability of posthumous human ovarian tissue donation in Utah. *Human Reprod*, 20:3560-3565.

59. Christensen GL, Ivanov IP, Atkins JF, Mielnik A, Schlegal PN, **Carrell DT** (2005): Screening the SPO11 and EIF5A2 genes in a population of infertile males. *Fertil Steril*; 84(3):758-760.
60. Aoki VW, Wilcox AL, Peterson CM, Parker-Jones K, Hatasaka HH, Gibson M, Huang I, **Carrell DT** (2005). Comparison of four media types during 3-day human IVF embryo culture. *Reprod Biomed Online* 2005;10(5):600-6.
61. Chohan KR, Griffin JT, LaFramboise M, De Jonge CJ, **Carrell DT** (2006): Comparison of chromatin assays for DNA Fragmentation evaluation in human sperm. *J Andrology*, 27:53-59.
62. Christensen GL, Ivanov IP, Atkins JF, **Carrell DT** (2006): Identification of polymorphisms in the Hrb, GOPC, and Csnk2a2 genes in two men with globozoospermia. *J Androl*; 27(1): 11-15.
63. Aoki VW, Liu L, **Carrell DT** (2006). A novel mechanism of protamine expression deregulation highlighted by abnormal protamine transcript retention in infertile human males with sperm protamine deficiency. *Mol Hum Reprod*.12:41-50.
64. Emery BR, **Carrell DT** (2006): The effect of epigenetic sperm abnormalities on early embryogenesis. *Asian J Andrology*; 8(2):131-142.
65. Griffin J, Emery BR, Huang I, Peterson CM, **Carrell DT** (2006): Comparative analysis of follicle morphology and oocyte diameter in four mammalian species (mouse, hamster, pig, and human). *J Exp & Clin Assist Reprod*; 3(1): 2.
66. Christensen GL, Ivanov IP, Wooding SP, Atkins JF, Mielnik A, Schlegal PH, **Carrell DT** (2006): Identification of polymorphisms and balancing selection in the male infertility candidate gene, ornithine decarboxylase antizyme 3. *BMC Med Genet*; 7(1): 27.
67. Christensen G, Wooding SP, Ivanov IP, Atkins JF, **Carrell DT** (2006): Sequencing and haplotype analysis of the Activator of CREM in the Testis (ACT) gene in populations of fertile and infertile males. *Molec Hum Reprod* 12:257-262.
68. **Carrell DT**, DeJonge C, Lamb D (2006): The genetics of male infertility: a field of study whose time is now. *Arch Androl* 52:269-274.
69. Aoki VW, Emery BR, Liu L, Griffin J, **Carrell DT** (2006): Protamine levels vary between individual sperm cells of infertile human males and correlate with DNA integrity. *J Androl* 27(6):890-898.
70. Aoki VW, Liu L, Jones KP, Hatasaka HH, Gibson M, Peterson CM, **Carrell DT** (2006): Sperm protamine 1/protamine 2 ratios are related to IVF pregnancy rates and predictive of fertilization ability. *Fertil Steril* 86(5):1408-1415.

71. Aoki VW, Christensen GL, Atkins JF, **Carrell DT** (2006): Identification of novel polymorphisms in the nuclear protein genes and their relationship with human sperm protamine deficiency and severe male infertility. *Fertil Steril* 86(5):1416-1422.
72. Aoki VW, Emery BR, **Carrell DT** (2006): Global sperm deoxyribonucleic acid methylation is unaffected in protamine-deficient infertile males. *Fertil Steril* 86(5):1541-1543.2
73. Hammoud AO, Gibson M, Peterson CM, Hamilton BH, **Carrell DT** (2006): Obesity and male reproductive potential. *J Androl* 27(5):619-626.
74. **Carrell DT**, Liu L, Christensen GL (2007): Polyploidy in mouse embryos derived from in vivo and in vitro fertilization is dependent on the timing of pregnant mare serum gonadotropin (PMSG) injection. *Fertil Steril* 87:1470-2.
75. **Carrell DT**, Emery BR, Hammoud S (2007): Altered protamine expression and diminished spermatogenesis: What is the link? *Hum Reprod Update* 13:313-27.
76. Meacham RB, Chemes H, **Carrell D**, Goldstein M (2007): Globozoospermia: Is there a role for varicocele repair? *J Androl* 28:490-491.
77. Hammoud AO, Gibson M, Huang I, Hammoud S, Peterson CM, **Carrell DT** (2007): Effect of sperm preparation techniques on intra-individual variation of sperm motility and pregnancy rates. *Arch Androl/J Reprod Systems* 53:349-351.
78. Hammoud S, Emery BR, Aoki VW, **Carrell DT** (2007): Identification of genetic variation in the 5' and 3' non-coding regions of the protamine genes in patients with protamine deregulation. *Arch Androl* 53(6):267-74.
79. **Carrell DT** and Emery BR (2008): Use of automated imaging and analysis technology for the detecting of aneuploidy in human sperm. *Fertil Steril* 90(2):434-7.
80. **Carrell DT** (2008): The Clinical Implementation of Sperm Chromosome Aneuploidy Testing: Pitfalls and Promises. *J Androl*, Mar-Apr 29(2):124-33.
81. Meistrich ML, Bailey J, **Carrell D**, Cooper T, Hess R, Johnston D, Marmar J, Morales C (2008) Changes in the Journal of Andrology in the electronic age. *J Androl* 29(2):123.
82. **Carrell DT**, Emery BR, Hammoud S (2008): The aetiology of sperm protamine abnormalities and their potential impact on the sperm epigenome. *Int J Androl* 31:1-9.
83. Christensen GL, Griffin J, **Carrell DT** (2008): Sequence analysis of the X-linked USP26 gene in severe male factor infertility patients and fertile controls. *Fertil Steril*, 90(3):851-852.
84. **Carrell DT** (2008): Contributions of spermatozoa to embryogenesis: assays to evaluate their genetic and epigenetic fitness. *Reprod Biomed Online* 16(4):474-484.

