Aging Analytics Agency

DEEP KNOWLEDGE GROUP

LONGEVITY INTERNATIONAL

Longevity and Precision Medicine Clinics in Switzerland

Landscape Overview Q3 2021

www.aginganalytics.com

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Introduction

Considering increases in the proportion of the elderly in respect of the populations in developed countries (aka the Silver Tsunami), **the concept of Longevity and Precision Medicine, which is based on advances in modern healthcare**, as well as innovative methods and technologies, is becoming more relevant than ever. Its ultimate goal is to slow down the aging process and prolong active and healthy human life.

Methodologically and conceptually similar, **Longevity and Precision Medicine is an integral part of Anti-Aging Medicine**. Anti-Aging Medicine is an evolving branch of medical science which treats the underlying causes of aging and aims to alleviate age-related ailments. Its ultimate goal is to extend the human healthy lifespan.

In Switzerland, we considered clinic as Longevity and Precision Medicine focused if it has a related products and services such as re-energisation through detoxification, restorement hormone levels with Bioidentical Hormones, measurement bio-markers, etc. The Life Expectancy Index is one of the bright indicators that Longevity and Precision Medicine is high performing in Switzerland.

In 2020, Switzerland was ranked first in Europe in terms of life expectancy (more than 83.8 years) in 2020.

Anti-Aging Medicine holds both risks and opportunities for humans, making it necessary for them to regulate and carefully integrate it into the clinic and society.

Based on the Top Longevity and Precision Medicine Clinics Global Overview 2021 and Top Precision Clinics Global Overview 2021, this report includes:

- A list of innovative Longevity and Precision Medicine Clinics in Switzerland;
- Analysis and examples of the most advanced Longevity and Precision Medicine technologies and research methods;
- A brief description of the methodology used for ranking clinics and their selection criteria.

Landscape Overview of Top Longevity and Precision Medicine Clinics in Switzerland in 2021 is based on:

40+ Longevity and Precision Medicine Clinics

Report Value Proposition

1. Which personalised and preventive therapies, diagnostics, prognostics, technologies and techniques can Longevity and Precision Medicine Clinics use to increase their competitive advantage?
2. What is the optimal set of Longevity and Precision Medicine technologies and services and how can it be integrated into Longevity and Precision Medicine Clinics' existing scope of services?
3. What techniques and technologies will become market-ready in 3 to 5 years' time? Which prospective technologies should Longevity and Precision Medicine Clinics watch out for and use within the next several years?

Over the past five years, we have accumulated enough knowledge and expertise to launch our new project - Longevity and Precision Medicine Landscape Overview in the UK 2021: Most Advanced Clinics, Technologies and Methods.

This report aims to provide:

- Ranking and analysis of the leading Longevity and Precision Medicine Clinics in Switzerland based on the publicity available information;
- In-depth analysis of Longevity and Precision Medicine technologies and therapies available today;
- Tangible estimations of what we can expect in 3 to 5 years, and which new technologies and treatments will be market-ready by 2022-2025;
- Practical guide to putting together the best possible combination of technologies and treatments today and tomorrow.

The information contained herein can help Longevity and Precision Medicine Clinics boost their strategic, technological and scientific prospects and provide their clients with the most sophisticated and comprehensive Longevity and Precision Medicine products and services.

Approach Used

Database

Identification of the leading 40 Longevity and Precision Medicine Clinics in Switzerland is based on the publicly available resources. To rank clinics and select the Top 15, we have developed a methodology and used ratings compiled by independent organisations.

Data Sources[1]

Publicly available sources (websites)	Industry-specific databases	Media overview (articles, press releases)	Industry reports and reviews

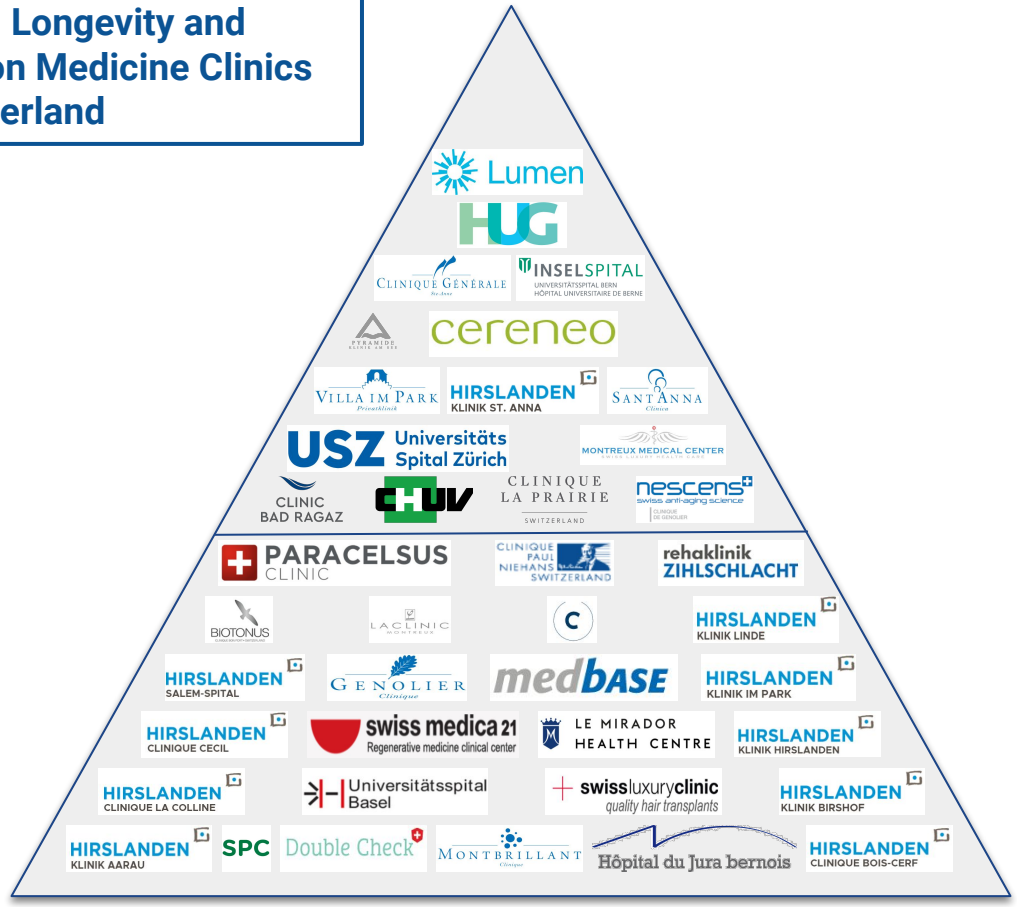
Applied Research & Analytics Methods

Descriptive analysis	Comparative analysis	Qualitative data collection	Mixed data research	Exploratory data analysis	Data filtering

Relying on various research methods and analytic techniques, the present report provides a comprehensive overview of Top 40 Longevity and Precision Medicine Clinics in Switzerland. Being a new type of medical institutions, Longevity and Precision Medicine Clinics play an important role in the implementation of the Longevity and Precision Medicine concept. AAA is not responsible for the quality of the secondary data presented herein; however, we do our best to eliminate the said risks by using different analytic techniques and cross-checking data. Please note that we did not deliberately exclude certain companies from our analysis. Nor was it due to the data-filtering method used or difficulties encountered. In fact, the main reason for their non-inclusion was incomplete or missing information in available sources. Our research is based on publicly available data from open sources provided by the clinics themselves, government and public health organisations, authoritative specialised media and other information resources.

