

March 2018

CURRICULUM VITAE

T.-C. Wu, M.D., Ph.D.

The Johns Hopkins Univeristy School of Medicine

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Academic and Hospital Appointments:

Professor of Pathology, The Johns Hopkins University School of Medicine
Professor of Oncology, The Johns Hopkins University School of Medicine
Professor of Obstetrics and Gynecology, The Johns Hopkins University School of Medicine
Professor of Molecular Microbiology and Immunology, The Johns Hopkins University, Bloomberg
School of Public Health
Director of Gynecologic Pathology, Department of Pathology, The Johns Hopkins University
School of Medicine
Pathologist, The Johns Hopkins Hospital

Personal Data:

Work Address: The Johns Hopkins University, School of Medicine
Cancer Research Building II, Room 309
1550 Orleans Street
Baltimore, Maryland 21205
Telephone (office): 410-614-3899
Fax (office): 443-287-4295
E-mail: wutc@jhmi.edu

Education:

9/75-7/82 M.D., National Taiwan University
College of Medicine
7/84-5/85 M.P.H., Epidemiology
The Johns Hopkins University
School of Hygiene and Public Health
6/85-5/89 Ph.D., Molecular Virology
The Johns Hopkins University
School of Hygiene and Public Health
Dissertation Topic: Transcriptional regulatory elements in
the non-coding region of human papillomavirus type 6.

Training:

7/89-6/90 Intern

March 2018

Anatomic Pathology
Department of Pathology
The Johns Hopkins Hospital
Baltimore, Maryland

7/90-6/92

Resident
Anatomic Pathology
Department of Pathology
The Johns Hopkins Hospital

7/92-6/95

Clinical Fellow
Division of Gynecologic Pathology
Department of Pathology
The Johns Hopkins Hospital
Baltimore, Maryland

Professional Experience:

June 1995 - Present

Pathologist
The Johns Hopkins Hospital, Surgical Pathology
Sign-out specimens from Gynecologic Pathology

June 1995 - June 1997

Assistant Professor of Pathology
The Johns Hopkins University School of Medicine

October 1996-July 1997

Assistant Professor of Oncology
The Johns Hopkins University School of Medicine

December 1996-July 1997

Assistant Professor of Molecular Microbiology and Immunology
The Johns Hopkins University,
School of Hygiene and Public Health

July 1997-October 1997

Assistant Professor of Obstetrics and Gynecology
The Johns Hopkins University School of Medicine

July 1997 – July 2003

Associate Professor of Pathology
The Johns Hopkins University School of Medicine

July 1997 – July 2003

Associate Professor of Oncology
The Johns Hopkins University School of Medicine

July 1997 – July 2003

Associate Professor of Molecular Microbiology and Immunology
The Johns Hopkins University, School of Hygiene and Public Health

Oct. 1997 – July 2003

Associate Professor of Obstetrics and Gynecology
The Johns Hopkins University School of Medicine

July 2003 – present

Professor of Pathology, Oncology, Obstetrics and Gynecology, and
Molecular Microbiology and Immunology
The Johns Hopkins Medical Institutions

RESEARCH ACTIVITIES

Select Publications:

Peer-Reviewed Scientific Articles (29 out of 224):