85. Hammoud AO, Wilde N, Parks A, Gibson M, **Carrell DT**, Meikle AW (2008): Male obesity and alterations of semen quality. *Fertil Steril* 90:2222-5.
86. Liu L, Aoki V, **Carrell DT** (2008): Evaluation of the developmental competence and chromosomal complement of mouse oocytes derived from in-vitro growth and maturation of preantral follicles. *J Assisted Reprod and Genetics*, 25(2-3):107-113..
87. Sanderson M, Hassold T, **Carrell DT** (2008): Proteins involved in recombination: A role in male infertility? *Systems Biol in Reprod Med* 54:57-74.
88. Hammoud AO, Gibson M, Stanford J, **Carrell DT**, Peterson CM (2008): IVF availability and utilization in the United States: A study of demographic, social, and economic factors. *Fertil Steril*, Epub June 7, 2008 ahead of print.
89. **Carrell DT** and Krausz C (2008): Genetic and epigenetic aspects of assisted reproduction: Application of genetic advances to assisted reproductive technologies. *Reprod Biomed Online* 16(4):471-473.
90. Huang I, Emery BR, Christensen GL, Griffin J, Peterson CM, **Carrell DT** (2008): Novel UBE2B associated polymorphisms in an infertile population. *A J A* 10(3):461-466.
91. Griffin J, Emery BR, Christensen G, **Carrell DT** (2008): Analysis of the meiotic recombination gene *REC8* for sequence variations in a population with severe male factor infertility. *Sys Biol Rep Med* 54:163-5.
92. Nanassy L, **Carrell DT** (2008): Paternal effects on embryogenesis. *J Exp Clin Assis Reprod*, Epub May 16, 2008; 5:2.
93. Aston KI, Peterson CM, **Carrell DT** (2008): Monozygotic twinning during in vitro fertilization therapy. *Reproduction* 136:377-86.
94. **Carrell DT**. (2008) Elucidating the Genetics of Male Infertility: Understanding Transcriptional and Translational Regulatory Networks Involved in Spermatogenesis. *Int J Androl*, 31(5):455-456.
95. Hammoud AO, Gibson M, Peterson CM, Meikle AW, **Carrell DT** (2008): Impact of male obesity on infertility: A critical review of the current literature. *Fertil Steril* 90:897-904.
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96. **Carrell DT**, Liu L, Hatasaka HH, Jones KP, Peterson CM: Abnormalities of sperm protamine content are predictive of abnormal sperm fertilizing capacity. Annual Meeting of the European Society of Human Reproduction and Embryology, Vienna, Austria, June 2002.
97. Cornwell CE, Thorp C, Wong A **Carrell DT**: Transient cooling of human oocytes during ICSI has no impact on fertilization and clinical pregnancy rates. Annual Meeting of the European Society of Human Reproduction and Embryology, Vienna, Austria, June 2002.
98. Moskovtsev S, Griffin J, Peterson CM, **Carrell DT**: Preantral follicles are not routinely observed in IVF aspirates. World Congress of Reproduction, Montreal, Canada, June 2002.
99. Aoki V, **Carrell DT**: Embryo quality after ICSI is improved using human tubal fluid (HTF) culture medium compared to G1.2 medium. World Congress of Reproduction, Montreal, Canada, June 2002.
100. Peterson CM, Hatasaka HH, Campbell BR, Jones KP, Adashi EY, **Carrell DT**: The use of outcomes-based data in reducing high order multiple pregnancies: The role of age, embryo score, and ovum donation. American Society of Reproductive Medicine Annual Meeting, 2002.
101. **Carrell DT**, Wilcox AL, Liu L, Hatasaka HH, Jones KP, Peterson CM: An abnormal protamine 1/protamine 2 (P1/P2) ratio is associated with diminished in vitro

fertilization capability. American Society of Reproductive Medicine Annual Meeting, 2002.

102. Christensen G, Ivanov I, Atkins J, Mielnik A, Schlegal P, **Carrell DT**: Detection of a novel mutation in the testis-specific antizyme-3 gene. American Society of Reproductive Medicine Annual Meeting, 2002.