Notes: (1) Grouped by, but not limited to

Leading Longevity and Precision Medicine Clinics in Switzerland



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Top 15 Longevity and Precision Medicine Clinics

1. Lumen Healthcare Clinic (Geneva)
2. Bern University Hospital (Bern)
3. Geneva University Hospitals (Geneva)
4. University Hospital Zurich (Zurich)
5. Lausanne University Hospital (Vaud)
6. Montreux Medical Center (Vaud)
7. Cereneo (Lucerne)
8. Clinica Sant'Anna (Ticino)
9. Clinique Générale Ste-Anne (Fribourg)
10. Privatklinik Villa im Park (Aargau)
11. Klinik Pyramide am See (Zurich)
12. Nescens Clinique de Genolier (Vaud)
13. Clinique La Prairie (Vaud)
14. Medical Center Bad Ragaz (St. Gallen)
15. Klinik St. Anna in Lucerne (Lucerne)

Notes: Based on publicly available data

Analytical Framework
Criteria Classification Directory

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General Characteristics
HQ location
Collaboration
Countries involved
Number of clinics
Regulation level
Regulatory jurisdiction
Size of all facilities
Certification (JCI)
Stage of business's life cycle

Scientific Activity
Grants
H-index
Impact factor of publications
Number of collaborations with scientific establishments
Number of licensed patents
Number of publications
Participation in scientific conferences

Financial Position
Annual revenue
Amount of investments
Number of investors
Number of subsidiary clinics
Ratio of funding to patents filed and grants

Marketing
Customers' interest level
Events attended
Media mentions
Participation in big industry conferences
Sponsorship activities

Focus Level (Therapeutic depth factor)
Biochemistry level
Cellular
Genomic
Organs
Proteins and Cell signaling
Tissue level

Team Composition
Doctors' H-index
Doctors' qualification
Doctors:employees ratio
Number of doctors
Number of employees
Number of specialised doctors

Orientation
Personalised biomarker analysis
Personalised diagnostics
Personalised in vivo & in silico drug testing
Personalised prognostics
Personalised QALY & HALE estimation
Preventive therapies

Clinic specialisation
Longevity and Precision Medicine
Age-related diseases
Aesthetic medicine
Wellness/SPA
Restorative medicine
Regenerative medicine

Infrastructure
Pensions
Hotels
Boutiques

Personality
Medical specialty
Gerontologist
Regenerative medicine specialist
Membership in Associations
Association of gerontologists

Analytical Framework
Criteria Classification Directory

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Services

Personalised Diagnostics
- 3D imaging
- Biomarker analysis
- Database of personal biomedical data
- Dual-energy X-ray absorptiometry scans
- Mobile Apps/AI assistants
- Multi-Omics Sequencing
- Non-invasive monitoring of biomarkers
- Qualitative functional tests
- Telemedicine
- Total-body imaging

Personalised Prognostics
- Disease outcome prognostics
- Personalised in vitro prognostics
- Screening of hereditary diseases
- Virtual Human Prognostics

Cosmetics
- Personalised stem cell creams
- Cosmetic nutraceuticals targeted at the Hallmarks of Ageing
- Cosmetic medicines and surgeries
- Rejuvenated stem cell facelifts

Preventive Treatment
- 3D bioprinting
- Gene therapies
- Genetically engineered cell therapies
- Heart Rate Variability optimisation
- Lifestyle programs
- Microbiome engineering
- Natural mimetics of validated geroprotectors
- Non-surgical heart therapy
- Small molecules & biologics
- Tissue engineering

Reactionary Treatment
- Abdominal medicine
- Ambulance
- Family medicine
- General internal medicine
- Hormone therapy
- Hospice
- Infrared therapy
- Long-term care
- Movement medicine
- Nuclear medicine
- Robotic surgery
- Surgery
- Traveller medicine
- Ultrasound therapy

Technologies

Omics
- Epigenomics
- Foodomics
- Genomics
- Glycomics
- Lipidomics
- Metabolomics
- Nutritional genomics
- Pharmacogenomics
- Pharmacomicrobiomics
- Proteomics
- Toxicogenomics
- Transcriptomics

Data Processing
- Big Data
- Bioinformatics
- Symbolic AI/Machine Learning
- Deep neural networks/ Deep learning
- Cloud computing

Targets of Treatment
- Alcohol/drug treatment
- Allergy
- Biological age measurement
- Cardiology
- Dentistry
- Dermatology
- Endocrinology
- Gastroenterology
- Immunology
- Infectious disease
- Maternal-Fetal medicine
- Neurology
- Obesity
- Oncology
- Ophthalmology
- Orthopaedics
- Otolaryngology
- Rheumatology
- Sleep disorders
- Targeted diseases
- Tracking the effect of therapies
- Urogynecology

Equipment
- 3D whole body photo-imaging system
- Air displacement plethysmography system
- CT/PET scanner
- CTC
- CyberKnife
- DaVinci robotic
- Doppler ultrasonography
- Dual-Energy X-ray absorptiometry (DXA)
- Fit3D
- FlexArm
- GAINSWave
- HRV optimisation device
- Isokinetic dynamometer
- Medical ventilators
- MRI machine
- MR-TRUS Fusion
- Non-Surgical heart therapy device
- SizeStream

Executive Summary

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Executive Summary

Longevity and Precision Medicine Clinics in Switzerland:

The healthcare in Switzerland is universal and is regulated by the Swiss Federal Law on Health Insurance. There are no free state-provided health services, but private health insurance is compulsory for all persons residing in Switzerland. The popularity of Longevity and Precision Medicine in the World and particularly in Switzerland created unprecedented demand for the services proposed by Longevity and Precision Medicine medical institutions. **As the result several medical research centres, think tanks and clinics were reestablished and changed their main focus to the Longevity and Precision Medicine.**

Many of the leading Longevity and Precision Medicine Clinics are located in Switzerland, as Swiss healthcare system is considered to be one among the most effective in the World. Longevity and Precision Medicine Clinic**s in Switzerland propose patients from the whole World a wide range of services** such as, cell therapies, anti aging cosmetology, prophylactic of genetic diseases, biomarker analysis and other effective services which can potentially increase the life expectancy of a patient.

With modern advances in artificial intelligence and machine learning, biomarker research and drug development have produced numerous tools for early diagnostics and prevention of communicable and non-communicable diseases, which remain largely unknown to the global medical community. Longevity and Precision Medicine Clinic**s in Switzerland have a huge potential for growth and development.**

Health Care System in Switzerland is:

- Universal (unified throughout the country)
- Based on high standards
- Regulated by legislation in the field of health care

Key Facts on Longevity and Healthcare in Switzerland:

- **No.1** according to the Life Expectancy Index 2020
- **83.8 years** life expectancy
- **25%** of the world's leading Longevity and Precision Medicine Clinics
- **12.3%** of Switzerland's GDP spends on health care
- **26 cantons** are responsible for organising the health care system
- **392 clinics** are contained on the Federal Office of Public Health website
- **35,900+** patients residing abroad stayed in Swiss hospitals and clinics
- **490,000+** overnight stays are generated by medical tourists
- **~ $220M** a tourism turnover per year

Executive Summary

Currently Available Longevity Treatments & Technologies

The list of the currently available diagnostic and treatment procedures in Longevity and Precision Medicine is quite extensive. We analysed the technology framework and selected the the most popular and well-known currently available diagnostic and treatment:

- Aging diagnostics (Biomarkers, Genetic panels);
- Geroprotection;
- Modern nutritional strategies. Functional nutrition;
- Microecology and microbiota;
- Biorhythm Correction and Sleep Optimisation;
- Functional correction of the hormonal axis;
- Peptide bioregulators;
- Personalised physical activity programs;
- Detox;
- Transfusiology approaches;
- Personalised anti-stress management;
- Placental and cell therapy;
- Physiotherapy and rehabilitation;
- Age-related cosmetology.

