BIOGRAPHICAL SKETCH

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NAME: **Golos, Thaddeus G.**

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

POSITION TITLE: **Professor and Chair**

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
Marquette University, Milwaukee, Wisconsin	B.S.	05/1978	Biology
University of Illinois at Urbana-Champaign	M.S.	05/1982	Physiology and Biophysics
University of Illinois at Urbana-Champaign	Ph.D.	10/1984	Physiology and Biophysics
University of Pennsylvania	Postdoctoral	09/1987	Obstetrics and Gynecology

A. Personal Statement

The Golos lab has pioneered the use of the nonhuman primate model in reproductive immunology and the placental expression and regulation of nonclassical MHC class I molecules. Study of the maternal-fetal immune dialogue includes nonpolymorphic MHC class I molecules expression on placental cells and their interactions with the maternal immune system, particularly endometrial natural killer cells and macrophages in promoting pregnancy success, including effects on placental and endometrial differentiation and vascularization. My position as a senior scientist at the Wisconsin National Primate Research Center, and faculty appointments in the Department of Comparative Biosciences in the School of Veterinary Medicine and Obstetrics and Gynecology in the School of Medicine and Public Health will facilitate cross-disciplinary research and specifically provide insight for translational approaches for human adverse pregnancy outcomes based on basic research with nonhuman primate resources. I have an ongoing funded R01 on nonhuman primate *in vivo* Zika infection, collaborate in NIH grants related to advanced imaging to identify adverse pregnancy outcomes and fetal consequences of vertical Zika virus transmission, and NIH and UW grants related to nonhuman primate embryonic genome editing.

I am committed to providing postdoctoral fellows and graduate students with training in reproductive sciences. I currently have four students doing their Ph.D. research in cellular and molecular pathology in my laboratory, including an underrepresented minority student for who I successfully obtained an NIH R25 fellowship in Women's Health Research. I am also mentoring a Ph.D. student who holds an individual F31 NIH fellowship, and a scientist who holds and NIH K99 grant. I have mentored 10 postdoctoral fellows over the past 25 years, and am also on the mentor committees for three assistant professors. Trainees in my laboratory obtain training in experimental design and analysis, interpretation, and reporting through weekly group and 1-on-1 lab meetings and through periodic discussion of their IDPs, and I contribute to the teaching of an Advanced Responsible Conduct of Research course each year. I have supported travel for conference research presentations for all my trainees, and supported their careers through both NIH and private foundation fellowship and grant applications. Of the > 20 predoctoral and postdoctoral trainees that have been in my lab, all are in the biomedical workforce either in academic research or medicine, or the biotechnology industry.

B. Positions and Honors

List in chronological order previous positions, concluding with the present position. List any honors. Include present membership on any Federal Government public advisory committee.

Positions:

1978-1984	Teaching/Research Assistant, University of Illinois, Urbana, Illinois.
1984-1987	Postdoctoral Fellow, University of Pennsylvania, Philadelphia, Pennsylvania.
1987-1994	Assistant Scientist, WI Regional Primate Research Center, Univ. of WI, Madison, WI.
1995-1999	Assistant Professor, Dept. of Obstetrics and Gynecology, University of WI Medical School, Associate Scientist, WI Regional Primate Research Center, Univ. of WI, Madison, WI.
1997-2003	Head, Reproduction Research Services, WRPRC.
1999-2003	Associate Professor (with tenure), Dept. of Ob/Gyn, University of WI Medical School
2003-present	Professor, Dept. of Ob/Gyn, University of WI School of Medicine and Public Health
2007-present	Professor, Dept. of Comparative Biosciences, Univ. of WI School of Veterinary Medicine
2015-present	Chair, Dept. of Comparative Biosciences, Univ. of WI School of Veterinary Medicine

Honors:

- NIH Predoctoral Fellowships, Reproductive Biology (1980-81), Cellular and Molecular Biology (1982-84), Univ. of Illinois
- USPHS Individual Postdoctoral NRSA, Univ. of Pennsylvania, 1985-87
- NICHD Lecturer, Perinatal Research Society, 2004
- Executive Committee, American Society for Reproductive Immunology, 2012-2016
- NIH Lecturer Award, Meeting of the International Federation of Placenta Associations, 2012
- Raymond O. Berry Lecturer in Reproductive Immunology, Texas A&M University, 2013
- invited speaker, NICHD/NIAID Workshop on Maternal-Fetal Immune Interface, 2014
- Zoetis Award for Veterinary Research Excellence, UW-Madison SVM, 2015
- Invited speaker, Distinguished Lecturers in Reproductive and Developmental Sciences, Michigan State University, 2016
- UW-Madison Vilas Distinguished Achievement Professor, 2019

Editorial Boards:

- Journal of Molecular Endocrinology, 1996-2000;
- Placenta, 2003-2009;
- American Journal of Reproductive Immunology, 2008-2017.

