

MICROALGAE, A SUSTAINABLE AND INNOVATIVE WAY TO PRODUCE ANTIBODIES TARGETING PEDIATRIC NEUROBLASTOMA

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NEUROBLASTOMA

Neuroblastoma is a pediatric cancer that arises from neuroblasts, which normally develop into neurons and other cells of the nervous system. Instead, these cells proliferate abnormally, forming tumors that typically develops in the abdomen (often from the adrenal glands).

Neuroblastoma affects 25 000 children worldwide every year. The children are under five years old. Neuroblastoma represents the second most common solid tumor in children, after brain tumors. Actually, the children suffering from high risk neuroblastoma possess 50% chance of survival.

PROBLEM

Currently, there is two monoclonal Antibodies (mAbs) that are commercialised to target Neuroblastoma. These mAbs are produced in Chinese Hamster Ovary (CHO) cells, which are very costly and resource-intensive. Therefore, there is a need to decrease the production cost of the mAbs while increasing their safety and if possible efficacy allowing a better access to more patients.

OUR PATENTED SOLUTION

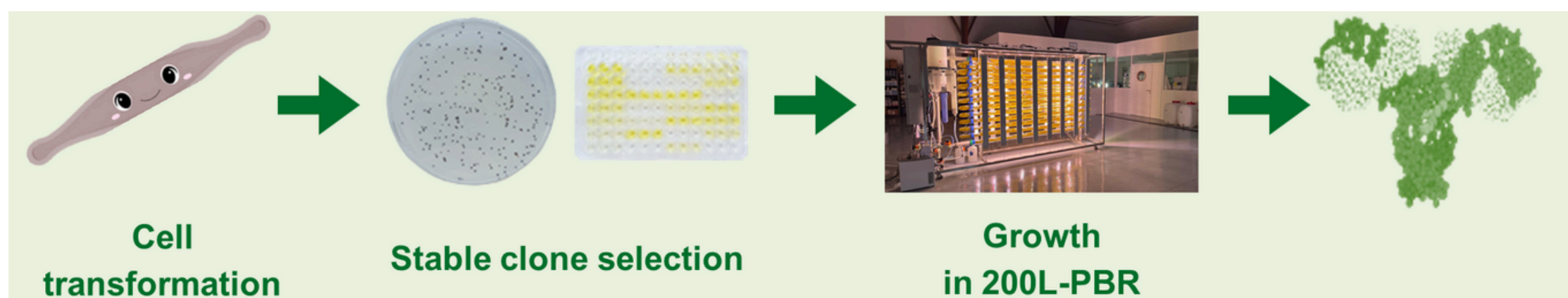
In Alga Biologics, we are bioinspired by the oceans and especially by marine microalgae that we are using as cell biofactories to produce safer, cost-effective and sustainable mAbs.

RESULTS

In this study, we produced mAbs targeting Neuroblastoma in the marine microalgae called *Phaeodactylum tricornutum*.

Such production has been performed after transformation of the microalgae cells in order to produce and secrete the mAbs into the culture medium, selection of the best producer clones and then culture of microalgae at 200L scale.

