



# Faculty Member Profile

**X. Cindy Tian**

**Associate Professor**

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## **Background:**

Dr. Tian received her BS in Animal Science from China Agricultural University. She obtained her MS and PhD from Cornell University where she conducted research in early pregnancy recognition and regulation of steroidogenesis in ovarian tissues. She then received post-doctoral trainings as a recipient of a National Research Service Award from NIH in developmental genetics and molecular embryology at Cornell University and University of Connecticut.

## **Courses Taught:**

ANSC 229 Animal Embryology and Biotechnology  
ANSC 329 Frontiers in Animal Embryology and Embryo Biotechnology  
ANSC 350 Fundamentals of Proteomics

## **Research Interests:**

The research interest of Dr. X. Cindy Tian is to understand the process of gene reprogramming by somatic nuclear transfer. Since the creation of Dolly, the first mammal cloned from an adult differentiated somatic cell, a long-held dogma in developmental biology, that the process of genes inactivation during development and differentiation was irreversible, was revolutionized. We now believe that inactivated genes can be reactivated by the somatic cloning technology and are capable to direct development of a new individual. The process of gene reactivation by somatic nuclear transfer is called nuclear or gene reprogramming. Nuclear reprogramming is the fundamental basis for tissue regeneration by the stem cell technology. The high rates of developmental abnormality of somatic clones, however, point to the fact that the nuclear reprogramming process is incomplete and imperfect at this time. Understanding the mechanisms regulating the nuclear/gene reprogramming events will lead to technologies to targeted re-differentiation of cells for tissue regeneration.

## **Recent Publications:**

Li C, Bin YF, Tian XC, Curchoe C, Yang L, Feng DY, Jiang QY, O'Neill M, Zhang SQ. 2008. Genetic

imprinting of H19 and IGF2 in domestic pigs (*Sus scrofa*). *Animal Biotechnology* (in press).

Everts RE, Chavatte-Palmer P, Razzak A, Hue I, Green CA, Oliveira R, Vignon X, Rodriguez-Zas SL, Tian XC, Yang X, Renard JP and Lewin HA. 2008. Aberrant gene expression patterns in placentomes are associated with phenotypically normal and abnormal cattle cloned by somatic cell nuclear transfer. *Physiol Genomics* (in press).

Yang X, Tian XC, Kubota C, Page R, Xu J, Cibelli J, Seidel G Jr. 2007. Risk assessment of meat and milk from cloned animals. *Nature Biotech* 25:79-83.

Yang X, Smith SL, Tian XC, Lewin HA, Renard JP, Wakayama T. 2007. Nuclear reprogramming of cloned embryos and its implications for therapeutic cloning. *Nature Gen* 39:295-302.

Jiang L, Jobst P, Lai L, Samuel M, Ayares D, Prather RS, Tian XC. 2007. Expression of Growth-Regulating Imprinted Genes in Cloned Piglets. *Cloning Stem Cell* 9:97-106.

Jiang L, Lai L, Samuel M, Prather RS, Yang X, Tian XC. 2007. Expression of X-linked Genes in Deceased Neonates and Surviving Cloned Female Piglets. *Mol Reprod Dev* DOI: 10.1002/mrd.20758.

Sung LY, Shen PC, Jeong BS, Xu J, Chang CC, Cheng WT, Wu JS, Lee SN, Broek D, Faber D, Tian XC, Yang X, Du F. 2007. Premature Chromosome Condensation Is Not Essential for Nuclear Reprogramming in Bovine Somatic Cell Nuclear Transfer. *Biol Reprod* 76:232-240.

Sung L-Y, Gao S, Shen H, Yu H, Song Y, Smith SL, Chang C-C, Inoue K, Kuo K, Lian J, Li A, Tian XC, Tuck DP, Weissman SM, Cheng T, Yang X. 2006. Cloned mouse pups can be derived from adult stem cells as well as terminally differentiated somatic cells. *Nature Genetics* 38:1323-8.