Diagnostic & Treatment in Longevity and Precision Medicine

Gene Therapies	Cell Therapies	Tissue Engineering	Small Molecules & Biologics
Natural Mimetics of Validated Geroprotectors	Genetically Engineered Cell Therapies	3D Bioprinting	Microbiome Engineering

We analysed the Progressive Model of P4 Medicine Platform and highlighted the most promising technologies in this Report such as AI-driven precision diagnostics, AI-driven advanced prognostics, personalised treatment optimisation, AI-driven preventative treatment.

AI is used to assess a patient's health and age. The advantage of using a patient's information in an AI-driven environment is that it enables to obtain previously unobtainable insights and conduct a powerful analysis of the data over time In addition, 3D visualisation of a patient's health enables to monitor improvement over a specific period of time.

Wireless implantable medical devices (eep brain neurostimulators, gastric stimulators, cochlear implants, cardiac defibrillators/pacemakers, foot drop implants, and insulin pumps) are commonly used to communicate with an outside programmer (reader) to monitor the health indicators of the patient.

Innovative technologies will enhance the development of Longevity and Precision Medicine as a solution to the internal problems of the human body and normalisation and restoration of its organs and systems.

Executive Summary

Biomarkers of Longevity

Aging Biomarkers already exist, but they are going through a period of discussion and validation. A major biomedical aim of these biomarkers today is to identify the subjects at higher risk for each specific age-related disease and syndrome at very early stage; the challenge of precision preventive medicine.

At present, the combination of last generation effective biomarkers, capable of assessing the deep biological age, with some classical and innovative biochemical and functional disease-specific ones, represents the best strategy to identify Disease-Specific Aging Trajectories in each individual. The use of biomarkers is a crucial component in healthcare research, and clinical practice. It is the foundation upon which measurement of Healthy Longevity and the effectiveness of P4 Medicine, Regenerative Medicine and Longevity therapeutics are built. Aggregation of biomarkers of Longevity, rather than biomarkers of disease only, and from healthy populations — among the young and the even younger, rather than bedside data from the hospital populations, will be part of everyday life due to the novel Digital Health platforms capable of extracting truly massive amounts of clinical relevance data from a single patient through electronic layers.

Aging Analytics Agency produced **Longevity Biomarkers 2021** to present an overview of the global landscape of aging and Longevity biomarkers, containing selected lists, rankings and classification frameworks of more than 150 Single Biomarkers.

Biomarkers are Promising Direction of Longevity Industry

The development and investigation of this area requires significant amount of capital, efforts and time which make biomarkers of longevity difficult to move from the first stage “Research Use Only” to the third “Approved for Clinical Use”. Around 37.5% of biomarkers are currently on the first stage. 29.17% of biomarkers of longevity are on the second stage which means they are healthcare-ready. 33.33% of biomarkers are on the third final stage and are considered to be approved for clinical use.

Categories of Biomarkers

- Blood-based Biomarkers
- Morphological, Physical and Physiological Biomarkers
- Transcriptomic Proteomics Biomarkers
- Combinations of biomarker categories: “Digital Avatars”
- Gut/Skin Microbiome Biomarkers
- Immunological Biomarkers
- Neurological Biomarkers
- Epigenetic Biomarkers

Summary of Comparative Analysis

	Lumen	INSELSPITAL	HUG Hôpitaux Universitaires Genève	CHUV	USZ Universitäts Spital Zürich
3P Approach	✓	✓	✓	✓	✓
Science-backed treatments	✓	✓	✓	✓	✓
Longevity and Precision Medicine Research	x	✓	✓	✓	✓
Specialisation	Anti-Aging, Cellular Therapies, Longevity and Precision Medicine, Regenerative & Aesthetic Medicine, Microbiote Rejuvenation, Checkup & Early Diagnosis, Stem Cells	Bioinformatics, Big Data, Blood and Marrow Transplantation, Cell Therapies, Genetic Testing	Big Data, Robotic Surgery, Stem Cell Therapies, Genetic Medicine, Elderly Care, Psychiatry, Chronic Pain	Big Data, Bioinformatics, AI, Personalized and Predictive Oncology (Tumor Genotyping), Robotic Surgery, Research on Metabolism, Nutrition, Ageing, and Associated Diseases	Bioinformatics, Big Data, AI for Oncology Imaging, Preventive Health Checkups, Diabetology and Clinical Nutrition, Geriatrics, Regenerative Medicine
Primary source of funding	Private	Public	Public	Public	Public
Advanced Equipment	3T MRI Machine, Helical MDTC Scans, Advanced Microscopy Equipment	CT, PET, MRI, Mammography, Ultrasound, X-Ray, Fluoroscopy, Neuroimaging, Nuclear Medicine	CT, PET, MRI, Mammography, Ultrasound, X-Ray, Fluoroscopy, Neuroimaging, Advanced Microscopes, Nuclear Medicine, Da Vinci Robotics, Cryobank	CT, MRI, Mammography, Ultrasound, da Vinci Robotics, Cyberknife M6	CT, PET, MRI, Mammography, Ultrasound, X-Ray, Fluoroscopy, Nuclear Medicine, Whole-Body Motion Analysis
Number of employees	100+	7,200+	10,000+	10,000+	8,000+

Summary of Comparative Analysis

	MONTREUX MEDICAL CENTER	cereneo	SANT ANNA Clinica	CLINIQUE GÉNÉRALE Ste-Anne	VILLA IM PARK Privatklinik
3P Approach	✓	✓	✓	✓	✓
Science-backed treatments	✓	✓	✓	✓	✓
Longevity and Precision Medicine Research	x	✓	x	x	x
Specialisation	Regenerative medicine, Activated Cellular Extract, Detoxification, Study on more than 70 laboratory values (markers, hemoglobin, etc.), Complete physical assessment	Personalised neurorehabilitation: movement therapy, speech- and language therapy, neuropsychology	Preventive check-ups; Personalised and integrative health approach; Personalised plastic, reconstructive and cosmetic surgery approach; Personalized Oncology	State-of-art clinical infrastructure; Personalized cancer medicine; Personalised and integrative health approach;	Bioinformatics, Big Data, AI for Oncology Imaging, Preventive Health Checkups, Diabetology and Clinical Nutrition, Geriatrics, Regenerative Medicine
Primary source of funding	Private	Private	Private	Private	Private
Advanced Equipment	Undisclosed	Dynamic Partial Body Weight Support (DBWS), Split-Belt Treadmill, Indego® Exoskeleton by Parker Hannifin	Undisclosed	Advanced Microscopy Equipment	CT, PET, MRI, Mammography, Ultrasound, X-Ray, Fluoroscopy, Nuclear Medicine, Whole-Body Motion Analysis
Number of employees	100+	100+	100+	100+	100+