103. Christensen G, Wilcox AL, **Carrell DT**: Evaluation of aneuploidy rates in morphologically distinct classes of spermatozoa. American Society of Reproductive Medicine Annual Meeting, 2002.

104. **Carrell DT**, Wilcox A, Peterson CM, Kuneck P, Campbell B, Malo J, Erickson L: Sperm chromosome aneuploidy analysis is beneficial in severely infertile men undergoing ICSI. Annual Meeting of the European Society of Human Reproduction and Embryology, June 2003, Madrid, Spain.

105. Aoki V, Peterson CM, Jones KP, Hatasaka HH, Erickson L, Malo J, Kuneck P, Campbell B, **Carrell DT**: The relationship between the sperm penetration assay (SPA) and IVF parameters in 1561 IVF microdrop insemination cases. Annual Meeting of the European Society of Human Reproduction and Embryology, June 2003, Madrid, Spain.

106. Chohan KR, Griffin J, **Carrell DT**: Assessment of DNA damage to sperm using acridine orange staining with different fixatives and after cryopreservation. Annual Meeting of the European Society of Human Reproduction and Embryology, June 2003, Madrid, Spain.

107. **Carrell DT**, Liu L: A diminished level of human sperm protamine 2 does not affect pronuclear development or early embryogenesis. Annual Meeting of the Society for the Study of Reproduction, July 2003, Cincinnati, OH.

108. Aoki VW, **Carrell DT**: Distribution of protamine-2 levels in sperm of infertile males and the correlation with sperm viability. American Society of Reproductive Medicine Annual Meeting, Oct 2003, San Antonio, Texas.

109. Aoki VW, Wilcox AL, Thorp C, **Carrell DT**: IVF embryo quality and pregnancy rates are improved with sperm from fresh testicular biopsy samples versus frozen samples. . American Society of Reproductive Medicine Annual Meeting, Oct 2003, San Antonio, Texas.

110. Christensen GL, Ivanov IP, Atkins JF, Schlegal P, Mielnik A, **Carrell DT**: Screening of the SPO11 and EIF5A2 genes in a population of azoospermic and severely oligozoospermic men. American Society of Reproductive Medicine Annual Meeting, Oct 2003, San Antonio, Texas.

111. Huang I, Emery B, Mizukami A, Hatasaka HH, **Carrell DT**, Peterson CM: Acceptability of ovarian tissue donation at the time of organ donation. American Society of Reproductive Medicine Annual Meeting, Oct 2003, San Antonio, Texas.

112. Christensen GL, **Carrell DT**, Ivanov IP, Atkins JF, Woodhead JH, White S: Development of a new transgenic seizure model in mice. Annual Meeting of the American Epilepsy Society, 2003.
113. Carrell JT, Emery BR, **Carrell DT**: An evaluation of the positioning of chromosomes 13, 18, 21, X, and Y in the sperm of donors of known fertility. EAA Symposium on the Genetics of Male Infertility, Florence, Italy, 2003.
114. **Carrell DT** and Wilcox AW: Sperm chromosome aneuploidy is greatly increased in patients with severe sperm ultrastructure defects. . EAA Symposium on the Genetics of Male Infertility, Florence, Italy, 2003.
115. Christensen G, Ivanov I, Schlegel P, Meilnik A, Atkins J, **Carrell DT**: Identification of two predominant haplotypes within the Antizyme 3 gene and its relevance to male infertility. EAA Symposium on the Genetics of Male Infertility, Florence, Italy, 2003.
116. Huang I, Liu L, Peterson CM, **Carrell DT**: Enhanced survival of denuded murine pre-antral follicles undergoing in vitro follicle culture and maturation. Society of Gynecological Investigation Annual Meeting, 2004.
117. Chohan KR, **Carrell DT**: Comparison between TUNEL and sperm chromatin dispersion test for the determination of DNA fragmentation in human sperm. American Society of Andrology Annual Meeting, April 19,2004, Baltimore, Maryland.
118. Christensen GL, Chohan KR, **Carrell DT**: Screening of globozoospermia candidate genes in two globozoospermic individuals with family histories of globozoospermia. American Society of Andrology Annual Meeting, April 19,2004, Baltimore, Maryland.
119. Chohan KR, Griffin JT, LaFromboise M, DeJonge CJ, **Carrell DT**: Sperm DNA damage in neat and density gradient fractions of patient and donor semen samples by different chromatin evaluation assays. Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
120. Emery BR, Chohan KR, Wilcox AL, Aoki VW, **Carrell DT**: Delayed fertilization of oocytes following in vitro culture results in increased embryo aneuploidy. Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
121. Christensen GL, Ivanov IP, Atkins JF, **Carrell DT**: Identification of three haplotypes within the Activator of CREM in the Testis (ACT) gene and their implications for fertility. Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
122. Liu L, Huang I, Griffin J, Peterson CM, **Carrell DT**: Comparison of maturation and chromosome aneuploidy rates using two protocols for in vitro maturation of mouse secondary follicles. Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct, 2004.

