Poster Presentation 1

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Chemolithoautotrophic sulfur oxidation in *Fusarium solani f.sp. pisi* NBRC9425 indicates a novel microbial sulfur metabolism

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Purpose: Chemolithoautotrophic sulfur oxidation is thought to be an ancient metabolic process carried out exclusively in prokaryotes. Given that *Fusarium solani* f.sp. *pisi* NBRC9425 grows using S^0 as a sole energy source, it is reasonable to doubt the “fact" that eukaryotes are not capable of chemolithoautotrophic sulfur oxidation. Therefore, the aim of this study is to investigate sulfur metabolism in *F. solani* f.sp. *pisi* NBRC9425.

Methods: Chlamydospores from organics-free sulfur-containing medium served as inoculum. Activities of sulfur-oxidizing enzymes were examined after the fungus was cultured in organics-free sulfur-containing medium. The proteome in response to sulfur and maltose was analyzed on two dimensional (2D) electrophoresis gels.

Results and Conclusions: After 15 days growth, the fungus oxidized S^0 and $S_2O_3^{2-}$ giving 0.19 mM SO_4^{2-}. Culture pH decreased from initial 5.0 to 3.9, suggesting that this fungus could oxidize sulfur chemolithoautotrophically. When incubated with various sulfur compounds, culture filtrate did not oxidize sulfur, indicating that sulfur oxidation occurred intracellularly. However, cell-free extract also did not show activity, suggestive of importance of cell integrity in sulfur oxidation. Now that culture filtrate or cell-free extract of prokaryotes oxidizes sulfur, strain NBRC9425 seemed employ a novel sulfur-oxidation strategy. 2D display of soluble proteins of NBRC9425 grown on different energy sources indicated distinct metabolisms.