Summary of Comparative Analysis

	PYRAMIDE KLINIK AM SEE	nescens swiss anti-aging science	CLINIQUE LA PRAIRIE SWITZERLAND	CLINIC BAD RAGAZ	HIRSLANDEN KLINIK ST. ANNA
3P Approach	✓	✓	✓	✓	✓
Science-backed treatments	✓	✓	✓	✓	✓
Longevity and Precision Medicine Research	x	✓	✓	x	✓
Specialisation	Anti-Aging, Cellular Therapies, Longevity and Precision Medicine, Regenerative & Aesthetic Medicine, Microbiote Rejuvenation, Checkup & Early Diagnosis, Stem Cells	Bioinformatics, Big Data, Blood and Marrow Transplantation, Cell Therapies, Genetic Testing	Big Data, Robotic Surgery, Stem Cell Therapies, Genetic Medicine, Elderly Care, Psychiatry, Chronic Pain	Musculoskeletal Rehabilitation, Internal-Oncological Rehabilitation, Anti-Aging Therapies; Detox; Gynaecology & Fertility. Holistic approach to health	Bioinformatics, Big Data, AI for Oncology Imaging, Preventive Health Checkups, Diabetology and Clinical Nutrition, Geriatrics, Regenerative Medicine
Primary source of funding	Private	Private	Private	Private	Private
Advanced Equipment	3T MRI Machine, Helical MDTC Scans, Advanced Microscopy Equipment	CT, PET, MRI, Mammography, Ultrasound, X-Ray, Fluoroscopy, Neuroimaging, Nuclear Medicine	Cell therapy, Acupuncture, Aesthetic surgery, Coolsculpting, Dietetics	Undisclosed	Undisclosed
Number of employees	100+	200+	100+	100+	1000+

Section 1:
Top Longevity and Precision Medicine Clinics in Switzerland

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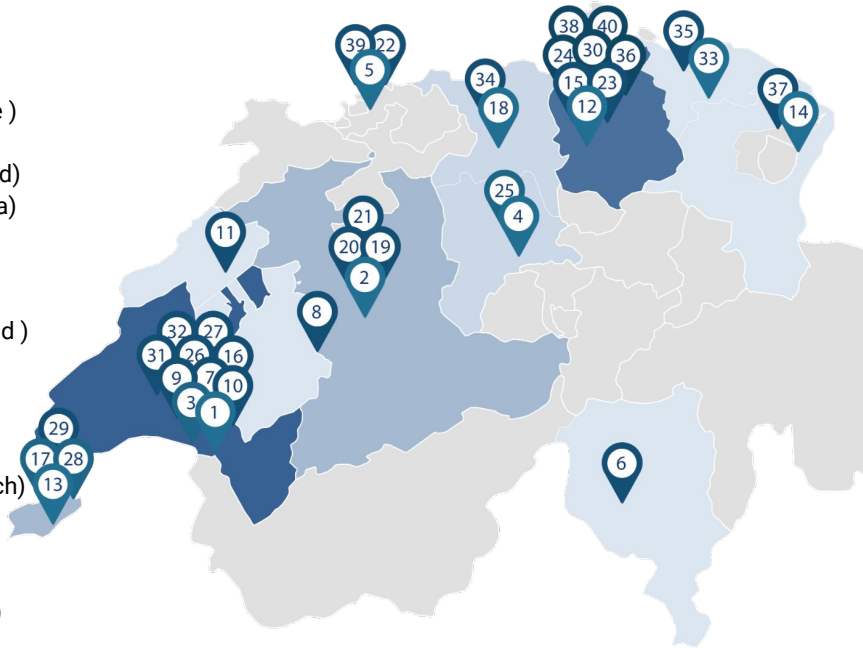
1.1 Longevity and Precision Medicine Clinics in Switzerland

1. Paul Niehans Clinic (Vaud)
2. Bern University Hospital (Berne)
3. Biotonus Centre, Bon-Port Clinic (Vaud)
4. Cereneo (Lucerne)
5. Clarunis University Abdominal Center Basel (Basel)
6. Clinica Sant'Anna (Ticino)
7. Clinique Cecil in Lausanne (Vaud)
8. Clinique Générale Ste-Anne (Fribourg)
9. Clinique La Prairie (Vaud)
10. Clinique Les Hauts de Genolier Genolier (Vaud)
11. Clinique Montbrillant (Neuchatel)
12. Double Check (Zurich)
13. Geneva University Hospitals (Geneva)
14. Medical Center Bad Ragaz (St. Gallen)
15. Hirslanden Clinic in Zurich (Zürich)
16. Hirslanden Clinic in Bois-Cerf (Vaud)
17. Hirslanden Clinique La Colline (Geneva)
18. Hirslanden Klinik Aarau (Aargau)
19. Hirslanden Klinik Linde (Berne)
20. Hirslanden Salem-Spital (Berne)
21. Hopital du Jura Bernois, Site de Moutier (Berne)
22. Klinik Birshof in Basel (Basel)
23. Klinik im Park in Zurich (Zurich)
24. Klinik Pyramide am See (Zurich)
25. Klinik St. Anna in Lucerne (Lucerne)
26. Laclinic-Montreux (Vaud)
27. Lausanne University Hospital (Vaud)
28. Le Mirador Medical Centre (Geneva)
29. Lumen Healthcare Clinic (Geneva)
30. Medbase Checkup Center (Zurich)
31. Montreux Medical Center (Vaud)
32. Nescens Clinique de Genolier (Vaud)
33. Paracelsus Clinic (Appenzell Ausserrhoden)
34. Privatklinik Villa im Park (Aargau)
35. Rehaklinik Zihlschlacht (Thurgau)
36. Swiss Luxury Clinic in Zurich (Zurich)
37. Swiss Medica (St. Gallen)
38. Swiss Prevention Clinic (Zurich)
39. University Hospital Basel (Basel)
40. University Hospital Zurich (Zurich)



Notes: Based on publicly available data

1.2 Top 15 Longevity and Precision Medicine Clinics in Switzerland

The Top 15 of Longevity and Precision Medicine Clinics in Switzerland has been compiled as per the ranking methodology described in Chapter 2.1. The clinics are assessed according to multiple criteria, parameters and expert assessment. The methodology used makes it possible to rank the clinics even if the information on them is incomplete or unavailable (e.g. due to the lack of generally accepted standards, absence of aging in the classification of diseases or the lack of a clear efinition of Longevity and Precision Medicine Clinics).

Included in the list are Longevity and Precision Medicine Clinics that use modern technologies for diagnosis, treatment and prevention of diseases. Other selection criteria included individual variability in the genomic landscape, environment and lifestyle.