123. Chohan KR, Griffin JT, Lafromboise M, De Jonge CJ, **Carrell DT**: Sperm DNA damage relationship with embryo quality and pregnancy outcome in IVF patients. Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
124. Wilcox AL, Aoki VW, **Carrell DT**: A Simplified technique for visualizing decondensed sperm heads in the hamster egg penetration test (HEPT). Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
125. Aoki VW, Liu L, Peterson CM, **Carrell DT**: Evaluation of protamine expression in the sperm of infertile males. Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
126. Aoki VW, Wilcox AL, Jones KP, Hatasaka HH, Gibson M, **Carrell DT**: Comparison of human tubal fluid (HTF), G1.2, and Sage Cleavage media for human in vitro fertilization (IVF). Annual Meeting of the American Society of Reproductive Medicine, Philadelphia, PA, Oct. 2004.
127. Aoki VW, Christensen GL, **Carrell DT**: Screening of sperm nuclear protein genes in a population of infertile males. Annual Meeting of the American Society of Human Genetics, Toronto Canada, October 26, 2004.
128. Huang I, Christensen G, Peterson CM, **Carrell DT**: UBE2B (RAD⁵¹ homologue) exons 2-6 are highly conserved and do not appear to be a cause of oligozoospermia or non-obstructive azoospermia. Annual Meeting of the Society of Gynecological Investigation, March 2005.
129. Huang I, Liu L, Griffin J, Peterson CM, **Carrell DT**: Comparison of maturation and chromosome aneuploidy rates in oocytes following in vitro maturation (IVM) of enzymatically or mechanically isolated preantral murine follicles. Annual Meeting of the Society of Gynecological Investigation, March 2005.
130. **Carrell DT**, Wilcox AL, Thorp C, Campbell B: Sperm analysis prior to PGD for translocations in the male: a case report. Annual Meeting of the Society for Preimplantation Genetics, London, England, April 2005.
131. Wilcox AL, Emery BR, **Carrell DT**: The use of automated imaging and analysis software for sperm FISH. . Annual Meeting of the Society for Preimplantation Genetics, London, England, April 2005.
132. Christensen G, Aoki V, **Carrell DT**: Analysis of the globozoospermia candidate gene, HRB. Annual Meeting of the European Society of Human Reproduction and Embryology, Copenhagen Denmark, July 2005.
133. **Carrell DT**, Aoki VW, Moskovtsev SI, Chohan K, Willis J, Liu L, Mullen JBM: DNA Damage is elevated in protamine-deficient human sperm. Annual Meeting of the

European Society of Human Reproduction and Embryology, Copenhagen Denmark, July 2005.

134. Aoki VW, Liu L, **Carrell DT**: Comparison of TUNEL, SCD, and DFI with protamine levels in sperm. Annual Meeting of the European Society of Human Reproduction and Embryology, Copenhagen Denmark, July 2005.

135. Sanderson M, Malo JW, Erickson LD, Kuneck PH, Campbell BF, **Carrell DT**: DNA damage in sperm: Should semen or the 90% density gradient layer be used for prospective screening? Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

136. Aoki VW, Liu L **Carrell DT**: Abnormal protamine protein levels are associated with increased retention of protamine transcripts in the mature spermatozoa of infertile males. Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

137. Aoki VW, Emery BR, Liu L, Griffin J, **Carrell DT**: Protamine levels vary between individual sperm cells of infertile human males and correlate with DNA integrity. Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

138. Huang I, Griffin J, Peterson CM, **Carrell DT**: Morphometric analysis of the follicular/oocyte complex of the mouse, hamster, and pig. Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

139. Huang I, Griffin J, Peterson CM, **Carrell DT**: Analysis and comparison of growth curves of the mouse, hamster, and human follicular/oocyte complex. Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

140. Sanderson M, Emery BR, **Carrell DT**: Comparison of automated and manual sperm TUNEL classification. Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

141. Huang I, Hatasaka HH, Gibson M, **Carrell DT**, Adashi EY, Peterson CM. The origin of high order multiple pregnancies. . Joint Annual Meeting of the American Society of Reproductive Medicine and the Canadian Fertility Society, Montreal, Canada, November 2005.

142. Christensen GL, Wooding SP, Ivanov IP, Atkins JF, **Carrell DT**: Haplotype analysis of the human ACT gene and comparison with nonhuman primates. Utah International Symposium on the Genetics of Male Infertility, January 26-28, 2006, Salt Lake City, UT.