- 1) **T.-C. Wu**, F.G. Guarnieri, K.F. Staveley-O'Carroll, R.P. Viscidi, H.I. Levitsky, L. Hedrick, K.R. Cho, J.T. August, and D.M. Pardoll (1995) Engineering an intracellular pathway for MHC Class II Presentation of Antigens. *Proc. Natl. Acad. Sci. USA.* 92(25): 11671-11675.
- 2) K.-Y. Lin, F.G. Guarnieri, K.F. Staveley-O'Carroll, H.I. Levitsky, J.T. August, D.M. Pardoll and **T.-C. Wu** (1996) Treatment of established tumors with a novel vaccine that enhances major histocompatibility class II presentation of tumor antigen. *Cancer Res.* 56(1): 21-26.
- 3) H. Ji, E.Y. Chang, K.-Y. Lin, R.J. Kurman, D.M. Pardoll, and **T.-C. Wu.** (1998) Antigen specific immunotherapy for murine lung metastatic tumors expressing HPV-16 E7 oncoprotein. *Int. J. Cancer.* 78(1): 41-45.
- 4) H. Ji, T.-L.Wang, C.-H. Chen, S.I. Pai, C.-F. Hung, K.-Y. Lin, R. J. Kurman, D. M. Pardoll, and **T.-C. Wu.** (1999) Targeting HPV-16 E7 to the endosomal/lysosomal compartment enhances the antitumor immunity of DNA vaccines against murine HPV-16 E7-expressing tumors. *Hum. Gene Ther.* 10(17): 2727-2740.
- 5) C.-H. Chen, T.-L. Wang, C.-F. Hung, Y. Yang, H. Chen, R. A. Young, D. M. Pardoll and **T.-C. Wu.** (2000) Enhancement of DNA vaccine potency by linkage of antigen gene to an HSP70 gene. *Cancer Research*, 60(4):1035-1042.
- 6) C.-F. Hung, W.-F. Cheng, Chai, C.-Y., K.-F. Hsu, L.He, M. Ling and **T.-C. Wu.** (2001) Improving vaccine potency through intercellular spreading and enhanced MHC class I presentation of antigen. *J. Immunol.* 166(9): 5733-5740.
- 7) C.-F. Hung, W.-F. Cheng, K.-F. Hsu, C.-Y. Chai, L. He, M. Ling and **T.-C. Wu.** (2001) Cancer immunotherapy using a DNA vaccine encoding the translocation domain of a bacterial toxin linked to a tumor antigen. *Cancer Res.* 61(9): 3698-3703.
- 8) W.-F. Cheng, C.-F. Hung, C.-Y. Chai, K.-F. Hsu, L. He, M. Ling and **T.-C. Wu.** (2001) Tumor-specific immunity and antiangiogenesis generated by a DNA vaccine encoding calreticulin linked to a tumor antigen. *J. Clin. Invest.* 108(5): 669-78.
- 9) T.W. Kim, C.-F. Hung, M. Ling, J. Juang, L. He, J.M. Hardwick, S. Kumar, and **T.-C. Wu.** (2003) Enhancing DNA vaccine potency by coadministration of DNA encoding antiapoptotic proteins. *J. Clin. Invest.* 112(1): 109-117.
- 10) C.-J. Hsieh, T.W. Kim, C.-F. Hung, J. Juang, M. Moniz, D.A. Boyd, L. He, P.-J. Chen, C.-H. Chen and **T.-C. Wu.**(2004) Enhancement of vaccinia vaccine potency by linkage of tumor antigen gene to gene encoding calreticulin. *Vaccine.* 22(29-30): 3993-4001.
- 11) L.H. Ellenson, and **T.-C. Wu.** (2004) Focus on endometrial and cervical cancer. *Cancer Cell* 5(6): 533-538