The selected clinics are assessed according to the weighted average indicators:

- Indicators are assigned weights based on the results of expert assessment to be used in the overall ranking;
- The total score for all criteria is determined for each clinic. The overall rating is calculated by taking into account the weights for each indicator

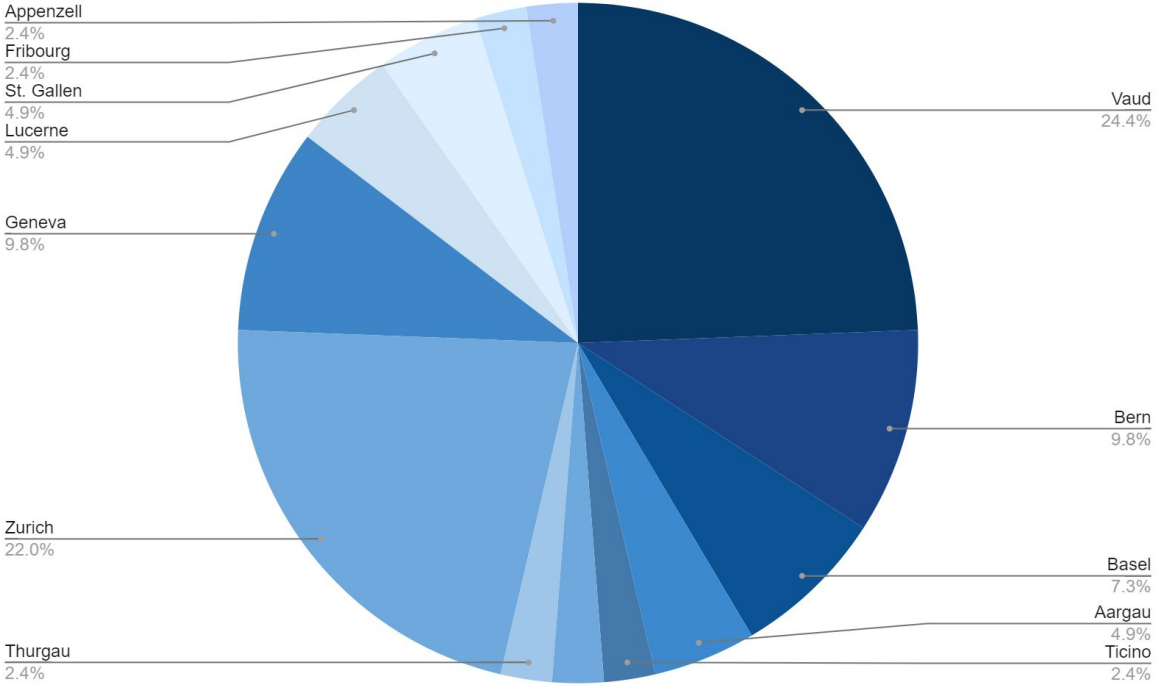
Top 15 Longevity and Precision Medicine Clinics

1. Lumen Healthcare Clinic (Geneva)
2. Bern University Hospital (Bern)
3. Geneva University Hospitals (Geneva)
4. University Hospital Zurich (Zurich)
5. Lausanne University Hospital (Vaud)
6. Montreux Medical Center (Vaud)
7. Cereneo (Lucerne)
8. Clinica Sant'Anna (Ticino)
9. Clinique Générale Ste-Anne (Fribourg)
10. Privatklinik Villa im Park (Aargau)
11. Klinik Pyramide am See (Zurich)
12. Nescens Clinique de Genolier (Vaud)
13. Clinique La Prairie (Vaud)
14. Medical Center Bad Ragaz (St. Gallen)
15. Klinik St. Anna in Lucerne (Lucerne)

Notes: Based on publicly available data

1.3 Distribution of Leading Longevity and Precision Medicine Clinics

Distribution of Leading Longevity and Precision Medicine Clinics by Cantons of Switzerland



Notes: Based on publicly available data

Section 2:
Contributions of Health Care to Longevity: A Review of Switzerland's Case

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2.1 Overview of the Swiss Health Care System

Switzerland, according to the Life Expectancy Index 2020, ranks first in Europe in terms of life expectancy (more than 83.8 years). Medical diagnostics is recognised as one of the most accurate in the world. Swiss clinics differ from other European clinics in a higher level and quality of patient care and in being equipped with modern medical equipment.

Switzerland is one of the world leaders in healthcare innovation. Here, the latest scientific discoveries are directly introduced into clinical practice ("translational medicine"). Hundreds of firms and laboratories work in the field of medical research, which are usually closely associated with clinics. Advanced research and development in this area is funded by private funds and receives government support.

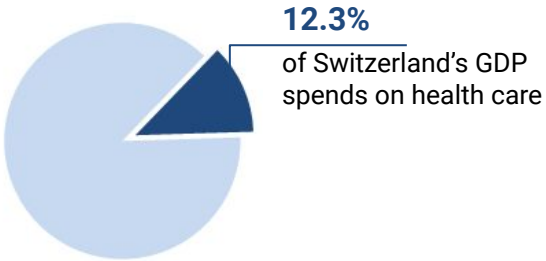
The training level of doctors and medical personnel is very high. Leading clinics and universities are integrated into the medical education system. **Swiss medical professionals have the most demanding criteria in the world to qualify for medical practice.**

Medicine is personalised. For each patient, individual diagnostic, treatment and rehabilitation programs are drawn up. **Much of the medical technology is produced directly in Switzerland.** The world's leading Big Pharma companies are located in Switzerland.

A significant part of the medical equipment produced in the country is exported. **Swiss medical technology and equipment are known throughout the world as perfect and reliable.** Swiss medicines are also highly valued in the world market. Swiss pharmaceuticals are supplied to most countries of the world, primarily to the USA and EU countries.

The country has created several sub-health clusters that bring together manufacturers of medical equipment and medicines, research laboratories and medical centers.

The health and medical industry is an important sector of the Swiss economy. Switzerland leads Europe in terms of the share of health care expenditures in the country's GDP, which is 12.3%.



Sources: United Nations Development Program

2.2 Organisational Structure of Health Care in Switzerland

The health care system in Switzerland is universal (unified throughout the country), meets high standards and is regulated by legislation in the field of health care.

The authorities of 26 cantons are responsible for organising the health care system in Switzerland. Ministers of Health of all the cantons form the Swiss Conference of Health Ministers of cantons (GDK), which aims to promote cooperation and the implementation of a common policy in the field of health between the cantons. The regulatory authority is the Federal Office of Public Health (FOPH).

The Swiss medical system is an efficient model with some of the highest per capita costs in the world. The financing of the healthcare system is based on health insurance, which is compulsory for all residents.

Every resident is required to have a basic insurance and accident insurance policy. In addition to basic health insurance, many people living in Switzerland purchase private health insurance. **Switzerland's private healthcare sector is one of the largest in the world and provides all possible medical services.**

The costs of complementary and alternative treatments offered by Swiss medical institutions are covered by the health insurance policy.

Organisational Forms of Medical Institutions in Switzerland:

1. Private practice (Arztpraxis)
2. Hospital (Belegarztspital)
3. Private hospital with hired doctors (Privatspital mit angestellten Ärzten)
4. Public hospital (öffentliches Spital)
5. Mixed form (combining elements of several of the above forms)

Swiss Healthcare Regulations Include[1]:

- International treaties
- Federal health laws (Swiss Federal Health Insurance Law)
- Cantonal laws

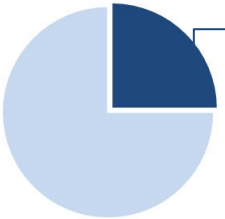
Sources: Federal Office of Public Health
Notes: (1) Depending on the canton, the list of treatments and the procedure for their provision differ.

2.3 Medical Centers and Clinics in Switzerland

Hospitals and ambulances are supported by the cantons. Medical faculties are located on the basis of cantonal hospitals, which train specialists in various fields. Private hospitals, outpatient clinics, nursing homes, facilities for the disabled and patients with chronic diseases can also receive government subsidies. So the government guarantees the local residents the provision of quality medical care. In addition, there are a large number of private clinics in the country.