Chang C-C, Nagy ZP, Abdelmassih R, Liu J-L, Yang X, Tian XC. 2006. Meiotic spindle formation and function following insertion of mitotic chromosomes into GV stage mouse oocytes. *RMBonline* 12:213-221.

Xu J, Guo ZQ, Nedambale TL, Zhang JX, Schenk J, Tian XC, Yang X, Du F. High Developmental Potential of Vitrified Holstein Cattle Embryos Fertilized in Vitro with Sex-sorted Sperm. 2006 *J Dairy Sci* 89:2510-8.

Nedambale TL, Du F, Xu J, Chaubal SA, Dinnyes A, Groen W, Faber D, Dobrinsky JR, Yang X, Tian XC. 2006. Prolonging bovine sperm-oocyte incubation in modified medium 199 improves embryo development rate and the viability of vitrified blastocysts. *Theriogenology* 66:1951-1960.

Suteevun T, Parnpai R, Smith SL, Chang C-C, Muenthaisong S, and XC Tian. 2006. Epigenetic characteristics of cloned and in vitro fertilized swamp buffalo (*Bubalus bubalis*) embryos. *J Anim Sci* 84:2065-2071.

Chaubal SA, Molina JA, Ohlrichs CA, Ferre LB, Faber DC, Bols PEJ, Riesen J, Tian XC, Yang X. Different transvaginal ovum pick-up techniques in cows to optimize oocyte retrieval and embryo production over a fixed period of time. *Theriogenology* 2006 66:1631-1648.

Suteevan T, Smith S, Muenthaisong S, Yang X, Parnpai R, Tian XC. Anomalous mRNA levels of chromatin remodeling genes in swamp buffalo (*Bubalus bubalis*) cloned embryos. *Theriogenology* 65:1704-1715 2006.

Nedambale TL, Du FL, Yang X, Tian XC. Effects of culture media on the development of in vitro-derived bovine embryos, and of  $\beta$ -mercaptoethanol on post-vitrification survival. *Anim Reprod Sci* 93:61-75 2006.

Du F, Shen P, Xu J, Sung L, Jeong B-S, Nedambale TL, Riesen J, Tian XC, Cheng WTK, Lee S-N, Yang X. Phytohemagglutinin-cell agglutination agent and embryo vitrification improves the efficiency of somatic cloning in cattle (*Bos Taurus*). *Theriogenology* 2006; 65: 642-657.

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Suteevan T, Smith S, Muenthaisong S, Yang X, Parnpai R, Tian XC. Temporal Expression of Chromatin Remodeling Genes in Single Swamp Buffalo (*Bubalus bubalis*) Cloned and In Vitro Fertilized Embryos. *Theriogenology* 65:1704-1715 2006.

Curchoe C, Zhang SQ, Yang L, Bin YF, Zhang XQ, Feng DY, Tian XC. Promoter-specific expression of the imprinted *Igf2* gene in cattle. *Biol Reprod* 73:1275-1281 2005.

Tian, XC, Kubota C, Sakashita K, Izaike Y, Okano R, Tabara N, Curchoe C, Jacob L, Zhang Y, Smith S, Bormann C, Andrew S, Yang X. 2005. Meat and Milk Compositions of Bovine Clones Compared with Matched Controls. *Proc Natl Acad Sci USA* 102: 6261-6266.

Nedambale TL, Yang X, Tian XC. 2006. Effects of culture media on the development of in vitro-derived bovine embryos, and of  $\beta$ -mercaptoethanol on post-vitrification survival. *Anim Reprod Sci* 93:61-75.

Yang L, Chavatte-Palmer P, Kubota C, O'Neill M, Taneja M, Hoagland T, Renard J-P, Yang X, Tian XC. Expression of imprinted genes is aberrant in deceased newborn cloned calves and relatively normal in surviving adult clones. *Mol Reprod Dev* 71:431-438.

Vasques LR, Stabellini R, Xue F, Tian XC, Soukoyan M, Pereira LV. 2005. Xist Repression in the absence of *Dnmt1* and *Dnmt3B*. *DNA Research Journal* 12:373-378.

