

## **BIO.05 - Inhibitory effect of microalgae and cyanobacteria extracts on influenza virus replication and neuraminidase activity**

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### **Introduction:**

The influenza virus can cause seasonal infections with mild to severe symptoms, circulating worldwide and can affect people in any age group. Therefore, this infection is a serious public health problem that causes severe illness and death in high risk populations. Every year, 0.5% of the world's population is infected by this pathogen. This percentage can increase up to ten times during pandemics infection. Influenza vaccination is the most effective way to prevent disease. In addition, anti-influenza drugs are essential for prophylactic and therapeutic interventions. The oseltamivir (OST, a neuraminidase inhibitor) is the primary antiviral used in the clinic during outbreaks. However, the pressure imposed by OST on this virus has led to the selection of OST-resistant mutants, with a prevalence of 1-2% in different countries. Thus, the search for new anti-influenza drugs is extremely important. Currently, several groups have been developing studies describing the biotechnological potential of microalgae and cyanobacteria, including antiviral activity of their extracts. In Brazil, this potential is poorly known and exploited.

### **Objective:**

The aim of this study is to evaluate the antiviral activity of natural extracts against influenza A and B, oseltamivir-sensitive and -resistant strains and lineages.

### **Methodology:**

With the aim of fulfilling this gap in the knowledge, 38 extracts from microalgae and cyanobacteria isolated from marine and freshwater biomes in Brazil were tested against cellular toxicity; replication and neuraminidase activity of influenza virus OST-sensitive and resistant strains.

### **Results:**

For this purpose, Madin-Darby Canine Kidney (MDCK)-infected cells were treated with 200 µg/mL of each extracts. A total of 17 extracts (45%) inhibited influenza A replication, with 7 of them causing more than 80% inhibition. Moreover, functional assays performed with viral neuraminidase revealed 2 extracts (from *Leptolyngbya sp.* and *Chlorellaceae*) with IC<sub>50</sub> mean < 200 µg/mL for influenza A and B, and also OST-sensitive and -resistant strains. Furthermore, MDCK cells exposed to 1 mg/mL of all the extracts showed viability higher than 80%.

### **Conclusion:**

Our results suggest that extracts of microalgae and cyanobacteria have promising anti-influenza properties. Further chemical investigation should be conducted to isolate the active compounds for the development of new anti-influenza drugs. The data generated contribute to the knowledge of the biotechnological potential of Brazilian biomes that are still little explored for this purpose.

**Keywords: influenza virus inhibition; neuraminidase inhibition; microalgae and cyanobacteria extracts**