BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Bagnell, Carol A.	Professor, Department of Animal Sciences Rutgers, The State University of New Jersey New Brunswick, NJ
eRA COMMONS USER NAME (credential, e.g., agency login) BAGNELL	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Glassboro State College, Glassboro, NJ	B.A.	05/1974	Biology
West Virginia University, Morgantown, WV	M.S.	05/1976	Biology
Medical College of Georgia, Augusta, GA	Ph.D.	05/1983	Endocrinology
University of Hawaii, Honolulu, HI	Postdoc	06/1983 – 06/1984	Reproductive Biology

A. Personal Statement

Studies in my laboratory focus on (1) improving our understanding of maternal programming of development by testing the lactocrine hypothesis and (2) the role of the hormone relaxin in reproduction. Our group defined the term 'lactocrine' as a means of maternal delivery of milk-borne bioactive factors into the circulation of offspring as a consequence of nursing. Porcine milk contains relaxin that is transmitted into the peripheral circulation of neonates only if they are allowed to nurse. These studies indicate that a window of opportunity for transmission of milk-borne bioactive factors, including relaxin, from mother to neonate is open during the first few days of life. Data from our porcine model provide compelling evidence that maternal programming of neonatal female reproductive tract development requires lactocrine signaling from birth. Current studies focus on the short-term effects of milk-borne factors on neonatal development as well as the long-term consequences of lactocrine signaling on reproductive health and fertility in adulthood. Since all mammals evolved to nurse, this research has broad implications for understanding maternal contributions to postnatal reproductive tract programming in both humans and domestic animals.

I've been a faculty member in the Department of Animal Sciences at Rutgers, the State University of New Jersey since 1988. I've served as department chair for six years and I am currently Director of the Graduate Program in Endocrinology and Animal Biosciences at Rutgers. My research in reproductive biology, with a focus on the swine ovary and uterus, has been supported with federal funding from the NIH or USDA for more than 25 years.

B. Positions and Honors

Positions and Employment

1985-1986 Assistant Researcher, Pacific Biomedical Research Center, University of Hawaii
1987-1988 Associate Researcher, Pacific Biomedical Research Center, University of Hawaii
1988-1989 Visiting Scientist, Reproduction Research Branch, NICHD, NIH
1988-1994 Assistant Professor, Dept. of Animal Sciences, Rutgers University, New Brunswick, NJ
1994-2002 Associate Professor, Dept. of Animal Sciences, Rutgers University, New Brunswick, NJ
1995-1999 Associate Chair, Dept. of Animal Sciences, Rutgers University, New Brunswick, NJ
2002- Professor, Dept. of Animal Sciences, Rutgers University, New Brunswick, NJ
2008-2014 Chair, Dept. of Animal Sciences, Rutgers University, New Brunswick, NJ
2014- Director, Graduate Program in Endocrinology & Animal Biosciences, Rutgers University

Other Experience and Professional Memberships

1993-1994 Chair, Membership Committee, Society for the Study of Reproduction
1993 NIH-Biochemical Endocrinology Study Section, ad hoc member
1996-1997 Participant, Sixth Annual ESCOP/ACOP Leadership Development Program

1999-2004 Member, Editorial Board, *Biology of Reproduction*
2000-2001 Member, Society for the Study of Reproduction, Future Meetings Committee
2000 USDA Grant Review Panel – Animal Reproductive Efficiency
2001 Sabbatical, Endocrinology Discovery Group, Merck Research Laboratories, Rahway, NJ
2001-2004 Member, Organizing Committee, Relaxin 2005 – The 4th International Meeting on Relaxin
2002-2005 Member, Editorial Board, *Domestic Animal Endocrinology*
2002- Member, Editorial Board, *Reproductive Biology and Endocrinology*
2005-2008 Member, Organizing Committee, Relaxin 2008, The 5th International Meeting on Relaxin
2008, 2009 USDA Grant Review Panel – Animal Reproduction
2017 USDA Grant Review Panel – Animal Reproduction

Honors

2003 Distinguished Alumnus Award, Medical College of Georgia - Graduate Studies, Augusta, GA.
2004 Graduate Program Award, Dept of Animal Sciences, Rutgers University, New Brunswick, NJ
2019 Teaching Excellence Award, School of Environmental & Biological Sciences, Rutgers U

