Mechanisms of Candida albicans invasive hyphal growth

Candida albicans is the most prevalent fungal pathogen in humans. Despite being a member of the human microbiota commonly inhabiting the intestinal and vaginal tract, it can cause life-threatening invasive infections in immunocompromised patients. Candidemia has high mortality rates, often exceeding 40% and killing ~700,000 people annually worldwide. A major virulence factor of C. albicans is its ability to switch between two distinct morphological forms: yeast and hyphae. The yeast form is thought to be the commensal state, and hyphae are virulent, specializing in penetrating host tissues, escaping from immune cells, and secreting toxins. In this talk, I will describe the discovery of microbiome-derived peptidoglycan in human blood that potently induces the yeast-to-hyphae transition and the adenyl cyclase Cyr1 as the peptidoglycan sensor in C. albicans, which activates hyphal development via the cAMP-protein kinase A (PKA) signalling pathway. I will also describe the identification of the cyclin-Cdk complex, Hgc1/Cdc28, as the master regulator of hyphal morphogenesis. Hgc1 is activated by the cAMP-PKA pathway and orchestrates multiple cellular machines by directly phosphorylating their key regulatory components. To conclude the talk, I will present some powerful genetic tools we recently developed to conduct genome-wide mutational studies in Candida to identify new mechanisms of antifungal resistance.

Professor WANG, Yue obtained his Ph.D. from the University of Minnesota in 1988. In 1989, he joined IMCB as a Postdoctoral Research Fellow and was promoted to Principal Investigator in 1993. Presently, he is a Professor and Research Director. His research revolves around studying human fungal pathogens, especially Candida species. For his outstanding research achievements, Professor Wang was awarded the President’s Science Award in 2012.