BIOGRAPHICAL SKETCH

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NAME: **Yong Zhu**

eRA COMMONS USER NAME (credential, e.g., agency login): **ZHU2019**

POSITION TITLE: Professor

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

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Xiamen University, Xiamen, China	B.S.	06/1984	Marine Biology
University of Tokyo, Tokyo, Japan	M. Sc.	03/1988	Physiology/Endocrinology
University of Tokyo, Tokyo, Japan	Ph.D.	03/1991	Molecular Endocrinology
Maruha Co, Central Res. Institute, Japan	Postdoctoral	10/1992	Biotechnology/Biochemistry
University of Texas at Austin, Texas Cold Spring Harbor Laboratory, New York	Postdoctoral	12/2001 06/2005	Biochemistry/Endocrinology DNA Microarray Course

A. Personal Statement

I have extensive experience and training both in the academy and industry and in the fields of reproduction, molecular endocrinology, gene editing, NGS (next-generation sequencing), bioinformatics, and protein biochemistry. As a graduate student at Tokyo University, I was trained in reproduction and molecular endocrinology, particularly in the area of progestin signaling and actions in the meiosis resumption and ovulation. As a research scientist at Central Research Institute Maruha Corporation, I carried out protein purification, amino acid analyses, sequencing and assay developments of peptide hormones, antibody production, functional analyses and signaling mechanisms of peptide hormones, and scaling up production and practical applications of recombinant proteins. At University of Texas-Austin, I continued the research in protein biochemistry and molecular endocrinology, including purification and assay development for a novel peptide hormone, functional analyses of steroid and peptide hormone and their signaling mechanisms. In particular, I made a breakthrough by identifying and characterizing a novel class of putative membrane progestin receptor family functioning in vertebrates from fish to human. As PI or co-investigator on several previous university, NSF, and NIH funded grants, I have laid the foundation for studying signaling and functions of steroid receptors by developing zebrafish as an alternative model for characterizing the functions of these progestin receptors and their molecular mechanisms. Since 2012, my lab has established TALEN and CRISPR gene editing technologies, and knockout various genes in the zebrafish and other organisms. We have also successfully conducted analyses of RNA-seq data obtained from the follicular cells of zebrafish in both wildtype and knockout, and compared transcriptomic data sets from human and mice. Dr. Zhu are collaborating with accomplished or new researchers around world. Current collaborators include Dr. Peter Thomas (University of Texas at Austin), Dr. Aldi Mazhar (University of Virginia), Dr. Sheue-yann Cheng (National Cancer Institute at NIH), Dr. Bon-chu Chung (Institute of Molecular Biology Academia Sinica Taipei), several experts at Xiamen University (Dr. Yiqun Wang, Dr. Guang Li, Dr. Wanshu Hong and Dr. Shi-xi Chen), and experts at East Carolina University (Dr. Fadi Issa, Dr. Tim Erickson and Dr. Nathan Hudson).

B. Positions and Honors

Positions and Employment

1991-1992 Research Scientist, Central Research Institute, Maruha Co, Tsukuba, Japan.
1993-2001 Research Associate, Marine Science Institute, University of Texas at Austin, Texas
2002-2008 Assistant Professor, Department of Biology, East Carolina University, North Carolina
2008-2015 Associate Professor, Department of Biology, East Carolina University, North Carolina
2011-Present Minjiang Chair Professor, Xiamen University, Xiamen, China
2015-Present Professor, Department of Biology, East Carolina University, North Carolina
2016-Present Adjunct Professor, Guangdong Ocean University, Zhanjiang, China

Other Experience and Professional Memberships

1988-1991 Member, The Japan Society of Fisheries Science
1988-1991 Member, Asia and Oceania Society for Comparative Endocrinology
1994-1995 Member, Society for Integrative & Comparative Biology
2002- Member, Triangle Consortium for Reproductive Biology
2002- Member, Endocrine Society
2002- Member, Society for Study Reproduction
2007- Member, Triangle Zebrafish Research Groups
2007- Member, Society for Developmental Biology
2011- Life Regular Member, Society of Chinese Bioscientists in America
2016- Member, Genetics Society of America
2010- Editorial Board, General and Comparative Endocrinology
2011- Associate Editor, Frontiers in Experimental Endocrinology
2017-2019 Senior Editor, General and Comparative Endocrinology-Special Issue for Chinese Comparative Endocrinologists.

Honors and Awards

1986-1991 Scholarship recipient, Ministry of Education, China
1991-1992 Scholarship recipient, The Association for Overseas Technical Scholarship, Japan.
2002 Hundred Talent Oversea Scholar Award, Chinese Academy Science, China
2005 Thomas Harriot College of Arts and Sciences Research Award, East Carolina University
2008 Thomas Harriot College of Arts and Sciences Research Award, East Carolina University
2017 Thomas Harriot College of Arts and Sciences Research Award, East Carolina University

C. Contribution to Science

Contribution #1 Identified and characterized a novel class of nongenomic progestin receptors

Peer-reviewed publications:

1) **Zhu, Y**., Rice, C.D., Pang, Y.‡, Pace, M.† & Thomas, P. (2003). Cloning, expression and characterization of a novel membrane progestin receptor and evidence it is an intermediary in meiotic maturation of fish oocytes. *Proc. Natl. Acad. Sci. U.S.A.* 100: 2231-2236. (*Has been cited over 600 times*). PMC151323.
2) **Zhu, Y**., Bond, J.E., Thomas, P. (2003). Identification, classification and partial characterization of genes in humans and other vertebrates homologous to a novel fish membrane progestin receptor. *Proc. Natl. Acad. Sci. U.S.A.* 100:2237-2242. (*Has been cited over 600 times*). PMC151324.
3) Hanna RN, Pang Y, Thomas P, **Zhu Y** (2006) Cell surface expression, progestin binding and rapid nongenomic signaling of zebrafish membrane progestin receptors α and β in Transfected Cells. Journal of Endocrinology 190: 247 - 260. Total Google Citations: 82
4) Hanna RN and **Zhu, Y** (2011). Controls of meiotic signaling by membrane or nuclear progestin receptor in zebrafish follicle-enclosed oocytes. *Molecular and Cellular Endocrinology*. 337:80-88. doi: 10.1016/j.mce.2011.02.004. Total Google Citations: 23

a) Historical background: identities of steroid receptors for nongenomic steroid signaling have not been well established.
b) Central finding: we found and characterized a novel family of progestin receptors that is highly conserved among vertebrates and could mediate nongenomic progestin signaling.

c) Influence of finding: receptors other than classic nuclear steroid receptors that may be responsible for nongenomic steroid signaling.
d) My roles: I was first who purified, cloned, and characterized these candidate receptors.

Contribution #2 Determined that nuclear progestin receptor (Pgr) was essential for ovulation, but not essential for nongenomic progestin signaling.

Peer-reviewed publications

1) **Zhu, Y**., Liu, D., Shaner, Z.C., Chen, S., Hong, W., Stellwag, E.J. (2015). Nuclear progestin receptor (Pgr) knockouts in zebrafish demonstrate role for Pgr in ovulation but not in rapid non-genomic steroid mediated meiosis resumption. Front Endocrinol (Lausanne). 6:37. doi: 10.3389/fendo.2015.00037. eCollection 2015.
2) Liu, D., Brewer, M.S., Chen, S., Hong, W., **Zhu, Y**. Transcriptomic signatures for ovulation in vertebrates. 247:74-86. doi: 10.1016/j.ygcen.2017.01.019.
3) Hanna RN, Daly SC, Pang Y, Anglade I, Kah O, Thomas P, **Zhu Y** (2010) Characterization and expression of the nuclear progestin receptor in zebrafish gonads and brain. Biol Reprod 82: 112-122.
4) Diotel N, Servili A, Gueguen MM, Mironov S, Pellegrini E, Vaillant C, **Zhu Y**, Kah O, Anglade I (2011) Nuclear progesterone receptors are up-regulated by estrogens in neurons and radial glialprogenitors in the brain of zebrafish. PLoS One. 6(11): e28375

a) Historical background: steroid receptors including nuclear progestin receptor have been suggested to mediate nongenomic progestin signaling induced oocyte maturation, and genomic progestin signaling controlled ovulation.
b) Central finding: we found nuclear progestin receptor was essential for ovulation, not essential for oocyte maturation and nongenomic progestin signaling during meiosis resumption and oocyte maturation.
c) Influence of finding: receptors other than classic nuclear steroid receptors are responsible for nongenomic steroid signaling, nuclear progestin receptor play a critical role in genomic progestin signaling and ovulation.
d) My roles: I developed, established, and trained students and colleagues on latest gene editing methods, RNA-seq, generated knockouts, conducted, supervised, analyzed experimental data with students and colleagues.

Contribution #3 Determined functions of somatolactin

1) **Zhu Y**, Thomas P (1998) Effects of light on plasma somatolactin levels in red drum (Sciaenops ocellatus). General and Comparative Endocrinology. 111:76-82.
2) **Zhu Y**, Thomas P (1997) Effects of somatolactin on melanosome aggregation in the melanophores of red drum (Sciaenops ocellatus) scales. General and Comparative Endocrinology 105: 127-133.
3) **Zhu Y**, Thomas P (1996) Elevations of somatolactin in plasma and pituitaries and increased α-MSH cell activity in red drum exposed to black background and decreased illumination. General and Comparative Endocrinology 101:21-31.
4) **Zhu Y**, Thomas P (1995) Red drum somatolactin: development of a homologous radioimmunoassay and plasma levels after exposure to stressors or various backgrounds. General and Comparative Endocrinology 99:275-288.

a) Historical background: functions of somatolactin, a new pituitary hormone related to growth hormone and prolactin, was unknown.
b) Central finding: we found that expression of somatolacitn transcript and protein were increased drastically in the dark or blackground. Somatolactin affects aggregation and development of melanophores.
c) Influence of finding: may lead to development of novel targets and treatments for melanoma or neuronal development.
d) My roles: I developed highly specific antibodies, and established an radioimmunoassy, conducted, and analyzed experiments with postdoctoral supervisor, Dr. Peter Thomas.

D. Research Support

Ongoing Research Support

NIH 2R15GM100461-02, $426,233, 03/01/2017-02/29/2020
Regulation and Functions of ADAMTS9 During Ovulation,
I propose to study molecular mechanism of progestin receptor mediated regulation and functions of ADAMTS9 during ovulation.
Role: PI

Completed Research Support

9. NIH 1R15GM100461-01A1**,** $316,524, 07/01/2013-02/28/2017
To Characterize Nongenomic Progestin Receptors via Knockouts in Zebrafish,
I proposed to generate knockout models for identifying and characterizing nongenomic progestin receptors, their signaling and functions.
Role: PI

NCBC Grant#2012-BRG-1210
North Carolina Biotechnology Center Zhu (PI) $70,000 07/01/12-02/28/14
Developing a method to control invasive animals through biotechnology
The goal of the study is to generate infertile knockouts and apply the methods for controlling invasive species.
Role: PI