Switzerland has an extensive network of modern public and private clinics, employing highly qualified doctors from all over Europe. The country occupies leading positions in the field of neurosurgery, cardiac surgery, oncology treatment, orthopedics, plastic and reconstructive surgery.

All Swiss medical institutions provide many types of specialised medical care and outpatient treatment, equipped with the most modern medical equipment. Its use can significantly shorten the period between the development of a treatment plan and the initiation of therapy. **Modern diagnostics, full screening upon admission and constant monitoring of the patient's health** are the three pillars on which the entire Swiss healthcare system rests. And impeccable comfort standards ensure quick recovery.



25%

of the world's leading Longevity and Precision Medicine Clinics are located in Switzerland

Our experience in analytical research in Longevity and Precision Medicine shows that about 25% of the world's leading Longevity and Precision Medicine Clinics are located in Switzerland. **Switzerland has received well-deserved recognition for the results of treatment in its rehabilitation clinics.** These facts contribute to the fact that in the study of Longevity and Precision Medicine Clinics we also consider rehabilitation and holistic approaches of leading clinics.

The Federal Office of Public Health website contains the official list of 392 clinics (hospitals) in Switzerland. From this list, we have selected clinics that, with a certain degree of probability, can be attributed to the Longevity category according to the selected criteria for the Longevity and Precision Medicine to which patients can be sent for more advanced and in-depth diagnostics and therapy.

Sources: Federal Office of Public Health

2.4 Advantages of Diagnostics in Longevity and Precision Medicine Clinics in Switzerland

Advantages of Diagnostics in Longevity and Precision Medicine Clinics in Switzerland

- Personalised diagnostics based on advances in molecular biology and genetics
- Personalised treatment aimed at prolonging active life
- Prevention and rehabilitation programs
- Qualified specialists: professors, doctors of sciences, the best doctors in Europe
- Modern ultra-precise diagnostic equipment and digital technologies
- Premium living conditions and high service

Medical Tourism

Switzerland is figuratively called the "medical capital of the world". Tens of thousands of foreign patients come to the country every year, wishing to undergo medical diagnostics, treatment and rehabilitation in this country. The state provides financial assistance to promote the services of Swiss clinics abroad. The assistance is carried out through the Swiss Association of Clinics and Hospitals.

35,900+
patients residing abroad stayed in Swiss hospitals and clinics (2% of all patients in Switzerland).

490,000+
overnight stays are generated by medical tourists in Switzerland.

~ $220M
a tourism turnover per year with accommodation, excursions, and meals.

Sources: Federal Office of Public Health; Switzerland Tourism

Section 3: Classification & Technology Framework

AGING
ANALYTICS
AGENCY

3.1 Research Methodology and Criteria

Research Timeline

Preamble

This analytical study draws on regional research in the Longevity and Precision Medicine Industry and research in **Regenerative Medicine and Longevity and Precision Medicine Clinics** conducted since 2013. It also contains a brief description of **our vision of the research methodology used, as well as our approach to the formation of selection criteria and a ranking system.**

One of the main achievements of the analytical study is the **refinement of the Longevity and Precision Medicine concept and creation of an objective system for evaluating Longevity and Precision Medicine Clinics** according to multiple parameters.

Longevity and Precision Medicine is a rapidly evolving branch of preventative Longevity and Precision Medicine that focuses on promoting healthspan and lifespan, and utilising aging biomarkers commonly referred to as aging clocks.

Longevity and Precision Medicine is the next generation of Longevity and Precision Medicine that evaluates patient parameters within a reference range for the ideal biological age of the patient and seeks to close the gap between current parameters and parameters of maximum physical performance for the ideal age. Deep aging clocks as quantifiable, trackable and accurate biomarkers of aging are an indispensable component of Longevity and Precision Medicine. Without the ability to measure biological age and how it changes as a result of interventions, Longevity and Precision Medicine cannot be applied.

This area of medicine will revolutionise healthcare and change the worldview of everyone — doctors, politicians and, above all, patients.

3.1 Research Methodology and Criteria

In the first stage, we sought to **analyse clinics providing Longevity and Precision Medicine-related services**, attempted to **determine parameters** affecting the assessment of these clinics and tried to **create a ranking system** for the assessment of Longevity and Precision Medicine Clinics.

We **reviewed and analysed methodology for compiling annual ratings of the best clinics** used by Newsweek & Statista, IBM Watson Health, and Overall Hospital Quality Star Ratings. Compiling such ratings required using various methods, including but not limited to, expert assessments, surveys of patients and clinic managers, and statistical methods.

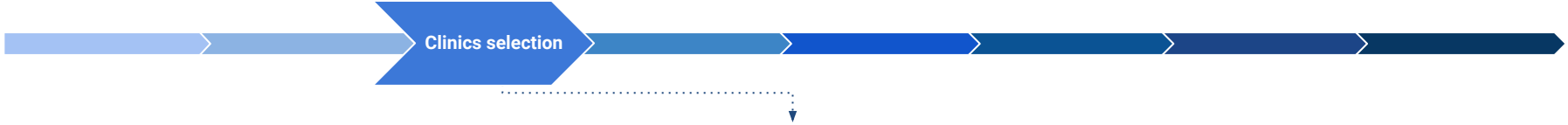
We relied on **more than 140 qualitative and quantitative criteria** we derived while conducting our previous studies. Analysis of the above methodologies allowed us to significantly increase the total number of criteria and parameters and pinpoint those of them that are crucial for including hospitals into the Longevity and Precision Medicine category. The **use of mathematical models and statistical methods of data processing** under conditions of incomplete information and uncertainty allowed us to achieve more accurate results.

The Proper Longevity and Precision Medicine Clinics **criteria system relies on qualitative and quantitative indicators** using which we were able to come up with a collective image of an ideal clinic and apply it to other areas (e.g. diagnostic techniques, equipment and technology used, scientific examination, and therapeutic specialisation).

The stages of the study (i.e. annual or in-depth in one of the regions) are as follows:

- Formation and refinement of the primary set of criteria and updating assessment methodology;
- Approval of the methodology and criteria with the Customer (in the case of a custom research mandate);
- Creation of a database of clinics, including special selection criteria;
- Evaluation of clinics by using indicators characterising Longevity and Precision Medicine Clinics;
- Determination of the best clinics (in several nominations) by ranking.

3.1 Research Methodology and Criteria



Formation of a List of Clinics

The **clinics were selected from amongst medical institutions, hospitals and clinics**, information about which can be obtained from open sources, verified databases of government and public organisations, and international and country ratings of clinics [1, 2, 3, 4, 5].

This approach made it possible for us to select **the best certified clinics that meet international standards, employ highly qualified personnel, use modern technologies and research methods, utilise cutting-edge equipment and have a well-developed infrastructure**.

While assessing the clinics, the following indicators were taken into account by default: opinions of patients, doctors, researchers and hospital managers, survival rate adjusted for risk, volume and quality of care, and clinic efficiency based on patient outcomes.

It should be kept in mind that the **parameters of international ratings and Longevity and Precision Medicine criteria may differ substantially** (e.g. the number of beds in a hospital, the average length of stay of a patient in it until recovery, etc.), therefore, we **did not limit** ourselves only to **clinics that were included in international rankings according to any particular criterion.**

One of the **parameters** we used is the **presence of a clinic in international rankings**. If a clinic that qualified for the Longevity and Precision Medicine Clinics category was included in international or regional ratings of the best clinics, its chances of being positively assessed in our rating increased substantially.