NIH Study Section service:

Chartered study section member:

- Biochemical Endocrinology Study Section (1997-2001);

ad hoc study section member:

- Biochemical Endocrinology (1994)
- Human Embryology and Development (1997, 1999, 2001)
- RFA on Immune Tolerance (2001)
- Reproductive Biology (2002)
- Pregnancy and Neonatology (1999, 2000, 2010, 2015, 2017)
- Reviewer/site visitor, U54 Cooperative Centers in Reproduction (1999, 2007, 2011)
- Chair, NICHD P01 review panel (2004)
- R20 Stem Cell Center review panel, NIGMS (2005)
- Special Emphasis Review Panels, NICHD (2001, 2005, 2007, 2008, 2013)
- R24/P01 reviews, NCRR (2008, 2010, 2011)
- R24, OD/ORIP, Therapeutic Approaches to Genetic Diseases (2015)
- NICHD “Rapid Response Review- Rapid Assessment of Zika Virus (ZIKV) Complications” (R21) (2016)
- Chair, SEP “Development of Somatic Cell Genomic Editing Large Animal Reporters” (U24) (2018)
- NIAID RFA Study Section “Immune Mechanisms at the Maternal-Fetal Interface” (2019)

C. Contributions to Science

Establishment of NHP embryo transgenesis and experimental embryology. While the macaque provides an important model for studying the physiology and pathophysiology of pregnancy in the intact animal, the role of specific genes, molecules and processes in embryonic development, implantation and placentation remains exceedingly difficult to address. We worked to use assisted reproductive technologies to develop the first robustly demonstrated ***expression*** of a transgene from nonhuman primate embryonic gene transfer. These

methods underpinned primate transgenesis and more recently, genomic editing for creation of improved primate models of human diseases. We also used IVF-derived rhesus embryos to model implantation directly with blastocysts with *in vitro* embryo culture.

Wolfgang, M.J., S.G. Eisele, M.A. Browne, M.L. Schotzko, M.A. Garthwaite, M. Durning A. Ramezani, R.G. Hawley, J.A. Thomson and T.G. Golos. 2001. Rhesus monkey placental transgene expression after lentiviral gene transfer into preimplantation embryos. *PNAS* 98:10728-10732. PMID: 11553810; PMCID: PMC58541.

Kropp J, Di Marzo A, Golos T. 2017. Assisted reproductive technologies in the common marmoset: an integral species for developing nonhuman primate models of human diseases. *Biology of Reproduction* 96: 277-287. PMID: 28203717; PMCID: PMC5967451.

Rozner AE, Durning M, Kropp J, Wiepz GJ, Golos TG. Decidual Macrophages Influence the Differentiation of Rhesus Monkey Embryonic Trophoblasts. 2016. *Am. J. Reprod. Immunol*. 76:364-375**.** PMID: 27637575; PMCID: PMC5056160.

Chang TC, Bondarenko GI, Gerami-Naini B, Drenzek JG, Durning M, Garthwaite MA, Schmidt JK, Golos TG. 2018. Trophoblast Differentiation, Invasion and Hormone Secretion in a Three-Dimensional In Vitro Implantation Model with Rhesus Monkey Embryos. *Reprod Biol Endocrinol*. Mar 16(1):24. doi: 10.1186/s12958-018-0340-3. PMID: 29548332; PMCID: PMC5857108.

Defining the immune cells at the macaque maternal-fetal interface. In 1989 Judith Bulmer and colleagues clarified that the large granular lymphocytes which were uniquely identified in the pregnant decidua were natural killer (NK) cells. However, major differences between mammals regarding the mode of implantation and decidualization strained the ability to understand the impact of the maternal-fetal immune interface on pregnancy success. My lab pioneered the use of the nonhuman primate model in the reproductive immunology of pregnancy, extending our studies of MHC molecules to their interactions with the maternal immune system, particularly decidual natural killer cells and macrophages in promoting pregnancy success. Our placental passive immunization studies demonstrated that the placental MHC effects endometrial differentiation and vascularization. We have now extended these studies to placental macrophages (Hofbauer cells).

Bondarenko G.I., Burleigh D.W., Durning M., Breburda E.E., Grendell R.L., and **T.G. Golos**. 2007. Passive Immunization against the MHC Class I Molecule Mamu-AG Disrupts Rhesus Placental Development and Endometrial Responses. *J. Immunol.* 179:8042-8050.