143. Emery BR, Aoki VW, Christensen GL, **Carrell DT**: Sequence analysis of the protamine 1 and 2 mRNA untranslated regions in a population of protamine deficient men. Utah International Symposium on the Genetics of Male Infertility, January 26-28, 2006, Salt Lake City, UT.
144. Hammoud S, Liu L, Aoki VW, **Carrell DT**: Protamine ratio and histone expression in different density gradient layers. Utah International Symposium on the Genetics of Male Infertility, January 26-28, 2006, Salt Lake City, UT.
145. Huang I, Christensen GL, Peterson CM, Emery BR, Hammoud A, **Carrell DT**: CGG deletions in a promoter region of the ube2b gene have been identified in men with oligospermia or non-obstructive azoospermia. Utah International Symposium on the Genetics of Male Infertility, January 26-28, 2006, Salt Lake City, UT.
146. Christensen GL, Atkins JF, **Carrell DT**: Screening of an adult, human, testis-specific cDNA library for putative binding partners of the antizyme 3 protein. Utah International Symposium on the Genetics of Male Infertility, January 26-28, 2006, Salt Lake City, UT.
142. Smith JF, Hamilton BD, Emery BR, Griffin J, **Carrell DT**: Analysis of pachytene nuclei in azoospermic men. Annual Meeting of the American Society of Urology. May 2006, Atlanta, GA
143. Huang I, Christensen G, Peterson CM, **Carrell DT**: CGG deletions in the 5' UTR of the UBE2B gene have been identified in the promoter region of men with oligozoospermia or non-obstructive azoospermia. Annual Meeting of the Society for Gynecological Investigation. March 2006, Toronto, Canada.
144. Huang I, Liu L, Emery BR, **Carrell DT**, Peterson CM: Hyper-oxygenation of holding media does not alter murine oocytes viability. Annual Meeting of the Society for Gynecological Investigation. March 2006, Toronto, Canada.
145. Christensen G, Ivanov I, Atkins J, **Carrell DT**: Yeast two-hybrid assays demonstrate that testis-specific ornithine antizyme-3 regulates spermatogenesis by interacting with antizyme inhibitor and ornithine decarboxylase. Annual Meeting of the American Society of Andrology, April 2006, Chicago, IL
146. Hammoud A, Peterson CM, **Carrell DT**: Effect of different sperm preparations on sperm motility. Annual Meeting of the Pacific Coast Fertility Society, 2006.
152. Aoki V, Liu L, Jones KP, Hatasaka HH, Peterson CM, **Carrell DT**: Sperm protamine 1/protamine 2 ratios are related to IVF pregnancy rates and predictive of fertilizing ability. Annual Meeting of the American Society of Andrology, April 2006, Chicago, IL.
153. Hammoud AO, Huang I, Hammoud S, Gibson M, Peterson C, **Carrell DT**: High intra-individual variation of sperm parameters after density gradient preparations. Annual

Meeting of the American Society of Reproductive Medicine, October 2006, New Orleans, LA.

154. Emery BR, Hammoud S, Christensen GL, Aoki VW, **Carrell DT**: Identification of genetic variation within the 5' and 3' untranslated regions of the human protamine genes in men with protamine deficiency. Annual Meeting of the American Society of Reproductive Medicine, October 2006, New Orleans, LA.

155. Hammoud S, Aoki V, Liu L, **Carrell DT**: Evaluation of protamine and histone expression in a sperm population isolated by density gradient centrifugation. Annual Meeting of the American Society of Reproductive Medicine, October 2006, New Orleans, LA.

156. Christensen GL, Griffin J, **Carrell DT**: Sequence analysis of the X-linked USP26 gene in severe male factor infertility patients and fertile controls. Annual Meeting of the American Society of Reproductive Medicine, October 2006, New Orleans, LA.

157. Emery BR, Krawetz SA, Platts AE, **Carrell DT**: mRNA profiles in sperm of patients with protamine deregulation indicate a more generalized developmental pathology. American Society of Andrology Annual Meeting, April 2007, Tampa, FL.

158. Hammoud A, Parks A, Gibson M, **Carrell DT**, Peterson CM, Meikle AW: Relation of obesity to decreased sperm count. Endocrine Society Western Section Annual Meeting, 2007, Carmel By The Sea, CA.

159. Hammoud A, Parks A, Wilde N, Gibson M, **Carrell DT**, Meickle AW: Obesity and male infertility. Annual Meeting of the Endocrine Society, June 2007, Toronto, Ontario, Canada.

160. Hammoud AO, Gibson M, Hunt SC, **Carrell DT**, Adams TD, Meikle W. Effect of weight loss after Roux-en-Y gastric bypass surgery on the male reproductive hormonal profile. Annual Meeting of the American Society of Reproductive Medicine, October 2007, Washington DC.

161. Hammoud S, Dunn DM, Emery BR, Weiss RB, **Carrell DT**. Identification of Gene Variability within the Contrin Gene of Azoospermic Patients. Annual Meeting of the American Society of Reproductive Medicine, October 2007, Washington DC.

162. Sanderson M, Moskovtsev S, Mullen B, **Carrell DT**. Increased incidence of MLH1 foci at locations proximal to the centromeres of pachytene spermatocytes in infertile men when compared to controls. Annual Meeting of the American Society of Reproductive Medicine, October 2007, Washington DC.

163. Emery BR, Sun Y, **Carrell DT**. Combined effects of the experimental left varicocele and lead or nicotine in the rat testis. Annual Meeting of the American Society of Reproductive Medicine, October 2007, Washington DC.

