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Transcriptome analysis identifies *Bacillus anthracis* AtxA as a global transcriptional regulator of genes that respond to carbon dioxide

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Upon infection of a mammalian host, *Bacillus anthracis* responds to elevated bicarbonate/CO₂ concentrations with increased expression of virulence factors that include the anthrax toxins and capsule. This response requires the presence of the pXO1 virulence plasmid-encoded pleiotropic regulator AtxA. To better understand the genetic basis of this response, a controlled *in vitro* system and Next Generation sequencing to determine and compare RNA expression profiles of the parental strain and an isogenic AtxA-deficient strain in a 2×2 factorial design with growth environments containing or lacking carbon dioxide was utilized. It was found 15 pXO1-encoded genes and three chromosomal genes that were strongly regulated by the separate or synergistic actions of AtxA and carbon dioxide. The majority of the regulated genes responded to both AtxA and carbon dioxide rather than to just one of these factors. Two previously unrecognized small RNAs that are highly expressed under physiological carbon dioxide concentrations in an AtxA-dependent manner were identified. Expression levels of the two small RNAs were found to be higher than those of any other gene differentially expressed in response to these conditions. Using an established recombinase technique, the sRNAs from pXO1 was deleted and phenotypical features of the single and double deletion mutants were characterized.

Biography

Andrei P Pomerantsev received his PhD in chemistry at the Lomonosov Moscow State University in the FSU and moved to the Scientific Research Center for Applied Microbiology, Obolensk, Russia, where he received the DSc degree in microbiology. Since 2001, he has been at the National Institute of Allergy and Infectious Diseases, National Institutes of Health, currently as a Staff Scientist in the laboratory of Stephen Leppla, performing basic and applied research on *Bacillus anthracis* genetics and regulation. He has published more than 30 peer-reviewed research papers in noted journals.

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