

Alphanosos: Rapid therapeutic response to the COVID-19 crisis

Scientific rationale

By the molecular diversity of its composition, an aqueous edible plant mixture extract (WECMEP) constitutes a massively parallel perturbation of a biological system against which normal eukaryotic cells are much more stable than altered (cancerous or virus-infected) cells and microorganisms. It should therefore be possible to find such mixtures that selectively reduce the growth of organisms on the basis of their difference in systemic robustness. Statistical modelling shows that at a constant dose, a mixture of individually edible plants is less likely to induce deleterious effects than individual edible plants alone. Compounds present in an aqueous extract are very likely to be highly bioavailable and unlikely to accumulate in adipose tissue.

Technological challenges solved by Alphanosos innovations

A library of a few hundred edible plants (of common use and food supplement type, available in bulk and traced) allows to assemble between 10^{10} and 10^{40} mixtures of 5 to 20 plants. A classical systematic experimental screening is therefore impossible. By using innovative and proprietary Artificial Intelligence type algorithms, Alphanosos is able to elaborate active ingredients by typically limiting itself to a few hundred experimental measurements distributed in about ten iterations, *i.e.*, from 30 mixtures per iteration. Other innovations allow Alphanosos to produce dozens of sterile mixtures extracts in the space of 4 hours (or even less depending on human means) allowing an experimental iteration cycle over 24 hours (depending on the *in vitro* model used).

Scientific and technological validation

Alphanosos' technology has already enabled the development of a collection of more than 1000 mixtures with antimicrobial activity, including towards multidrug resistant strains (*S. aureus*, *K. pneumoniae*, *A. baumannii*, *N. gonorrhoeae*, Mycobacteria, *C. albicans*, *Vibrio spp.*, ...). They are patent pending in 71 countries. A second collection was obtained in partnership with the BSF of EPFL, effective specifically against cancer cell lines. In both cases, less than 10 iterations were necessary to obtain activities with potencies between $100\mu\text{g/mL}$ and $1000\mu\text{g/mL}$ total extract ("totum").

COVID-19 project – discovery – expected duration : 3 weeks

Alphanosos proposes to work with an experienced coronavirus laboratory to develop with its AI and WECMEP technology an active ingredient that significantly reduces the speed of virus replication/propagation between cells. This collaborative mode of operation has been validated by the partnership with the BSF-EPFL.

COVID-19 project – deployment into clinical trial – next day after discovery

The WECMEP(s) discovered and selected will have by construction the regulatory status, before therapeutic claim, of a food preparation. According to WHO and FDA, they are adapted to enter directly into phase II. A technology transfer under a confidentiality agreement will enable a hospital pharmacist to produce them immediately as a magistral preparation.

COVID-19 project – deployment at population scale – next day after clinical validation

The selected plants are available, in stocks and traced, on a scale of tens of tons, which can be mobilized by simple order to a supplier, or by requisition, allowing the production of millions of treatments for curative use. Two operators, in "35-hour/week" work conditions can produce at the rate of one ton (typically) of asset per month. Through recruitment and training, or even deployment in hospital pharmacies, a production capacity adapted to the need can be set up in a matter of days.

Regulatory aspects

In the present emergency and following the example of what has already been experimented with bacteriophages, and because of the specific dietary status of the active ingredients developed, the final magistral preparation by hospital pharmacists can be imposed/accepted by the health authorities.

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www.alphanosos.com

<https://www.linkedin.com/feed/update/urn:li:activity:6639449303809167360>

<https://www.biorxiv.org/content/10.1101/2020.01.09.899823v1>

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