- 12) A.D. Bins, A. Jorritsma, M.C. Wolkers, C.-F. Hung, **T.-C. Wu**, T.N. Schumacher, and J.B. Haanen. (2005) A rapid and potent DNA vaccination strategy defined by *in vivo* monitoring of antigen expression. *Nat. Med.* 11(8): 899-904.
- 13) C.L. Trimble, S. Piantadosi, P. Gravitt, B. Ronnett, E. Pizer, A. Elko, B. Wilgus, W. Yutzy, R. Daniel, K. Shah, S. Peng, C. Hung, R. Roden, **T.-C. Wu**, and D. Pardoll. (2005) Spontaneous regression of high-grade cervical dysplasia: effects of human papillomavirus type and HLA phenotype. *Clin Cancer Res.* 11(13): 4717-4723.
- 14) K.-Y. Lin, D. Lu, C.-F. Hung, S. Peng, L. Huang, C. Jie, F. Murillo, J. Rowley, Y.-C. Tsai, L. He, D.J. Kim, E. Jaffee, D. Pardoll, and **T.-C. Wu**. (2007) Ectopic expression of vascular cell adhesion molecule-1 (VCAM-1) as a new mechanism for tumor immune evasion. *Cancer Res.* 67(4): 1832-1841.
- 15) C.-W. Tseng, C.-F. Hung, R.D. Alvarez, C. Trimble, W.K. Huh, D. Kim, C.-M. Chuang, C.-T. Lin, Y.-C. Tsai, L. He, A. Monie, and **T.-C. Wu**. (2008) Pretreatment with cisplatin enhances E7-specific CD8⁺ T cell-mediated antitumor immunity induced by DNA vaccination. *Clin Cancer Res.* 14(10): 3185-3192.
- 16) C.L. Trimble, S. Peng, F. Kos, P. Gravitt, R. Viscidi, E. Sugar, D. Pardoll, and **T.-C. Wu**. (2009) A phase I trial of a HPV DNA vaccine for HPV16⁺ cervical intraepithelial neoplasia 2/3. *Clin Cancer Res.* 15(1):361-367.
- 17) T. H. Kang, K. H. Noh, J. H. Kim, H. C. Bae, K. Y. Lin, A. Monie, S. I. Pai, C.-F. Hung,⁴ **T.-C. Wu**, and T. W. Kim (2010) Ectopic Expression of X-linked Lymphocyte-Regulated Protein pM1 (XLR) Renders Tumor Cells Resistant to Anti-Tumor Immunity. *Cancer Research* 70: 3062-3070.
- 18) C.M. Heaphy, A.P. Subhawong, S.-M. Hong, M.G. Goggins, E.A. Montgomery, E. Gabrielson, G.J. Netto, J.I. Epstein, T.L. Lotan, W.H. Westra, I.-M. Shih, C.A. Iacobuzio-Donahue, A. Maitra, Q.K. Li, C.G. Eberhart, J.M. Taube, D. Rakheja, R.J. Kurman, **T.-C. Wu**, R.B. Roden, P. Argani, A.M. De Marzo, L. Terracciano, M. Torbenson, and A.K. Meeker. (2011) Prevalence of the Alternative Lengthening of Telomeres (ALT) Telomere Maintenance Mechanism in Human Cancer Subtypes. *American Journal of Pathology.* 179(4): 1608-15.
- 19) K. H. Noh, Y.-H. Lee, J.-H. Jeon, T. H. Kang, C.-P. Mao, **T.-C. Wu** and T. W. Kim (2012) Cancer vaccination drives Nanog-dependent evolution of tumor cells towards an immune-resistant and stem-like phenotype. *Cancer Research* 72: 1717-1727
- 20) T. H. Kang; C.-P. Mao; L. He; Y.-C. Tsai; K. Liu; V. La; **T.-C. Wu** and C.-F. Hung (2012) Tumor-Targeted Delivery of IL-2 by NKG2D Leads to Accumulation of Antigen-Specific CD8⁺ T Cells in the Tumor Loci and Enhanced Anti-Tumor Effects. *PLoS One* 7(4):e35141
- 21) T.H. Kang, CP Mao, SY Lee, A Chen, JH Lee, TW Kim, R Alvarez, RB Roden, D Pardoll, CF Hung, **T.-C. Wu** (2013). Chemotherapy acts as an adjuvant to convert the tumor microenvironment into a highly permissive state for vaccination-induced antitumor