S.V. Dambaeva, M. Durning, A.E. Rozner, and **T.G. Golos**. 2012 Immunophenotype and Cytokine Profiles of Rhesus Monkey $CD56_{bright}$ and $CD56_{dim}$ Decidual Natural Killer (NK) Cells. Biol. Reprod. 86: 1-10. PMCID: PMC3313663

Reyes L, Philips P, Wolfe B, **Golos T**, Walkenhorst M, Progulski-Fox A, Brown M. 2017. *Porphyromonas gingivalis* and adverse pregnancy outcome. Journal of Oral Microbiology 10:1374153**.**

Reyes L, Wolfe B, **Golos T**. 2017. Hofbauer Cells: Placental Macrophages of Fetal Origin. Results Probl Cell Differ. 62:45-60.

Defining MHC Class I expression in the macaque placenta. The observation that the fetal allograft survives within a maternal environment that would seem poised to respond to the paternal antigens represents a conundrum of mammalian pregnancy. While most mammals have distinctly different placentation from humans, the hemochorial placentation of nonhuman primates is very similar to the human, however understanding whether this model can serve to provide insight into maternal-fetal immune interactions required a fundamental definition of the cellular and molecular aspects of nonhuman primate placental and decidual immune function. Initially in collaboration with the David Watkins lab, we have made seminal contributions to the field, defining placental MHC expression in macaques. Salient among these discoveries was the identification of a putative HLA-G homolog designated Mamu-AG, and the demonstration that anti-placental Mamu-AG treatment results in altered placental vascularization, growth, development, and maturation of the decidua. We have been essentially the only lab worldwide conducting these studies with the macaque model.

Boyson, J.E., K. Iwanaga, T.G. Golos, and D.I. Watkins. 1997. Identification of a novel MHC Class I gene, *Mamu-AG,* expressed in the placenta of a primate with an inactivated G locus. *J. Immunol.* 159: 3311-3321. PMID: 9317129.

Slukvin, I.I., J.E. Boyson, D.I. Watkins and T.G. Golos. 1998. The rhesus monkey analogue of human lymphocyte antigen-G is expressed primarily in the villous syncytiotrophoblast. *Biol Reprod.* 58:728-738. PMID:9510956.

Slukvin, I.I., D.P. Lunn, D.I. Watkins, and T.G. Golos. 2000. Placental expression of the nonclassical MHC class I molecule Mamu-AG at implantation in the rhesus monkey *PNAS* 97: 9104-9109. PMCID: PMC16829.

Bondarenko, G., M. Durning, D. Burleigh, E. Breburda, R. Grendell, and T.G. Golos. 2007. Passive immunization against the MHC class I molecule Mamu-AG disrupts rhesus placental development and endometrial responses. *J. Immunol*: 179: 8042-8050. PMCID: PMC6191312.

Establishment of nonhuman primate models of infectious disease and adverse pregnancy outcomes. The work in the Golos lab on placental MHC class I molecules and the immune cell environment of the decidua have logically led to a significant involvement and commitment to the development of infectious disease models of adverse pregnancy outcomes. The two most advanced areas include pregnancy loss caused by ingestion of *Listeria monocytogenes,* which the lab has recently shown colonizes the decidua, and causes 100% pregnancy loss in first trimester monkeys within 2 weeks of infection, and the Zika virus, which is cleared from nonpregnant monkeys within 10-12 days, but viremia persists for up to 70 days in pregnant macaques.

Wolfe KB, Wiepz GJ, Schotzko ML, Bondarenko GI, Durning M, Faith NG, Simmons HA, Mejia A, Suresh M, Czuprynski CJ, Kathariou S, Golos TG. 2017. Acute fetal demise in early nonhuman primate pregnancy infection with *Listeria monocytogenes.* mBio 8: e01938-16. PMCID: PMC5358912.

Nguyen SM, Antony KM, Dudley DM, *et al,* Golos TG. 2017. Highly Efficient Maternal-Fetal Zika Virus Transmission in Pregnant Rhesus Macaques. PLOS Pathogens: 13(5): e1006378. PMCID: PMC5444831.

Mohr EL, Block LN, Newman CM, *et al*, Golos TG. 2018. Ocular and Uteroplacental Pathology in a Macaque Pregnancy with Congenital Zika Virus Infection. PLOS One 13: e0190617. PMCID: PMC5790226.

Dudley DM, Van Rompay KK, Coffey LL, Ardeshir A, Keesler RI, Grigsby PL, Steinbach RJ, Hirsch AJ, MacAllister RP, Hodge T, Streblow DN, Tardif S, Patterson JL, Tamhankar M, Seferovic M, Aagaard KM, Sanchez-San Martin C, Chiu CY, Panganiban AT, Maness NJ, Gilbert MH, Bohm RP, Wang X, Adams Waldorf KM, Gale Jr M, Rajapopal L, Hotchkiss CE, Mohr EL, Capuano III SV, Friedrich TC, Golos TG, O'Connor DH. 2018. Miscarriage and Stillbirth Following Maternal Zika Virus Infection in Nonhuman Primates. *Nature Medicine*. PMCID: PMC6082723.