While selecting and ranking clinics for data validation and verification, we also used the following generally accepted methods: **expert assessments, patient surveys, clinic survey methods and "mystery shopper"**.

3.1 Research Methodology and Criteria

At this stage, clinics that do not specialise in the prevention and treatment of aging manifestations (e.g. surgical, oncological or pediatric ones), as well as clinics practicing traditional and alternative medicine) are excluded from consideration.

The criteria used for selecting clinics can be attributed to the following main groups:

- Specialisation (target of treatment);
- Technologies and diagnostic methods (personalised diagnostics);
- Technologies and treatment methods;
- Equipment;
- Medical staff (composition);
- Each of these groups can be broken down into subgroups.

The list of Longevity and Precision Medicine Clinics selection criteria is being constantly updated. New criteria identified in open sources (e.g. publications, databases, the Internet, expert opinion, etc.) are being constantly added to it. Below are the examples of groups of criteria, each of which can be applied to Longevity and Precision Medicine Clinics:

- Age-related diseases;
- Systemic inflammation;
- Aesthetic medicine;
- Regenerative medicine;
- Cell technologies.

3.1 Research Methodology and Criteria

Formation of a Primary Set of Criteria and Assessment Methodology

Currently, our basic set of verified, balanced and harmonised criteria (with an adapted SMART approach — Specific, Measurable, Achievable, Relevant, Time bound used in time management) for benchmarking and scoring clinics includes more than **140 criteria (quantitative and qualitative ones)**. This basic set of criteria has been complemented by the Longevity and Precision Medicine selection criteria proposed by experts in fields of biology of aging, anti-aging medicine and Gerontology.

Based on the results of surveying the expert community, the criteria for **the selection and comparison of clinics were supplemented with the weighting coefficients of conformity to the Longevity and Precision Medicine category**. The weighting factors characterise the contribution of each criterion to the overall assessment of the clinic.

For comparative analysis of Longevity and Precision Medicine Clinics, a multi-criteria linear model is used in which, after several iterations on additional “training samples” of Longevity and Precision Medicine Clinics, iterative refinement of the criteria weights is carried out.

This approach will allow us to increase the number of criteria for comparative analysis and use Machine Learning and AI algorithms in the future. **Multi-criteria optimisation methods** make it possible to select the most significant criteria and reveal hidden connections and patterns.

These approaches also make it possible to reveal inaccurate information, as well as dubious, unverified and unconfirmed methods of diagnostics and therapy, which are declared as anti-aging, slowing down aging or prolonging life.

Determination of the minimum set of Longevity and Precision Medicine criteria will allow clinics to be **ranked according to various Longevity and Precision Medicine parameters in real time**.

New and additional features for multi-comparative analysis of Longevity and Precision Medicine Clinics can ensure a smooth **transition from a linear to a non-linear scoring model**.

3.1 Research Methodology and Criteria

The selected clinics are assessed according to weighted indicators:

- Indicators are assigned weights based on the results of expert assessment to be used in the overall ranking;
- The total score for all criteria is determined for each clinic. The overall rating is calculated by taking into account the weights for each indicator.

Given that we are dealing with multi-parametric analysis, the following mathematical model that allows us to carry out a comparative analysis for any set of criteria and parameters is used:

$$Z\left(C\left(\frac{n^k}{n^i}\right), P\left(\frac{m^l}{m^j}\right)\right) = F\left(G\left(n^k\, m^l\, n^i\, m^j\right) * P\left(\frac{m^l}{m^j}\right)\right)$$

‘C’ stands for a certain number of analysed clinics from n = i to n = k; ‘P’ denotes parameters used for this analysis from m = j to m = l

‘G’ is a matrix that sets weights for both parameters and clinics; ‘F’ is a normalising function, the form of which is determined by the developed mathematical model.

Thanks to this methodology, ranking becomes possible even if the data about a certain clinic is incomplete (e.g. due to the lack of generally accepted standards, absence of aging in the classification of diseases or lack of a clear definition of Longevity and Precision Medicine Clinics).

Longevity and Precision Medicine Clinics ranking stages:

1. The clinics are ranked based on their overall scores.
2. The clinics are listed in descending order according to their score.
3. The best clinics with the highest overall score are determined.

3.2 Currently Available Longevity and Precision Medicine Treatments & Technologies

Longevity and Precision Medicine is a new direction in health care whose **goal is to increase the average life expectancy of a person** in the near term and increase the maximum life expectancy of a person in the long term.

This branch of medicine includes the following areas:

- Early diagnosis of diseases that are characterised as age-dependent;
- Prevention of early development of age-related diseases and general early aging or involution;
- Diagnosis and treatment of age-related diseases ;
- Prolongation of the active phase of a person's life (for as long as their mental, physical and, social activity is preserved);
- Improving the quality of life at all stages of aging of the human body;
- Treatment and care in old age (geriatric care).

The list of the currently available diagnostic and treatment procedures in Longevity and Precision Medicine is quite extensive.

The Most Popular and Well-known Currently Available Diagnostic & Treatment

Aging diagnostics (Biomarkers, Genetic panels)	Geroprotection	Modern nutritional strategies. Functional nutrition
Microecology and microbiota	Biorhythm correction and sleep optimisation	Functional correction of the hormonal axis
Peptide bioregulators	Personalised physical activity programs.	Detox
Transfusiology approaches	Personalised anti-stress management	Placental and cell therapy
Physiotherapy and rehabilitation	Age-related cosmetology	

3.2 Currently Available Longevity and Precision Medicine Treatments & Technologies

Key Results of Longevity and Precision Medicine

- Improving the quality of human life
- The maximum duration of the health age
- The maximum duration of mental and physical activity
- Mild course of age-related diseases with a minimum number of complications and a minimum percentage of unfavorable outcomes
- Achievement of the maximum possible average life expectancy of a particular individual **(from 90 to 120 years)**

Based on this and taking into account the structure and capabilities of modern health care, several levels of the structure of the Longevity and Precision Medicine Clinic can be assumed, namely:

- Longevity and Precision Medicine Cabinet. Being part of the Longevity and Precision Medicine healthcare structure, it can be a clinic that provides the minimum required set of medical services.
- Closed-Loop Clinic. Since it is capable of providing the maximum range of medical services, its main goal will be to extend the average life expectancy of a person and go beyond it in the near future.

3.2 Currently Available Longevity and Precision Medicine Treatments & Technologies

Diagnostic & Treatment in Longevity and Precision Medicine

Gene Therapies	Cell Therapies	Tissue Engineering	Small Molecules & Biologics	Natural Mimetics of Validated Geroprotectors	Genetically Engineered Cell Therapies	3D Bioprinting	Microbiome Engineering
Gene therapy is an experimental technique that uses genes to treat or prevent disease. In the future, this technique may allow doctors to treat a disorder by inserting a gene into a patient's cells instead of using drugs or surgery.	Cell therapy is the transplantation of human cells to replace or repair damaged tissue and/or cells. With new technologies, many different types of cells may be used as part of a therapy or treatment for a variety of diseases and conditions.	Tissue engineering is the construction of bioartificial tissues in vitro as well as the in vivo alteration of cell growth and function via implantation of suitable cells isolated from donor tissue and biocompatible scaffold materials.	Small molecules are used to treat a variety of diseases and can be quite diverse in their mechanisms of action. It can be effective enzyme inhibitors and can target extracellular proteins or intracellular receptors in the cytosol, nuclei, and central nervous system.	E.g. metformin, rapamycin). Scientists find natural mimetics as anti-cancer, anti-aging drugs metformin, and rapamycin. Geroprotectors of natural origin and supplements has a strong potential on the market.	T cells genetically equipped with chimeric antigen receptors (CARs) or TCRs have shown remarkable effectiveness in treating some hematological malignancies, although the efficacy of engineered T cells in treating solid tumors is far from satisfactory.	Three dimensional (3D) bioprinting is the utilisation of 3D printing – like techniques to combine cells, growth factors, and/or biomaterials to fabricate biomedical parts, often with the aim of imitating natural tissue characteristics.	Microbiome engineering holds great promise because of advances in the field of synthetic biology, which strives to create and rewire biological organisms so they perform desired tasks.

