

## PROMOTION RECOMMENDATION

The University of Michigan  
School of Public Health  
Department of Epidemiology

Zhenhua Yang, assistant professor of epidemiology, Department of Epidemiology, School of Public Health, is recommended for promotion to associate professor of epidemiology, with tenure, Department of Epidemiology, School of Public Health.

### Academic Degrees:

M.D.	1982	North Sichuan Medical College, P.R. China
Ph.D.	1995	Copenhagen University, School of Health Science, Denmark

### Professional Record:

2000 to present	Assistant Professor, Department of Epidemiology, School of Public Health, University of Michigan
1999 to 2000	Research Assistant Professor, Division of Infectious Disease, Department of Internal Medicine, College of Medicine, University of Arkansas for Medical Sciences
1995 to 2000	Research Associate, Department of Pathology, College of Medicine, University of Arkansas for Medical Sciences
1991 to 1992	Fellow, Lausanne University, College of Medicine, Institute of Genetics and Biology of Microorganisms, Lausanne, Switzerland
1984 to 1991	Associate Director, Bacterial Vaccine Department I, Chengdu Institute of Biological Products, Ministry of Public Health, China
1982	Research Associate, Department of Quality Control, Chengdu Institute of Biological Products, Ministry of Public Health, China
1982 to 1984	Fellow, Danish International Development Agency, WHO BCG Vaccine Reference Laboratory and Tuberculin Department, State Serum Institute, Copenhagen, Denmark

### Summary of Evaluation:

**Teaching** – Since joining the University of Michigan, Dr. Yang has taught two existing courses in the Department of Epidemiology, *Hospital Epidemiology* and *Vaccines in Public Health*. These two courses constitute two of the major required courses in the Hospital Molecular Epidemiology (HME) program. In the last three years, more and more students from outside the HME program and outside the School of Public Health have elected these courses. This past year, Dr. Yang developed a new multidisciplinary course, *Tuberculosis: The Pathogen, the Host, and the Environment*, to meet the needs of doctoral and advanced masters students.

To accommodate the growing interests in tuberculosis research among students, Dr. Yang's advising and mentoring extends beyond the HME program. Since Fall 2000, she has served as the academic advisor for 28 masters students and has supervised five masters theses. She is currently mentor to two doctoral students in the HME program and co-mentor to two doctoral students in the General Epidemiology program. She has also served as mentor to a post-doctoral fellow who is now a faculty member at Zonguldak Kara Elmes University in Turkey.

**Research** – The long-term goals of Dr. Yang's research program are to identify underlying genetic factors of *M. tuberculosis* and host factors important to the pathogenesis and epidemiology of tuberculosis. Such knowledge can contribute to the development of more efficient vaccine, diagnostics, and therapeutic agents for tuberculosis control. At the end of her first year at Michigan, Dr. Yang successfully applied for a NIH R01 grant with direct costs of \$1,175,000 for five years. She established a clinically and epidemiologically well-characterized five-year population-based collection of *M. tuberculosis* clinical isolates. With these resources, Dr. Yang studied the host-related risk factors for extrapulmonary tuberculosis disease. To determine associations of demographic, clinical and life-style characteristics of tuberculosis patients with the occurrence of extrapulmonary tuberculosis, she conducted a retrospective

case-control study. To our knowledge, this is the first population-based case-control study characterizing extrapulmonary tuberculosis. This study expands the knowledge base regarding the epidemiology of extrapulmonary tuberculosis and enhances our understanding of the relative contribution of the host-related factors to the pathogenesis of tuberculosis. Dr. Yang made the first observation that a genetic change in the *M. tuberculosis* gene acts as an independent risk factor for the occurrence of extrapulmonary tuberculosis. Her finding that a microbial change is an independent risk factor for extrathoracic tuberculosis provides a rationale for the selection of gene targets for future functional studies aimed at identifying virulence factors. Furthermore, her findings have led to formulation of new research questions for the competing renewal application of her NIH grant as well as the application of other new grants.

Dr. Yang continues research collaborations with her former colleagues at the University of Arkansas. This work involves development and evaluation of various methods for molecular epidemiologic studies of tuberculosis in different populations. During the last two years, Dr. Yang also established international collaborations to study important emerging problems threatening the success of the global tuberculosis control programs, including multi-drug resistance to *M. tuberculosis*.

#### Recent and Significant Publications:

Yang ZH, Kong Y, Wilson F, Foxman B, Fowler AH, Marrs CF, Cave MD, and Bates JH. Identification of risk factors for extrapulmonary tuberculosis. *Clin Infect Dis.* 38(2):199-205, 2004.

Ramaswamy SV, Dou SJ, Rendon A, Yang ZH, Cave MD, and Graviss EA. Genotypic analysis of multidrug-resistant Mycobacterium tuberculosis isolates from Monterrey, Mexico. *J Med Microbiol.* 53(2): 107-113, 2004.

Ijaz K, Yang ZH, Templeton G, Stead WW, Bates JH, and Cave MD. Persistence of a strain of Mycobacterium tuberculosis in a prison system. *Int J Tuberc Lung Dis.* 8(8):994-1000, 2004.

Talarico SE, Durmaz R, and Yang ZH. Insertion- and deletion-associated genetic diversity of Mycobacterium tuberculosis phospholipase C-encoding genes among 106 clinical isolates from Turkey. *J Clin Microbiol.* 43(2):533-8, 2005.