164. Emery BR, **Carrell DT**. Screening of an adult, human, testis-specific cDNA library for putative binding partners of the protamine 1 protein. Annual Meeting of the American Society of Reproductive Medicine, October 2007, Washington DC.
165. Huang I, Christensen G, Griffin J, Peterson CM, **Carrell DT**. Single and dual CGG deletions in the 5' UTR of the UBE2B gene increases binding to transcription factor SP1, and may be a cause of human male infertility. Annual Meeting of the American Society of Reproductive Medicine, October 2007, Washington DC.
166. Hammoud S, Jones D, Emery BR, **Carrell DT**. Evaluation of the methylation status of the complete internal control region (ICR) of the H19 gene in DNA from sperm with and without protamine abnormalities. 3rd Int Symposium on the Genetics of Male Infertility, Florence, Italy, Sept 15-20, 2007.
167. Emery BR, Platts AE, Lalancette C, Krawetz SA, **Carrell DT**. Protamine 1 and 2 transcript levels retained in mature sperm correlate with different cohorts of the mature sperm transcriptome. 3rd Int Symposium on the Genetics of Male Infertility, Florence, Italy, Sept 15-20, 2007.
168. Paasch U, Emery BR, Rasch M, Grunewald S, Glander HJ, **Carrell DT**. Effect of Annexin V magnetic sperm separation on the aneuploidy rate in human spermatozoa. 3rd Int Symposium on the Genetics of Male Infertility, Florence, Italy, Sept 15-20, 2007.
169. Hammoud AO, **Carrell DT**, Meikle W, Hunt SC, Adams TD, Gibson M. Determinants of Inhibin B levels in obese males. Annual Meeting of the Pacific Coast Fertility Society, April 2008.
170. Nanassy L, Peterson CA, Wilcox AL, **Carrell DT**. Comparison of single and sequential culture systems on embryo development, pregnancy and implantation rates using sibling oocytes. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.
171. Nanassy L, Peterson CA, Wilcox AL, **Carrell DT**. The effect of oxygen tension on embryo development, pregnancy and implantation rates during the culture period from day 3 to embryo transfer. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.
172. Aston KI, Liu L, **Carrell DT**. Single nucleotide polymorphisms in Egr4 and DAX1 are not significantly associated with azoospermia, oligozoospermia, or protamine deficiency. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.
173. Hammoud S, Jones D, Cairns B, **Carrell DT**. Altered Sperm CpG DNA methylation at imprinted loci in fertile patients and patients with protamine abnormalities. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.
174. Hammoud S, Nix D, Zhang H, Purwar J, Cairns B, **Carrell DT**. Genome-wide

epigenetic characterization of human sperm reveals distinctive chromatin states that poise genes to guide embryo development. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.

175. Hansen S, Eichler EE, Fullerton SM, Emery BR, **Carrell DT**: Analysis of copy number variation (CNV) of the SPANXA-E gene family in infertile and fertile men. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.

176. Cumming J, **Carrell DT**: The usefulness of reflexive semen cultures for detecting bacterial infections in infertility patients. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.

177. Hammoud AO, Sanderson M, Gibson M, **Carrell DT**, Jones KP, Peterson CM. Air pollution is associated with reduced sperm motility in exposed men. Annual Meeting of the American Society of Reproductive Medicine, San Francisco, CA, Oct 2008.

178. Liu L, Emery BR, **Carrell DT**. Localization of topoisomerase IIB in rat germ cells during spermatogenesis. Annual Meeting of the American Society of Andrology, Philadelphia, PA, April 2009.

179. Aston K, **Carrell DT**. Genome-wide scan for single nucleotide polymorphisms (SNPs) associated with severe oligozoospermia and azoospermia in men. Annual Meeting of the American Society of Andrology, Philadelphia, PA, April 2009.

180. Sanderson M, Emery BR, **Carrell DT**. Compounding effects of lead and nicotine on rat sperm DNA damage in a surgically induced varicocele model. Annual Meeting of the American Society of Andrology, Philadelphia, PA, April 2009.

181. Linnemann AK, Platts AE, Lalancette C, Doggett N, **Carrell DT**, Krawetz SA. High throughput genomic sequencing reveals pericentromeric clustering of sperm MARs. Joint Genome Institute Fourth Annual Meeting, Walnut Creek, CA, March 25-27, 2009.

182. Nanassy L, **Carrell DT** (2009): The methylation status of the promoters of OCT4, SOX2, HOXC11, MIR17, and NANOG genes in infertile men. Annual Meeting of the American Society of Reproductive Medicine, Atlanta, GA, Oct 2009.

183. Nanassy L, **Carrell DT** (2009): Evaluation of Oct4, Tead4, and Cdx2 expression in whole embryos and individual blastomeres to assess early embryonic markers of cell determination and embryonic quality. Annual Meeting of the American Society of Reproductive Medicine, Atlanta, GA, Oct 2009.