- immunity. *Cancer Research*. 73(8);2493-2504.
- 22) F.Sandoval, M. Terme, M. Nizard, C. Badoual, M.F. Bureau, L. Freyburger, O. Clement, E. Marcheteau, A. Gey, G. Fraisse, C. Bouguin, N. Merillon, E. Dransart, F. Quintin-Colonna, G. Autret, M. Thiebaud, M. Suleman, S. Riffault, **T.-C. Wu**, O. Launay, J. Taieb, J. Richardson, L. Zitvogel, W.H. Fridman, L. Johannes, E.Tartour (2013) Mucosal imprinting of vaccine induced-CD8+T cells is crucial to inhibit mucosal tumors. *Science Translational Medicine*. 5(172):172
 - 23) Maldonado L, Teague JE, Morrow MP, Jotova I, T.-C. **Wu** , Wang C, Desmarais C, Boyer JD, Tycko B, Robins HS, Clark RA, Trimble CL.(2014) Intramuscular therapeutic vaccination targeting HPV16 induces T cell responses that localize in mucosal lesions. *Sci Transl Med*. 6(221):221ra13.
 - 24) S Peng, JW Wang, B Karanam, C Wang, WK Huh, RD Alvarez, SI Pai, CF Hung, **T.-C. Wu** and RBS Roden (2015) Sequential Cisplatin Therapy and Vaccination with HPV16 E6E7L2 Fusion Protein in Saponin Adjuvant GPI-0100 for the Treatment of a Model HPV16+ Cancer. *PloS One* 10 (1), e116389
 - 25) Y Sun, S Peng, J Qiu, J Miao, B Yang, J Jeang, C-F Hung, **T-C Wu** (2015) Intravaginal HPV DNA vaccination with electroporation induces local CD8+ T-cell immune responses and antitumor effects against cervicovaginal tumors. *Gene Therapy* 22(7), 528-535.
 - 26) YY Sun, S Peng, L Han, J Qiu, L Song, YC Tsai, B Yang, RB Roden, CL Trimble, CF Hung, **TC Wu** (2016) Local HPV Recombinant Vaccinia Boost Following Priming with an HPV DNA Vaccine Enhances Local HPV-Specific CD8+ T Cell Mediated Tumor Control in the Genital Tract. *Clin. Cancer Res*. 22(3): 675-69.
 - 27) RD Alvarez, WK Huh, S Bae, LS Jr Lamb, MG Conner, J Boyer, C Wang, CF Hung, E Sauter, M Paradis, EA Adams, S Hester, BE Jackson, **TC Wu**, CL Trimble (2016) A pilot study of pNGVL4a-CRT/E7(detox) for the treatment of patients with HPV16+ cervical intraepithelial neoplasia 2/3 (CIN2/3). *Gynecologic Oncology* 140(2): 245-252.
 - 28) Song KH, Choi CH, Lee HJ, Oh SJ, Woo SR, Hong SO, Noh KH, Cho H, Chung EJ, Kim JH, Chung JY, Hewitt SM, Baek S, Lee KM, Yee C, Son M, Mao CP, **Wu TC**, Kim TW. (2017) HDAC1 Upregulation by NANOG Promotes Multidrug Resistance and a Stem-like Phenotype in Immune Edited Tumor Cells. *Cancer Res*. 2017 Sept 15;77(18):5039-5053. doi: 10.1158/0008-5472.CAN-17-0072.
 - 29) Lin YH, Yang MC, Tseng SH, Jiang R, Yang A, Farmer E, Peng S, Henkle T, Chang YN, Hung CF, **Wu TC**. (2018) Integration of oncogenes via Sleeping Beauty as a mouse model of HPV16+ Oral tumor and immunologic control. *Cancer Immunol Res*. 2018 Jan 23. doi: 10.1158/2326-6066.CIR-16-0358.

Inventions and Patents (6 out of 19):

1. US Patent number: 6,734,173
Title: Fusion of Heat shock protein 70 to antigens enhance the potency of DNA vaccines
Issue Date: 05/11/04
Investigators: Tzyy-Choou Wu, Chien-Fu Hung
Status: Exclusively Licensed by Papivax Biotech Inc.
2. US Patent number: 8,007,781
Title: Fusion of Calreticulin (CRT) to Antigen
Issue Date: 8/30/11
Investigators: Tzyy-Choou Wu, Chien-Fu Hung
Status: Exclusively Licensed by Papivax Biotech Inc.
3. US Patent number: 9,085,638
Title: DNA Vaccine Enhancement with MHC Class II Activators
Issue Date: 07/21/15
Investigators: Tzyy-Choou Wu, Chien-Fu Hung
Status: Available from Hopkins Tech Transfer office
4. US Patent number: 9,296,784
Title: Mesothelin Vaccines and Model Systems
Issue Date: 03/29/16
Inventors: Tzyy-Choou Wu, Chien-Fu Hung
Status: Exclusively Licensed by ImmunoCellular Therapeutics and Aduro
5. US Patent number: 9,561,275
Title: Selectively Targeted Coating of Tumor Cells with Foreign Antigenic Peptide Renders Tumor Cells Susceptible to Antigen-specific CD8+ T Cell-mediated Killing
Issue Date: 02/07/17
Inventors: Tzyy-Choou Wu, Chien-Fu Hung
Status: Available from Hopkins Tech Transfer office
6. US Patent number: 9,701,725
Title: Anti-Cancer DNA Vaccine Employing Plasmids Encoding Signal Sequence, Mutant Oncoprotein Antigen, And Heat Shock Protein
Issue Date: 07/11/17
Investigators: Tzyy-Choou Wu, Chien-Fu Hung
Status: Licensing agreement currently under negotiation

