Title of Proposed Project:

**Study the role of copper mediated cell death in Gram negative vs. Gram positive bacteria.**

Brief Abstract

Studies from our and other labs clearly demonstrate efficient and rapid killing of bacteria, fungi and viruses upon exposure to surfaces composed of copper or copper-containing alloys. However, the exact mechanism of cell death is still not fully understood. Our results indicate strong correlation between copper surface exposure and increased lipid peroxidation levels leading to faster cell death. Given the differences between the cell wall and plasma membrane of gram positive and gram negative bacteria we would like to compare the copper mediated toxicity rates of cell death between E.coli, P. aeruginosa, B. subtilis and S.aureus. This study will help us understand how differences in cell membrane might be the underlying cause in rapid cell death on copper surfaces. In view of the potential importance of copper alloy surfaces in the batter against hospital-acquired infections, it is essential to understand the mechanism of contact-mediated killing by copper.

Relevant Publications & Scholarship


R. Sullivan, T. Holden, G. Tremberger, Jr, E. Cheung, C. Branch, J. Burrero, G.


### Education

<table>
<thead>
<tr>
<th>Institution</th>
<th>Degree</th>
<th>Year(s)</th>
<th>Discipline</th>
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<tr>
<td>York College, CUNY</td>
<td>B.S. (Honors)</td>
<td>1998</td>
<td>Biology</td>
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<tr>
<td>Queens College, CUNY</td>
<td>M.Phil</td>
<td>2002</td>
<td>Molecular Biology</td>
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<td>Graduate Center, CUNY</td>
<td>Ph.D.</td>
<td>2004</td>
<td>Molecular Biology</td>
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### Other Current & Past Funding (last 5 years)

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<th>Period</th>
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<td>8/1/12 - 7/31/13</td>
<td>Testing the impact of various CuSO4 concentrations on Legionella pneumophila</td>
<td>$7,000.00</td>
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<td>7/1/12-6/30/13</td>
<td>Study the role of copper induced cell death in Bacillus subtilis</td>
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<td>09/01/11 - 08/31/12</td>
<td>BioPREP Undergraduate Summer Research Program</td>
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<td>Study the Role of Plasma Membrane Unsaturated Fatty Acids on Copper Induced E.coli Cell Death</td>
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<tr>
<td>07/01/11 - 6/30/12</td>
<td>Role of plasma membrane lipid peroxidation in copper surface mediated contact killing in bacteria</td>
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<td>07/01/10 – 06/30/11</td>
<td>Lipid Peroxidation as a Mechanism of Copper Induced Cell death in E.coli</td>
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<td>6/1/10 – 6/30/11</td>
<td>Understanding the mechanism of lipid peroxidation mediated, copper induced cell death in E.coli</td>
<td>$10,000.00</td>
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<td>07/01/10-06/30/11</td>
<td>Creating a State of the Art Molecular Biology Lab at QCC</td>
<td>$65,568.00</td>
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<td>2009-2010</td>
<td>Modernizing biotechnology lab at QCC to revive Medical technology program</td>
<td>$90,339.00</td>
<td>NYS Department of Education</td>
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<td>8/25/08 – 8/24/09</td>
<td>To investigate the mechanism of copper-surface induced toxicity in E.coli</td>
<td>$8,800.00</td>
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<td>2008-2009</td>
<td>Optical CD and bioinformatics analysis to study antibiotic induced evolutionary changes in E. coli</td>
<td>$30,000.00</td>
<td>CUNY Community College Collaborative Research Incentive</td>
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**Attachments**

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**Budgets**

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<td>Most of research at community college happens during summer months and so does training of students. PI will devote the summer months into moving the project forward by training QCC students so that they can continue the work over the rest of the academic year as well.</td>
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<td>All the money will be used to purchase research related supplies: 1. Growth media for difference bacterial cultures 2. TBARS Assay Kits 3. Invitrogen Live Dead Assay kits 4. Gel electrophoresis buffers, agarose, plates, tips, microcentrifuge tubes etc.</td>
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