- Full list of published work in My Bibliography, maintained by the US National Library of Medicine. http://www.ncbi.nlm.nih.gov/sites/myncbi/thaddeus.golos.1/bibliography/41146380/public/?sort=date&direction=descending

D. Additional Information: Research Support and/or Scholastic Performance

List both selected ongoing and completed research projects for the past three years (Federal or non-Federally-supported). *Begin with the projects that are most relevant to the research proposed in the application.* Briefly indicate the overall goals of the projects and responsibilities of the key person identified on the Biographical Sketch. Do not include number of person months or direct costs.

ONGOING:

P01 AI132132-01A1 (P.I.: D. O'Connor, Project 1 Leader: T. Golos) 08/01/18-07/31/23
NIH
Zika Virus Pathophysiology During Pregnancy
The goals of this Program Project Grant are to define whether maternal Zika virus viremia can be a predictor of the risk for fetal infection and postnatal birth defects, to assess the impact of preexisting Dengue virus immunity on maternal-fetal Zika virus transmission, and to determine if maternal passive immunization with anti-Zika hyperimmune globulin or or monoclonal antibodies can protect against maternal-fetal transmission or ameliorate fetal pathology.

R01 AI132519-01A1 (P.I.: T. Golos) 04/25/18-3/31/23
NIH
Pathways of vertical Zika virus transmission in nonhuman primate pregnancy

The goal of this grant is to define the pathway for vertical Zika virus transmission to the fetus.

R21 AI129308-01 (P.I.: T. Golos) 09/04/17-08/31/20 (NCE)
NIH
Nonhuman Primate Model to Assess Fetal Zika Virus Infection Complications
The goal of this grant is to assess the tropism and impact of Zika virus with direct amniotic fluid infection in a pregnant rhesus monkey model.

R21 HD091163-01 (P.I.: T. Golos) 09/21/16-08/31/20 (NCE)
NIH
Nonhuman Primate Model to Assess Embryonic Zika Virus Infection
The goal of this grant is to assess the tropism and impact of Zika virus with *in vitro* fertilized rhesus monkey embryos and assess risk for human infertility patients.

R01EY026045-01 (PI: J. Stout, subcontract PI: T. Golos) 05/01/16-03/31/21
NIH
Non-human Primate Models of Ocular Disease
The goal of this grant is to expand screen macaque populations for gene mutations associated with human eye diseases and propogate selected lines with a nonhuman primate breeding program. Dr. Golos will direct the rhesus monkey breeding program.

R24 OD021322-01A1 (PIs: I. Slukvin, T. Golos) 05/01/16-01/31/20
NIH/ORIP
CCR5-mutant monkey model to facilitate the development of novel stem cell-based therapies for AIDS
This grant will use CRISPR genomic editing to produce cynomolgus macaques carrying a Δ 32 mutation in CCR5 shown to be protective against HIV infection. Animals will be used as bone marrow donors for piloting BMT therapy for curing SIV infection.

U01 HD087216-01 (PIs: D. Shah, O. Wieben, co-investigator: T. Golos) 10/01/15-06/30/20
NIH
Advanced MRI for Uteroplacental Flow, Perfusion, Oxygenation & Inflammation
The goal of this grant is to develop new imaging approaches to assess placental structure and function, in real time, for the purpose of providing predictive value to MRI for adverse pregnancy outcomes.

P51 OD011106-53 (P.I: M. Mailick) 05/01/2017-04/30/2022
NIH
Wisconsin National Primate Research Center
Precision Medicine Embryonic Genomic Editing subunit
I co-direct the Precision Medicine Core of the Wisconsin National Primate Research Center, and co-chair the Regenerative and Reproductive Medicine Working Group.

COMPLETED

R21 AI136014-01 (P.I.: T. Golos) 12/01/17-11/30/19
NIH
Immune response to Zika infection at the primate maternal-fetal interface.
The goal of this grant is to assess the impact of Zika virus infection during pregnancy on placental and decidual immune cells, the animals under study are from a separate FDA study to David O'Connor.

R01 AI107157-01A1 (P.I.: T. Golos) 08/01/14-07/31/19
NIH
The Maternal-Fetal Interface in Listeria-Induced Pregnancy Loss
The goal of this grant was to define the mechanisms by which infection with *Listeria monocytogenes* causes pregnancy loss in a rhesus monkey model by studying decidual and placental infection and inflammation.

R24 OD019803-01 (PIs: T. Golos, M. Emborg) 05/01/15-01/31/19
NIH/ORIP
Transgenic Marmosets for Translational Stem Cell Research.
The goals of this grant were to derive iPSC from the common marmoset, develop transgenic animals expressing an allele of LRRK2 associated with human Parkinson's disease, and determine the feasibility of genomic editing of marmoset embryos with the CRISPR/Cas9 system.