C. Selected Peer-reviewed Publications (selected from over 70 peer-reviewed publications)

1. Yan W, Wiley, AA, Bartol FF and **Bagnell CA**. 2005. Tissue-specific effects of relaxin on the reproductive tract of neonatal gilts. Ann N Y Acad Sci. 1041:132-135.
2. Yan W, Ryan PL, Bartol FF, **Bagnell CA**. 2006. Uterotrophic effects of relaxin related to age and estrogen receptor activation in neonatal pigs. Reproduction 131:943-950.
3. Yan W, Wiley AA, Bathgate RAD, Frankshun AL, Lasano S, Crean BD, Steinetz BG, **Bagnell CA**, Bartol FF. 2006. Expression of LGR7 and LGR8 by neonatal porcine uterine tissues and transmission of milk-borne relaxin into the neonatal circulation by suckling. Endocrinology 147:4303-10.
4. Bartol FF, Wiley AA, **Bagnell CA.** 2006. Uterine development and endometrial programming. In: Asworth CJ, Kraeling RR (eds.), Control of Pig Reproduction VII: Nottingham University Press, UK; pp. 113-130.
5. Masters RA, Crean BD, Yan W, Moss A, Ryan PL, Wiley AA, **Bagnell CA,** Bartol FF. 2007. Neonatal porcine endometrial development and epithelial proliferation affected by age and exposure to estrogen and relaxin. Domestic Anim Endocrinol 33:335-346.
6. Ho TY, Yan W, **Bagnell CA.** 2007. Relaxin-induced matrix metalloproteinase-9 expression is associated with the activation of the NF-kappaB pathway in human THP-1 cells. J Leukocyte Biol 81:1303-1310.
7. Santora K, Rasa C, Visco D, Steinetz BG, Bagnell CA. 2007. Antiarthritic effects of relaxin, in combination with estrogen, in rat adjuvant-induced arthritis. JPET 322(2): 887-893.
8. Yan W, Chen J, Wiley AA, Bartol FF, **Bagnell CA**. 2008. Relaxin and estrogen affect estrogen receptorα, vascular endothelial growth factor and relaxin receptor expression in the neonatal porcine uterus and cervix. Reproduction 135:705-712.
9. Bartol FF, Wiley AA, **Bagnell CA**. 2008. Epigenetic programming of porcine endometrial function and the lactocrine hypothesis. Reprod Domest Anim 43 Suppl 2: 273-279.
10. Frankshun AL, Ho TY, Steinetz BG, Bartol FF, **Bagnell CA**. 2009. Biological activity of relaxin in porcine milk. Ann N Y Acad Sci 1160:164-168.
11. Chen J, Wiley AA, Kauffold H, Wahner M, Bartol FF, **Bagnell CA**. 2009. Perinatal zearalenone exposure affects RXFP1, RXFP2 and morphoregulatory gene expression in the neonatal porcine uterus. Ann N Y Acad Sci 1160:188-189.
12. **Bagnell CA**, Steinetz BG, Bartol FF. 2009. Milk-borne relaxin and the lactocrine hypothesis for maternal programming of neonatal tissues. Ann N Y Acad Sci 1160:152-157.
13. Bartol FF, Wiley AA, **Bagnell CA**. 2009. Relaxin and maternal lactocrine programming of neonatal uterine development. Ann N Y Acad Sci 1160: 158-163.
14. Chen JC, Wiley AA, Ho T-Y, Frankshun A-L, Hord KM, Bartol FF, **Bagnell CA**. 2010. Transient estrogen exposure from birth affects uterine expression of developmental markers in neonatal gilts with lasting consequences in pregnant adults. Reproduction 139:623-630.
15. Ho T-Y, Santora K, Frankshun A-L, **Bagnell CA.** 2011. Effects of relaxin and estrogens on bone remodeling markers, receptor activator of NF-kB ligand (RANKL) and osteoprotegerin (OPG), in rat adjuvant-induced arthritis. Bone 48:1346-1353.
16. Frankshun A-L, Ho T-Y, Reimer DC, Chen J, Lasano S, Steinetz BG, Bartol FF, **Bagnell CA**. 2011. Characterization and biological activity of relaxin in porcine milk. Reproduction 141: 373-380.

