T 5.1: From Fundamental research regarding the protein N-glycosylation pathways in microalgae to the production of microalgae-made biologics at industrial scale

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Abstract:

After screening different microalgae from their capacity to synthesize glycoproteins, we identified that the diatom *Phaeodactylum tricornutum* was able to synthesise hyman type N-glycans to its endogenous proteins. Therefore, we decided to demonstrate that is would be possible to use such microalgae as an alternative cell biofactory for the production of antibodies. As compared to mammalian cells as an expression system, the use of microalgae helps us to reduce the production costs of the antibodies while improving their quality and efficacy, thereby facilitating patient access to these innovative treatments. Moreover, this represents a sustainable way to produce antibodies as demonstrated through the production of glycosylated functional antibodies directed against viruses like Hepatitis B and Marburg viruses (Hempel et al., 2011; Hempel and Maier, 2012; Vanier et al., 2015; Hempel et al., 2017; Vanier et al., 2018).
In this context, we created in November 2021, ALGA BIOLOGICS, a deeptech company that is producing antibodies for diagnostic and therapeutic purpose in microalgae like *Phaeodactylum tricornutum*. To achieve its first proof-of-concept at 200L scale, ALGA BIOLOGICS is currently producing an antibody directed against neuroblastoma, a pediatric cancer that affects approximately 25,000 young children worldwide. In this presentation, in vitro functional characterization of this microalgae-made monoclonal antibody will be presented. The company is supported in its ambition by the French government through the France 2030 program under the acceleration strategy for bioproduction and biotherapies and by the ADD (Aide au Développement Deeptech) from BPI France.

Keywords: Microalgae, Bioproduction, Antibodies, Biologics, Sustainability

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