XII. INVITED ORAL PRESENTATIONS (Non-Abstracts)

1. "Cryopreservation of embryos and male factor infertility", RESOLVE/SERONO Symposium, Insights into Infertility, Salt Lake City, UT, 9-15-90.
2. "hCG receptors in *Pseudomonas maltophilia*", Endocrinology/Metabolism Division Seminar, Univ of Utah School of Medicine, 1-14-91.
3. "Updates in Infertility: Electro-ejaculation/adoptive sperm program", Univ of Utah Physical Medicine and Rehabilitation Conference, Salt Lake City, 3-8-91.
4. "The role of hCG in *X. maltophilia*", Dept of Physiology Seminar, Univ of Utah School of Medicine, 5-8-92.
5. "CLIA 88 and OSHA regulations in the Andrology and IVF laboratories." Andrology Laboratory Management Conference, Park City, UT, 9-17-92.
6. "Chorionic gonadotropin-like material in prokaryotes? Proof of its existence and a possible evolutionary link in *X. maltophilia*. Department of Internal Medicine Seminar, Univ. of Utah School of Medicine, 9-22-92.
7. "Donor Options: Sperm, egg, and embryo donor programs." Resolve Symposium, Snowbird, UT, 10-24-92.
8. "Advances in infertility testing and treatment." AUAA Annual Meeting, Salt Lake City, UT, 1992.
9. "Continuing Education for Andrology Technicians." Univ of Utah, Andrology Conference, 10-21-94.
10. "Micromanipulation of Gametes During IVF" Abbott Northwestern Hospital, Reproductive Medicine Seminar, 11-19-94.
11. "hCG Receptors in *Xanthomonas maltophilia*." Univ of Utah Dept Physiology, 1-3-95.
12. "Cellular and Molecular Basis of Biological Rhythms." Univ of Utah Dept of Medicine, 1-12-94.
13. "CG Receptors in Bacteria" Univ of Utah Dept Physiology, 7-10-95.
14. "Evaluation of sperm function prior to IVF" Partus Medical Clinic Symposium on Intracytoplasmic Sperm Injection and IVF" Ekaterinburg, Russia, March 3, 1997.
15. "The use of intracytoplasmic sperm injection and embryo hatching in an IVF program." Partus Medical Clinic Symposium on Intracytoplasmic Sperm Injection and IVF" Ekaterinburg, Russia, March 4, 1997.

16. "IVF Laboratory Techniques: ICSI" University of Utah/Resolve Symposium, March 26, 1997.
17. "Intracytoplasmic Sperm Injection: Technical Aspects and Concerns." Dept of OB-GYN Seminar, Univ of Utah, July 1, 1997.
18. "Advanced Reproductive Technologies: Current and Future Technology," Am Urology Association Western Section Annual Meeting, Sept 15, 1997.
19. "New Advances in Assisted Reproductive Technologies," ARTA Annual Meeting, Cairo, Egypt, Sept. 10, 1997.
20. "Advances in Advanced Reproductive Technologies for Male Factor Infertility," Thirty-Ninth Annual Ob/Gyn Update and Reproductive Endocrinology and Infertility Update, Park City, UT, Mar 6, 1998.
21. "Recent Advances in the Diagnosis and Treatment of Male Infertility," Grand Rounds, St Cloud Hospital, St Cloud, MN, May 12, 1998.
22. "ICSI for the Treatment of Severe Male Factor Infertility," Abbott Northwestern Hospital, Minneapolis, MN, May 13, 1998.
23. "Advances in the Treatment of Male-Factor Infertility," Serono Symposium on Advanced Reproductive Procedures, Provo, UT, Oct 28, 1998.
24. "Semen Analysis at the Turn of the Century: Case Studies Illustrating the Use of New Sperm Function Assays." World Conference on Human Reproduction, Salvador, Brazil. May 4-7, 1999.
25. "Sperm Chromosome Aneuploidy," Univ of Utah Department of Surgery Research Conference, Salt Lake City, UT, March 31,00.
26. "Electron Microscopy of Sperm: Use in Cases of Unusual Sperm Function," Laboratory Grand Rounds, Veterans' Affairs Hospital, Salt Lake City, UT, April 5, 2000.
27. "Quality control in the IVF Laboratory," Partus Conference, Ekaterinburg, Russia, Sep 20, 2000.
28. "Co-culture improves embryo quality," Partus Conference, Ekaterinburg, Russia, Sep 20, 2000.
29. "Preimplantation Genetic Diagnosis: An update on current technology," Abbott Northwestern/Univ. of Minnesota Cytogenetics Conference Nov 2000.
30. "The Relationship Between Sperm Protamine levels and Diminished Sperm Fertilizing Ability." July 2, 2001, ESHRE Conference, Geneva, Switzerland.

