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Is the expression of catalase by *Staphylococcus aureus* protective or detrimental to the survival of the bacteria when exposed to H2O2 in broth or after phagocytosis by monocytes? Are we disproving a dogma or misinterpreting data?

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Production of catalase; an enzyme degrading oxygenated water (H_2O_2), is considered an important mechanism of protection of *Staphylococcus aureus* against killing by phagocytes, which partly relies on H_2O_2 production. We observed, however, that a catalase negative clinical isolate (UCN-61) was more resistant to H_2O_2 mediated killing in broth, produced less reactive oxidant species (ROS) and multiplied more rapidly in human monocytes than the reference catalase positive strain ATCC25923. By complementation UCN-31 with *katA* (the gene encoding catalase), we restored its susceptibility to H_2O_2 mediated killing, ROS production and growth impairment in monocytes. Similar results were obtained when comparing an engineered catalase (-) mutant (NR47908; prepared in the environment of the clinical strain USA300) to its *katA*-complemented counterpart. Addition of N-acetyl-cysteine (a hydroxyl-radicals scavenger) reduced the killing activity of H_2O_2 towards all catalase positive strains tested but not towards the catalase negative UCN61 and NR47908 strains, while increasing their thriving abilities after phagocytosis by THP-1 monocytes. Contrary to the current dogma, expression of catalase by *S. aureus* may, therefore, exert more deleterious rather than a protective effect to the bacterium. In *S. aureus*, catalase may actually function more as oxidase than as H_2O_2 degrading enzyme but ROS produced as intermediates during H_2O_2 degradation could be also involved.

Biography

Paul M Tulkens has completed his MD from the Université Catholique de Louvain and he has also completed his PhD. He did his Postdoctoral studies at the Rockefeller University, New York. He has created the unit of cellular and molecular pharmacology and has also launched the activities of clinical pharmacy at the Université Catholique de Louvain. He has published more than 280 papers in reputed journals and has been serving as an Editorial Board Member of several journals dealing with antibiotics.

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