## MICROARRAY AS A TOOL TO DISCOVER ENZYMES INVOLVED IN DETOXIFICATION OF OXYGEN-DERIVED OR IRON LIMITATION STRESS AND THAT MAY HAVE POTENTIAL IN BIOTECHNOLOGY

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In general, enzymes have potential in biotechnology and can be used in for instance medicine and life-science industry. Our group utilise the fish pathogenic bacterium *Vibrio (Aliivibrio) salmonicida* as a model organism for various studies including gene regulation, bacterial communication networks and virulence mechanism. *V. salmonicida* causes "cold-water vibriosis" (or "Hitra disease") in fish, including marine-reared Atlantic salmon. Here, we have studied genes and proteins involved in stress management in this bacterium.

Generally, stress to microorganisms can be defined as any deviation from optimal growth conditions that result in a reduced growth rate. In their natural habitat, bacteria can meet various types of stresses such as nutrient availability, radiation, reactive oxygen species or iron limitation. Pathogenic bacteria, for instance, may be subjected to oxidative stress through the oxidative burst from phagocytic cells.

Faced with stress or stressors, bacteria will induce regulatory networks that control the expression of selected gene responses. These regulatory networks are called "stress responses" as the level of the response is highest during a stress condition.

By studying differentially regulated genes and proteins involved in different stress conditions, we get insight into the molecular mechanisms of *V. salmonicida.* In this work, we have studied the response of this bacterium to oxidative-derived free radical ($O_2^-$, $H_2O_2$ and $OH^\cdot$) stress and stress caused by iron limitation. Hydrogen peroxide, paraquat or iron chelator was added to the growth media and microarray was used as a tool to examine the response of the bacteria to these stress conditions.

## THE USE OF BROWN ALGAE OF THE LAMINARIALES FOR MANUFACTURING OF DIETARY JAMS ENRICHED WITH SELENIUM AND CHROMIUM

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Balanced nutriton is one of the factors determining the health of the population of Russia. The topical issues now are the development and manufacturing application of the healthy dietary products. Laminaria is one of the best raw material for such products. It is a natural selective absorbent of macro- and micronutrients accumulated in tissues, contains a large amount of polysaccharides and organic iodine. Biologically active substances of laminaria can reduce blood pressure, increase resistance to infectious diseases, as well as have a positive effect in treatment of cardiovascular diseases, anemia, osteoporosis (Sovershaeva S. N. et al, 2002).

Useful properties of products based on kelp can be enhanced by the addition of micronutrients required for healthy people, and for people suffering from alimentary-dependent diseases.

Cardio-vascular diseases have the leading role among the pathologies associated with poor diet. One of the effective approaches to this socially important issue is the development and manufacturing of new dietic products intended for use in nutrition of persons suffering from such diseases as coronary heart disease and hypertension.

Epidemiological studies have shown that consumption of selenium not only reduced risk of developing of cardiovascular disease, but also contributed to an increase of life expectancy.

An achievement of the national biotechnology was to develop and commercialize the method of cultivation of baker's yeast Saccharomices cerevisiae with a high content of organic forms of selenium (Zolotov P. A. et al, 1998). Broad use of selenium yeast in the diet of the population, however, was