ImmunolAge: Quantification of Biological Age through the Immune System

Brief description

Biological aging does not always coincide with chronological age and varies significantly between individuals. This technology allows the objective quantification of the real rate of aging through functional analysis of the immune system from a simple peripheral blood sample.

As a result of more than 40 years of research in the biology of aging, a standardized method has been developed that evaluates key functional parameters of immune cells, integrating them through a proprietary algorithm to estimate an individual's biological age.

The result is delivered in the form of an interpretative report that provides information about the functional status of the immune system and its relationship with the aging process.

This service can be applied to the general population as well as to clinical, preventive, or anti-aging intervention validation programs.

How does it work?

From approximately 8 mL of peripheral blood:

1. Mononuclear cells (PBMCs) and polymorphonuclear cells (PMNs) are isolated.
2. Different immune functional parameters associated with aging are evaluated:

- Cytotoxic activity of Natural Killer cells.
- Chemotactic capacity of lymphocytes.
- Lymphocyte proliferative capacity.
- Chemotactic capacity of neutrophils.
- Phagocytic capacity of neutrophils.

3. The results are integrated using a proprietary mathematical algorithm that estimates biological age or aging rate.

The procedure is fully standardized and experimentally validated.

What problem does it solve?

Currently, most aging biomarkers are based on molecular measurements. This technology provides a direct functional measurement of the immune system's status, one of the main regulators of healthy aging.

It allows:

- Objective evaluation of individual aging.
- Monitoring the effectiveness of nutritional, pharmacological, or lifestyle interventions.
- Validation of anti-aging strategies in clinical or preclinical research.
- Identification of interindividual differences in immune resilience.
- Incorporation of functional biomarkers into clinical trials.

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What future products will it develop?

- One-time analytical service for biological age determination.
- Longitudinal studies for monitoring anti-aging interventions.
- Validation of products or therapies with potential geroprotective effects.
- Functional assessment in clinical trials.
- Preventive medicine and longevity programs.
- Complementary determination based on oxidative and antioxidant parameters.
- Application of equivalent mathematical models in murine models for preclinical evaluation.

Competitive advantages compared to other research

- Evaluation based on real cellular function, not solely on molecular markers.
- High sensitivity to detect changes following interventions.
- Minimally invasive methodology (standard blood draw).
- Does not require complex omics technologies, reducing costs and time.
- Enables reproducible longitudinal studies.
- Extensive prior experimental experience supporting the robustness of the model.

Where has it been developed?

NeuroImmunolAge Research Group (Aging, Neuroimmunology and Nutrition).

Department of Genetics, Physiology and Microbiology. Complutense University of Madrid.

And furthermore…

- Fully standardized and reproducible protocol.
- Validated in research and in collaboration with clinical entities.
- Supported by scientific publications that endorse the methodology.

Researcher in charge

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