17. Chen JC, Frankshun A-L, Wiley AA, Miller DJ, Welch KA, Ho T-Y, Bartol FF, **Bagnell CA**. 2011. Relaxin and milk-borne lactocrine-acting factors affect morphoregulatory gene and protein expression patterns in the neonatal porcine uterus. Reproduction 141:675-683.
18. Bartol FF and **Bagnell CA**. 2012. Lactocrine programming of female reproductive tract development: Environmental connections to the reproductive continuum. Mol Cell Endocrinol 354:16-21.
19. Frankshun A-L, Chen JC, Barron L, Ho T-Y, Miller DJ, Rahman K, Bartol FF, **Bagnell CA**. 2012. Nursing during the first two days of life is essential for the expression of proteins important for growth and remodeling of the neonatal porcine cervix. Endocrinology 153(9):4511-21.
20. Bartol FF, Wiley AA, Miller DJ, Silva AJ, Roberts KE, Davolt MLP, Chen JC, Frankshun A-L, Camp ME, Rahman KM, Vallet JL and **Bagnell CA**. 2013. Lactocrine signaling and developmental programming. Journal of Animal Science (Invited Review) 91:696-705.
21. Miller DJ, Wiley AA, Chen JC, **Bagnell CA**, Bartol FF. 2013. Nursing for 48 h from birth supports uterine gland development and endometrial cell- compartment specific gene expression. Biol Reprod 88 (1):4, 1-10.
22. Camp ME, Wiley AA, Boulos MB, Rahman KM, Bartol FF, **Bagnell CA**. 2014. Effects of age, nursing, and oral IGF1 supplementation on neonatal porcine cervical development. Reproduction 148: 441-451.
23. Rahman KM, Lovich JE, Lam C, Camp ME, Wiley AA, Bartol FF, **Bagnell CA**. 2014. Nursing supports neonatal porcine testicular development. Domestic Animal Endocrinology 48: 84-92.
24. Harvey C, Chen J, **Bagnell CA,** Uzumcu M. 2015. Methoxychlor and its metabolite HPTE inhibit cAMP production and expression of estrogen receptors alpha and beta in rat granulosa cell in vitro. Reproductive Toxicology 51:72-78.
25. Rahman KM, Camp ME, Prasad N, McNeel AK, Levy SE, Bartol FF, **Bagnell CA**. 2016. Age and nursing affect the neonatal porcine uterine transcriptome. Biol Reprod 94(2):46, 1-13.
26. Ho TY, Rahman KF, Camp ME, Wiley AA, Bartol FF, **Bagnell CA**. 2016. Timing and duration of nursing from birth affect neonatal porcine uterine matrix metalloproteinase 9 and tissue inhibitor of metalloproteinase 1. Domestic Animal Endocrinology 59: 1-10.
27. George AF, Rahman KM, Camp ME, Prasad N, Bartol FF, **Bagnell CA**. 2017. Defining age- and lactocrine-sensitive elements of the neonatal porcine uterine microRNA-mRNA interactome. Biol Reprod 96(2): 327-340.
28. **Bagnell CA**, Ho TY, George AF, Wiley AA, Miller DJ, Bartol FF. 2017. Maternal lactocrine programming of porcine reproductive tract development. Molec Reprod Development 84: 957-968.
29. George AF, Rahman KM, Miller DM, Wiley AA, Camp ME, Bartol FF, **Bagnell CA**. 2018. Effects of colostrum, feeding method and oral IGF1 on porcine uterine development. Reproduction 155:259-271.
    - Selected for journal cover page
30. George AF and **Bagnell CA**. 2018. Relaxin. In: TE Spencer and JA Flaws (ed). *Encyclopedia of Reproduction*, 2nd Edition, Volume 2, Female Reproduction - Pregnancy, Chapter 90. Elsevier Inc., Waltham, MA, in press.
31. George AF, Ho T-Y, Prasad N, Keel BN, Miles JR, Vallet JL, Bartol FF, **Bagnell CA.** 2018. Neonatal lactocrine deficiency affects the adult porcine endometrial transcriptome at pregnancy day 13. Biol Reprod 100(1): 71-85.
32. **Bagnell CA** and Bartol FF. 2019. Relaxin and the 'Milky Way': The lactocrine hypothesis and maternal programming of development. Molec Cellular Endocrinology 487:18-23.
33. **Bagnell CA** and Bartol FF. 2020. Review: Maternal programming of development in the pig and the lactocrine hypothesis. Animal (in press)

D. Research Support

Ongoing Research Support (past 3 years)

NJ-06175 (Hatch) Bagnell (PI) 1/1/2016 – 12/31/2021
USDA-CREES
Role of milk-borne factors in neonatal reproductive tract development
The focus here is on the global effects of nursing on uterine gene and protein expression in the neonate. Also, epigenetic changes in response to age and nursing from birth will be investigated by monitoring global uterine DNA methylation patterns.

USDA 2013-67016-20523 Bagnell (Co-PI) 2/1/2013 – 1/31/2019
Maternal lactocrine programming of female reproductive tract development
This research centers on identifying agents in colostrum and critical periods important for programming reproductive tract development using the neonatal pig as a model system.

Bernard and Jane Steinetz Research Fund Bagnell (PI) 2006 - 2021
Endowment for research supported by the Steinetz Charitable Lead Unitrust

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Completed Research Support

2007-35203-18098 Bagnell (Co-PI) 9/1/2007 – 8/31/2011
USDA-NRICGP
Molecular markers and mediators of reproductive tract development (competitive renewal)
This research focuses on milk as a conduit for delivery of growth factors in a lactocrine manner from mother to offspring to influence critical developmental events shortly after birth that dictate development of reproductive tract tissues in the pig.
Role: Co-PI

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