

Annual Conference on

# MICROBIAL PATHOGENESIS, INFECTIOUS DISEASE, ANTIMICROBIALS AND DRUG RESISTANCE

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## Microbial pathogenesis, drug development and patent related court cases

Ananda M Chakrabarty

University of Illinois College of Medicine, USA

While some bacteria, such as *Helicobacter pylori* and *Agrobacterium tumefaciens*, are known to cause cancer in human beings and plants, it has also been known for over hundred years that when certain bacteria infect human beings with cancer, the cancer regresses, often totally. It is also well-known that many pathogenic bacteria with long term residence in the human body as biofilms consider the human body as their habitat and try to protect it from outside invaders such as cancers, viruses and parasites through secretion of protein weapons. In one instance, *Pseudomonas aeruginosa*, an opportunistic pathogen, secretes a protein azurin on contact with cancer cells. Upon release, azurin enters preferentially to cancer cells and interferes in cancer cell growth through multiple mechanisms involving complex formation with various cellular proteins in cancer cells that promote cancer cell growth. Such complex formation then leads to loss of function of such cancer growth promoting proteins. Thus azurin is known to induce apoptosis in cancer cells, as well as interfere in rapid cancer cell growth, through

stabilization of tumor suppressor protein p53. Azurin also forms complexes with vascular endothelial growth factor receptor (VEGFR) and cell surface associated receptor tyrosine kinases such as EphB2 to inhibit angiogenesis and cell signaling in cancer cells to inhibit their growth. A chemically-synthesized 28 amino acid fragment (Azurin 50-77), termed p28, has completed a phase I trial in 15 stage IV cancer patients with metastatic tumors that were resistant to all conventional drugs and these patients had a life expectancy of about 6 months. P28 not only showed very little toxicity but also significant beneficial effects including partial and complete regression of the tumors in four patients, significantly prolonging their lives. P28 has also shown similar lack of toxicity but good efficacy in several pediatric brain tumor patients. The University of Illinois at Chicago holds many patents on azurin/p28 as anticancer and anti-infective agents and the patent eligibility issues on such products of nature will be discussed.

e: pseudomo@uic.edu