

Arthrobacter nicotinovorans pAO1 – Why do we need its proteome?

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Marius Mihasan, Ph.D. Faculty of Biology, Alexandru Ioan Cuza University of Iasi, Romania

Nicotine is an alkaloid produced by the tobacco plant to prevent consumption by herbivores. In humans, it plays an important role in smoking addiction, is able to modulate brain functions but in high doses nicotine is potentially lethal.

Large quantities of solid and liquid waste containing nicotine are generated during the tobacco-manufacturing process and, although considered toxic, are simply discarded into the environment. Nicotine metabolizing bacteria might offer a unique way of exploiting this nicotine-waste for the production of valuable chemicals and to help us better understand the molecular basis of smoking addiction.

Arthrobacter nicotinovorans is such a bacteria able to metabolize nicotine. Nicotine-derivatives produced by *Arthrobacter nicotinovorans* are able to modulate brain functions in rodents. Most notably, 6-hydroxy-nicotine (6HNic) is able to improve short and long-term memory in both normal and an Alzheimer's disease rat model.

We are currently studying the 6HNic metabolism and toxicity in lab-rats. A genetically engineered *Arthrobacter* strain is used to produce the 6HNic, albeit with a rather low efficiency. More data on nicotine transport and pathway regulators is required for further engineering the strain and improving the 6HNic yield. It is envisioned that a mass-spectrometry based proteomic approach would provide such data.



Marius Mihasan is an associate professor in the Faculty of Biology, Alexandru Ioan Cuza University of Iasi, Romania. He is currently visiting Clarkson and working in in the lab of Costel Darie on Fullbright Fellowship. His work focuses on *Arthrobacter nicotinovorans* - a microorganism found in soil that is able to “eat up” nicotine and use it to grow.