31. "Embryos Cryopreservation: Current Concepts and Techniques." Partus Conference, July 6, 2001, Ekaterinburg, Russia.
32. "New Ideas in the ART Laboratory: An Update," Department of Obstetrics and Gynecology Grand Rounds, University of Utah, March 12, 2002.
33. "Cytoplasmic and Germinal Vessicle Transfer, Embryo Splitting, Vitrification, and Other New Developments in the ART Laboratory." Grand Rounds, Abbott Northwestern Hospital, April 30, 2002.
34. "The Genetics of Male Infertility," Colorado Society of In Vitro Fertilization, Denver, Colorado, September 26, 2002.
35. "Our Current Understanding of the Genetics of Infertility," Abbott Northwestern Hospital, Minneapolis, MN, January 9, 2004.
36. "An Update on Andrology," Utah Valley Regional Medical Center, Provo, UT, January 12, 2004.
37. "Sperm Fertilization Ability and its Relationship to Chromatin Packaging." University of Toronto School of Medicine, Urology Department Presentation, April 27, 2004.
38. "Sperm Chromatin Assays: The Future," AAB Annual Meeting, Las Vegas, NV, May 15, 2004.
39. "The Bell Curve: Honest and Effective Quality Assurance Programs," Allina Laboratory, Abbott Northwestern Hospital, Minneapolis, MN, April 17, 2005.
40. "Andrology in the 21st Century," University Medical Billing, Salt Lake City, UT, May 5, 2005.
41. "Male Infertility: Problems In the Genome?" State of the Art Talk, AUA Western Section Annual Meeting, Vancouver, British Columbia, 8-2-05.
42. "The Genetics of Male Infertility," Circle of Life, Ogden UT, October 5, 2005.
43. "Advances in Vitrification of Oocytes and Embryos" Seminar at Partus IVF, Ekaterinburg, Russia, 9-13-05.
44. "What's New in Andrology: Sperm Counts to Gene Mutations" Ob-Gyn Symposium, Ogden, UT, Sept 23, 2005.
45. "The Genetics of Male Infertility in the Era of Genomics: Tools for Progress", Utah International Symposium on the Genetics of Male Infertility. January 26-28, 2006, Salt Lake City, UT.
46. "Epigenetics and Spermatogenesis" Minnesota CRM, Minneapolis, MN, April 2007.

47. “The etiology and clinical significance of sperm chromatin abnormalities: progress in understanding protamine expression abnormalities.” 3rd Int Symposium on the Genetics of Male Infertility, Florence, Italy, Sept 15-20, 2007.
48. “Sperm chromatin remodeling and sperm epigenetic factors affecting early embryogenesis.” World Congress of the Gene, Guangzhou, China, Dec 5, 2008.
49. “Epigenetic factors affecting male infertility.” World Congress of the Gene/BIT, Guangzhou, China, Dec 7, 2008.
50. “Poising of the Sperm Epigenome for early embryogenesis”, Population Council Seminar, New York, NY, Dec 11, 2008.
51. “The Andrology Laboratory of the Future: Rise of Molecular Diagnostics”, Associated and Regional University Pathologists, Salt Lake City, UT, Feb. 18, 2009.
52. “What Causes Poor Embryo Development: The Role of the Sperm and Egg”, Minnesota Resolve Conference, Minneapolis, MN, Feb. 21, 2009.
53. “Protamines and Gamete Fitness”, Ninth International Congress of Andrology, Barcelona, Spain, March 9, 2009.
54. International Congress of Andrology Satellite Symposium on Sperm DNA Damage: From Research to the Clinic, “Sperm DNA methylation and its relevance to assisted reproduction techniques (ART)” Rome, Italy, March 12, 2009.
55. “Sperm Epigenetics”, at ESHRE Symposium on “Sperm DNA Organization: Organization, protection, vulnerability – from basic science to clinical application”, Karolinska Institute, Stockholm, Sweden, May 21, 2009.
56. “Sperm Epigenetics and DNA Damage” ESHRE Concensus Committee on DNA Damage, Karolinska Institute, Stockholm, Sweden, May 20, 2009.
57. “Sperm Epigenetics and Embryogenesis”, HFEA Horizon Committee, ESHRE Annual Meeting, Amsterdam, Netherlands, June 29, 2009.
58. “Imprinting Errors and ART: The Potential Role of the Gametes”, American Society of Reproductive Medicine Annual Meeting, Atlanta, GA, Oct 20, 2009.
59. “The Role of Sperm in Embryogenesis: Can We Improve Embryo Quality Through Better Sperm Analysis and Selection?”, American Society of Reproductive Medicine Annual Meeting, Atlanta, GA, Oct 20, 2009.

XIII. PATENTS

1. Control of Infectious Microorganisms by Modulation of Chorionic Gonadotropin-Related Protein Activity. (Inventors: WD Odell, JT Griffin, S Grover, O Caticha, DT Carrell, ML Woods) Patent #6139839.
2. Use of heparin to evaluate the decondensation of human spermatozoa: prediction of fertility status. (Inventors: DT Carrell, BR Emery, CM Peterson). Application Pending
3. Poising of the sperm genome for early embryogenesis. (Inventors: DT Carrell, B Cairns, S Hammoud). Application Pending

XIV. PHOTOMICROGRAPH CONTRIBUTIONS

1. Cover Photo, Department of Physiology Syllabus on Reproductive Physiology, University of Cambridge, Dr. Alison J Forhead, 2001.
2. "Conceptions to Birth" Book by Alexander Tsiaras. Doubleday Books, 2002.
3. "Conceptions to Birth" Television Program, CBS, 2002.
4. "Research at NASA" Book by NASA, 2001