EDUCATIONAL ACTIVITIES

Editorial Activities:

Editorial Board

- 2000-present member, Diagnostic Molecular Pathology
- 2004-present member, American Journal of Pathology
- 2004-present member, International Journal of Gynecological Pathology
- 2005-present Associate Editor, Journal of Biomedical Science

2008-2010 member, Gene Therapy
2009-present member, Cancer Research
2010-present Associate Editor, Cell and Bioscience

CLINICAL ACTIVITIES

Certification:

1992 - present State of Maryland License
1992 American Board of Pathology,
Certification in Anatomic Pathology

Service Responsibilities:

- a) Regularly sign out diagnostic GYN surgical pathology specimens.
- b) Participate in the development of new molecular diagnostic tests.
- c) Participate in the development of new molecular immunological assays.

ORGANIZATION ACTIVITIES

Institutional Administrative Appointments:

July 1996-present
Member of the CAC Clinical Research and Development Subcommittee

February 1997
Member of the Ad hoc Review Committee for Promotion to Assistant Professor

May 1999, October 2002
Member of the Ad hoc Review Committee for Promotion to Associate Professor

October 2003, 2004
Member of the Ad hoc Review Committee for Promotion to Professor

March 1998-present
Member of the Subcommittee for the recruitment of M.D., Ph.D. residents

July 1997-present
Member of the Research Committee of JHU Women's Health Initiatives

February 2002-January 2006
Director of the Vaccine Immunology Basic Research Center

February 2002-present
Director of the Cervical Cancer Steering Committee

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August 2002-present

Member of the Research Council of the Sidney Kimmel Comprehensive Cancer Center at Hopkins

February 2006-present

Member of the Subcommittee for Professor Promotion Committee

Professional Societies:

American Society for Clinical Investigation (ASCI)

American Association of Immunologists

Sigma Xi

Society of Chinese Bioscientists in America (SCBA)

Binford-Dammin Infectious Disease Society of International Academy of Pathology

American Association for Cancer Research

International Society of Gynecological Pathologists

American Society of Gene Therapy

American Society for Microbiology

International Papillomavirus Society

Association of American Physicians (AAP)

National Academy of Inventors

Academician, Academia Sinica

RECOGNITION

Awards, honors:

National Taiwan University, College of Medicine

9/75-6/82 Book Award, 1975 through 1982 for being in top five percent of the class

1979 Dr. Shu Yeh Scholarship (best student in Pathology)

Johns Hopkins University, School of Hygiene & Public Health

1986-1988 The Hampil Fellowship (tuition and stipend support)

1987 The Frederick B. Bang Award (for an outstanding research idea in the area of pathobiology)

1989 The Delta Omega Honorary Society Alpha Chapter (in recognition of excellence in student research)

International Academy of Pathology

1994 Binford-Dammin Award (from Binford-Dammin society of International Academy of Pathology)

The Passano Foundation

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1996 Passano Physician Scientist Award

Society of Chinese Bioscientists in America DC Chapter
2000 Outstanding Service Award

American Society for Clinical Investigation
2002 Elected member

The Chinese American Medical Society
2008 Scientific Award

The Association of American Physicians
2012 Elected member

Academician of Academia Sinica
2016 Elected member

International Association of Chinese Pathologists
2017 Outstanding Pathologist Award

OTHER PROFESSIONAL ACCOMPLISHMENTS

January 1998- January 1999
President of the Society of Chinese Bioscientists in America (SCBA), DC Chapter

January 2000-January 2001
Secretary-Treasurer of International Association of Chinese Pathologists

January 2001-January 2003
President-Elect of International Association of Chinese Pathologists

January 2003-July 2005
President of International Association of Chinese Pathologists

March 2004-February 2005
President-Elect-Elect of the Binford-Dammin Infectious Disease Society

March 2005-February 2006
President-Elect of the Binford-Dammin Infectious Disease Society

March 2006- February 2007
President of the Binford-Dammin Infectious Disease Society

January 2010- December 2015
Co-Executive Director of the Society of Chinese Bioscientists in America (SCBA)