Li Wang, Enkui Duan, Li-ying Sung, Xiangzhong Yang and X Cindy Tian. 2005. Generation and characterization of pluripotent putative stem cells from cloned bovine embryos. *Biol Reprod* 73:149-155.

Fuliang Du, Pen-Zhi Shen, Jie Xu, Li-Ying Sung, B-Seon Jeong, John Riesen, X Cindy Tian, Winston TK Cheng, Shan-Nan Lee and Xiangzhong Yang. 2005. Phytohemagglutinin-cell agglutination agent

and embryo vitrification improves the efficiency of somatic cloning in cattle (*Bos Taurus*).  
*Theriogenology* 65:642-657.

Nedambale TL, Dinnyés A, Groen W, Dobrinsky JR, Tian XC and Yang X. 2004. Comparison on in vitro fertilized bovine embryos cultured in KSOM or SOF and cryopreserved by slow freezing or vitrification. *Theriogenology* 62: 437-449.

Enright BP, Sung LY, Chang CC, Yang X, Tian XC. 2005. Methylation and Acetylation Characteristics of Cloned Bovine Embryos from Donor Cells Treated with 5-aza-2'-deoxycytidine. *Biol Reprod* 72:944-948.

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Kubota C, Tian XC, Yang X. Differential fertility in second and third generation clones of a prize breeding bull. *Nature Biotechnology*. 2004; 22: 693-694.

Tian XC. Reprogramming of epigenetic inheritance by somatic cell nuclear transfer. *RBMonline* 2004; 8:501-508.

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Enright BP, Kubota C, Yang X, Tian XC. Epigenetic characteristics of donor cells treated by Trichostatin A or 5-aza-2'-deoxycytidine and development of embryos cloned from treated donor cells. *Biol Reprod* 2003; 69:896-901.

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Liu J-L, Kusakabe H, Chang C-C, Suzuki H, Schmidt DW, Julian M, Pfeffer R, Bormann CL, Tian XC, Yanagimachi Y, Yang X. Freeze-dried sperm fertilization led to term development in rabbits. *Biol Reprod* 2004; 70:1776-1781.

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Nedambale TL, Dinnyes A, Groen W, Dobrinsky JR, Tian XC, Yang X. Comparison of in vitro fertilized bovine embryos cultured in ISOM or SOFaaci or SOFaaci and cryopreserved by slow freezing or vitrification. *Theriogenology*. 2004; 62: 437-449.

Zhang SQ, Feng DY, Tian XC, Yang X. 2003. Progress on Imprinted Genes in Mammals. *China Biotechnology* 12:23-54.

Sung, L.Y., Du, F., Xu, J., Chang, W., Jiang, S., Tian, X.C. and Yang, X. 2005. The effect of albumin and sodium citrate on the development of *in vitro* produced bovine embryos under different oxygen tension. *Reprod Nutr Dev* 44:551-64.

Lee, J.W., Wu, S.C., Tian, X.C., Barber, M., Hoagland, T., Riesen, J., Yang, X. 2003. Production of Cloned Pigs by Whole Cell Intracytoplasmic Microinjection. *Biol Reprod*. 69: 995-1001.

Lee, J.W., Tian, X.C., Yang, X. 2003. Failure of male pronucleus formation is the major cause for the lack of fertilization and embryo development in pig ICSI oocytes. *Biol Reprod* 68:1341-1347.

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Du, F., Sung, L.Y., Tian, X.C., Yang, X. 2002. Differential Cytoplasm Requirement for Embryonic and Somatic Cell Nuclear Transfer in Cattle. *Mol Reprod Dev* 63:183-191.

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Xue, F., Tian, X.C., Kubota, C., Du, F., Taneja, M., Dinnyes, A., Dai, Y., Pereira, L.V., Yang, x. 2002. Aberrant X-Chromosome inactivation in deceased cattle derived from somatic cloning. *Nature Genetics* 31:216-220.

### **Hobbies or Non-Academic Interests:**

American Style Ballroom Dancing