

INVITED LECTURE H17

Respiratory proteins outwit the bug

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During infection, the host immediately and opportunistically exploits the invading microbe's virulence factors, the proteases and pathogen-associated molecules, to activate its respiratory proteins (both the arthropod hemocyanin and human hemoglobin) into potent ROS-producers in the immediate vicinity of the pathogen. Through various biochemical assays, real-time cell imaging, and *in vivo* bacterial clearance studies, we demonstrated that pathogen recognition is directly linked to prompt killing, without the need for signaling cascades and antimicrobial production. Due to the localization effect, this ROS production specifically targets the invading microbes and spares the hosts from harm. This previously unrecognized defense mechanism is unique, fundamental, straightforward and especially effective against virulent strains of bacteria. This frontline defense mechanism is so crucial to the survival of the species that it has been entrenched for ~500 million years, from horseshoe crab to human. Although the species have diversified and evolved a variety of immune defense pathways, their respiratory proteins have retained this seminal tactic to "outplay, outwit and outlive" the bug.