Cave MD, Yang ZH, Stefanova R, Fomukong N, Ijaz K, Bates J, and Eisenach KD. Epidemiologic import of tuberculosis cases whose isolates have similar but not identical IS6110 RFLP patterns. *J Clin Microbiol.* 43(3):1228-33, 2005.

Aktas E, Durmaz R, Yang D, and Yang ZH. Molecular characterization of isoniazid and rifampicin resistance of Mycobacterium tuberculosis clinical strains obtained from Eastern Turkey. *J Microbial Drug Resistance.* 11(2):94-9, 2005.

Yang ZH, Yang D, Kong Y, Zhang L, Marrs CF, Foxman B, Bates JH, Wilson F, and Cave MD. Clinical relevance of Mycobacterium tuberculosis plcD gene mutations. *Am J Respir and Crit Care Med.* 171(12):1436-42, 2005.

Yang ZH, Durmaz R, Yang D, Gunal S, Zhang L, Foxman B, Sanic A, and Marrs CF. Simultaneous detection of isoniazid, rifampin, and ethambutol resistance of Mycobacterium tuberculosis by a single multiplex allele-specific PCR assay. *Diagn Microbiol Infect Dis.* 53(3):201-8, 2005.

Talarico S, Cave MD, Marrs CF, Foxman B, Zhang L, and Yang ZH. Genetic variation of the Mycobacterium tuberculosis PE\_PGRS33 gene among clinical isolates. *J Clin Microbiol.* 43(10): 4954-4960, 2005.

Kong Y, Cave MD, Yang D, Zhang L, Marrs CF, Foxman B, Bates JH, Wilson F, Mukasa LN, and Yang ZH. Distribution of insertion- and deletion-associated genetic polymorphisms among four Mycobacterium tuberculosis phospholipase C genes and associations with extrathoracic tuberculosis: A population-based study. *J Clin Microbiol.* 43(12):6048-53, 2005.

Service – Dr. Yang has served on four departmental committees and one school committee in the last five years: the admissions committee, the doctoral committee, the facilities and research committee, the curriculum committee; and the School of Public Health strategic planning committee. Dr. Yang has also been a member of the Michigan Tuberculosis Elimination Advisory Committee since 2002 and contributed to the planning and guidance of the state's efforts to eliminate tuberculosis and conduct relevant research. Nationally, she served on the Planning Committee of the 10th Annual Conference of the International Union Against Tuberculosis and Lung Diseases, North American Regions in 2005.

External Reviewers:

Reviewer (A): "...Dr. Yang has developed a very interesting research program since her arrival at the University of Michigan. Investigations into the bacterial causes for differences in human manifestations of tuberculosis have become an exceedingly hot topic, and [she] is at the forefront of this field." "The quality of Dr. Yang's work, her grant funding and her productivity as shown by her publication record would almost certainly earn her the promotion at my own institution."

Reviewer (B): "Dr. Yang has contributed significantly to the literature on the molecular epidemiology of tuberculosis... these papers were published in highly regarded journals such as the American Journal of Respiratory and Critical Care Medicine, the Journal of Infectious Diseases..." "Dr. Yang's stature as a scientist is indicated by her excellent publication record and her successful application for NIH funding. She has established collaborations with several investigators in different programs that are likely to lead to additional high-quality publications and funding."

Reviewer (C): "[Dr. Yang produced] some of the earliest significant studies that melded laboratory work with epidemiologic analysis of the TB patients rather than simple surveys or studies of small numbers of outbreak-associated isolates." "I believe Dr. Yang is well qualified for promotion to the rank of Associate Professor with tenure. She has a very strong background in basic sciences and has been very successful in integrating laboratory studies with relevant epidemiologic analysis. Her publications are widely cited in the TB literature and she is well regarded in the field."

Reviewer (D): "Since arrival at University of Michigan, Dr. Yang has had another 20 publications. At the same time she has faced the challenges of successfully applying for a level III safety lab, acquiring a research grant of \$1.175 million from NIH for TB genetic research." "Her publications are relevant even to me, a clinician, which makes her work all the more important."

Reviewer (E): "Her work on the use of polymorphic guanine-cytosine rich sequence (PGRS) typing has led to the widespread use of that method as the standard technique applied when strains of *M. tuberculosis* have few copies of IS6110. This has enabled application of genotyping on a wider scale to a larger number of isolates." "I feel that Dr. Yang has a well-deserved national reputation based on her scholarly achievements."

Reviewer (F): "...Dr. Yang's work is nationally recognized, and given the international nature of the tuberculosis field, her work is also widely known in the international TB research communities." "I am astounded by Dr. Yang's teaching and mentoring credentials. Her courses appear to be appreciated, in demand, and quite unique in content." "...Dr. Yang would be an asset to any university with a serious interest in international health issues, tuberculosis in particular."

Summary of Recommendation:

Dr. Yang is a highly regarded researcher in the field of tuberculosis who has made significant contributions to the areas of teaching, research and service. She has developed a strong interdisciplinary and collaborative research program that has attracted national and international attention and has been responsible for helping to shape the field of vaccinology and molecular epidemiology. With the unanimous support of the Department of Epidemiology, the Advisory Committee on Academic Rank and the Executive Committee of the School of Public Health, I recommend Dr. Yang for promotion to the rank of associate professor of epidemiology, with tenure.



Kenneth E. Warner, Ph.D.  
Dean, School of Public Health

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