Finally, the mAbs of interest was purified from the culture media

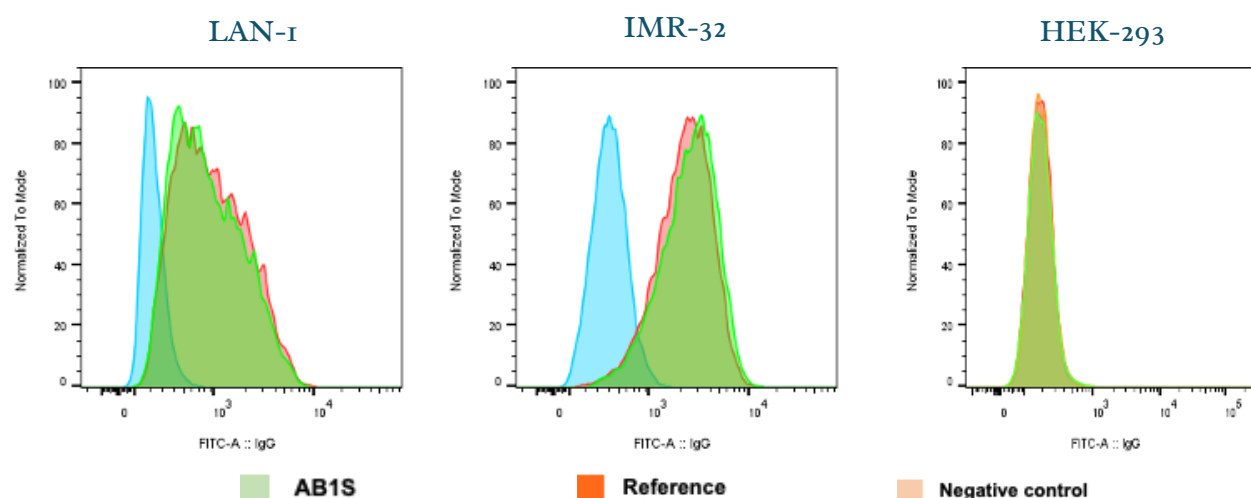


NeuroblastomAb : a fully fonctionnal antibody able to bind the GD2 antigen and the Fcγ receptors of human immune system.

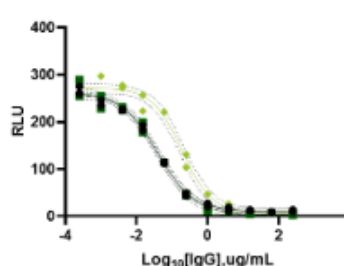
LAN-1, neuroblastoma cell line established in 1977 from a bone marrow metastasis of a 2-year-old boy with stage IV neuroblastoma

IMR-32 neuroblast cells isolated from brain tissue that exhibits neuroblastoma

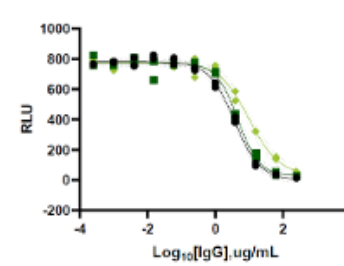
HEK-293 permanent cell line established from primary embryonic human kidney



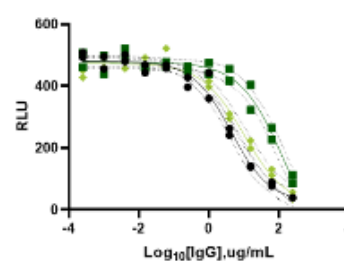
FcγRI Binding Immunoassay



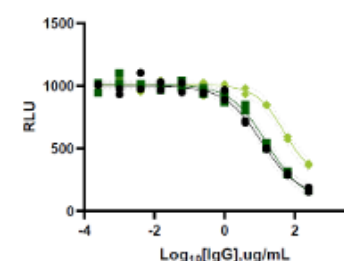
FcγRIIIa V158 Binding Immunoassay



FcγRn Binding Immunoassay



FcγRIIIa F158 Binding Immunoassay



CONCLUSION - PERSPECTIVE

Microalgae are able to successfully produce and accumulate in their culture media full-length and functional antibodies. Antibody structure and activity are comparable to CHO-derived mAbs for antigen and Fcγ Receptors binding and even better regarding the capacity to bind FcRn.

Future experiments will be performed to measure in details the affinity using SPR and to demonstrate the anti-tumor and anti-metastatic effect of the microalgae-based mAbs targeting GD2.

TAKE HOME MESSAGE

The microalgal bioproduction platform offers a cost-effective, clean, flexible and sustainable bioproduction alternative for producing homogenous mAbs and other derived formats. Such production can be done for diagnostic, research and therapeutics applications.

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