3.2 Currently Available Longevity and Precision Medicine Treatments & Technologies

Overview of the Progressive Model of P4 Medicine Platform

AI-Driven Precision Diagnostics

- Multi-Omic Sequencing
- Continuous monitoring powered by Big Data Analytics
- Continuous monitoring of health state based on changes in biomarkers of aging

AI-Driven Advanced Prognostics

- AI-driven prognostics
- Advanced biomarker-based prognostics
- AI-driven predictive prognostics based on personalised multi-omics

Personalised Treatment Optimisation

- AI-driven in silico personalised treatment optimisation
- AI-driven personalised in vivo drug optimisation
- Treatment optimisation based on patient genetics

AI-Driven Preventative Treatment

- Maintenance state of precision health through preventive medicine
- AI-based predictions of optimal drug combination

3.2 Currently Available Longevity and Precision Medicine Treatments & Technologies

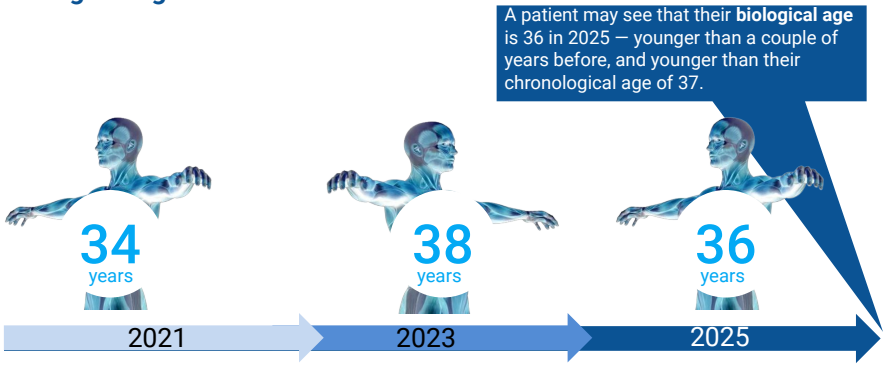
Precision Diagnostics

- Multi-Omics Sequencing
- Qualitative functional tests
- Non-invasive continuous monitoring of biomarkers
- Whole-body and organ specific biological age calculation based on biomarkers
- Multi-modal total-body imaging
- 3D integration of cross-sectional tissue and organ imaging

Young.AI is a digital avatar that uses AI to assess a patient's health and age. The advantage of using a patient's information in an AI-driven environment is that it enables to obtain previously unobtainable insights and conduct a powerful analysis of the data **over time.**

3D visualisation of a patient's health enables to monitor not only its deterioration, but also improvement over a specific period of time. An interpretation can be made based on a patient's personal circumstances. A patient may, therefore, be able to see how their body has changed in terms of health, function, and biological age over a period of 5 years.

Biological Age



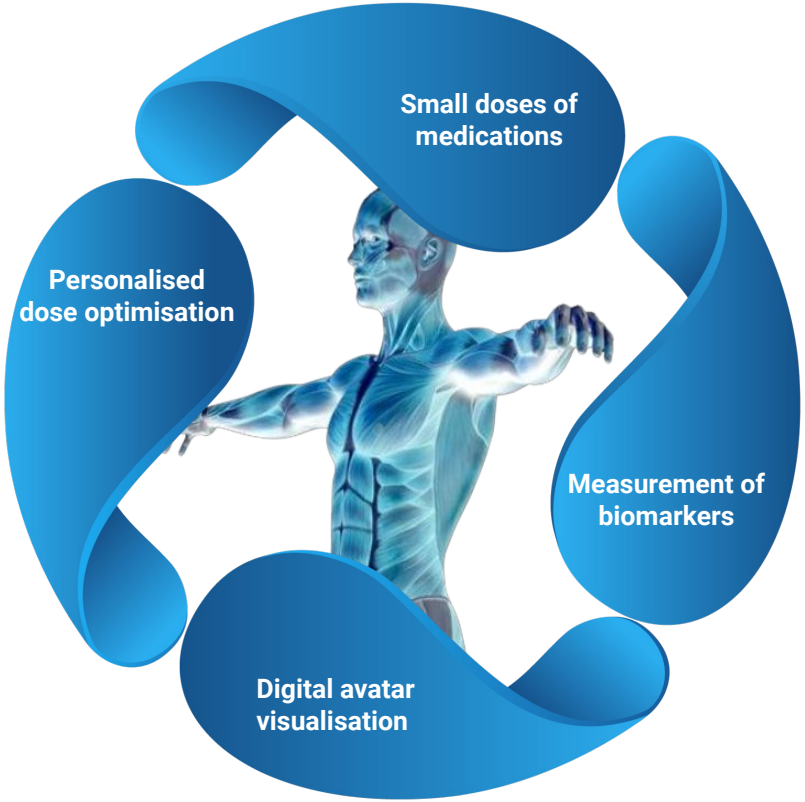
3.2 Currently Available Longevity and Precision Medicine Treatments & Technologies

Biomarkers and Data Science in the Core of P4 Medicine

Not only do new methods of standard industry benchmarking and forecasting need to be developed to combat the issues of overcomplexity and multidimensionality in the Longevity and Precision Medicine Industry, but new methods of testing the basic safety and efficacy of Longevity and Precision Health prevention, diagnostics, prognostics and therapeutics need to be adapted as well, moving away from the use of model organisms, towards a more human-centric approach.

Digital biomarkers satisfy all these new industry requirements: they can be continuously tested on all users, notifying adverse micro-effects and ultra-stratifying patients.

A large part of health information is digitised, which allows us to compile enormous amount of data, access global servers, and compare patient information, sort of a dynamic repository of information that is constantly being updated. The massive advance as far as these databases facilitates doctors in their diagnostic process, their ability to measure, analyse, compare patients, and produce medical reports that are more accurate and personalised, that will, in turn, lead to the best available therapy or treatment of the time.



3.3 Emerging Longevity Treatments & Technologies

Top-20 Cutting-Edge Biotechnologies in Development

1. CRISPR-Cas systems: revolutionary for gene editing, gene therapy, fundamental biology, diagnostics, and more.
2. Gene therapy: enables cures for genetic diseases and powerful treatments for many cancers, may eventually treat polygenic disorders, ameliorate aging, and even enhance human biology (e.g., provide radiation resistance to astronauts). Synergy with CRISPR-Cas technologies will greatly aid gene therapy.
3. DNA origami: paves the way for new nanomedicines, biocatalysts, biosensors, imaging probes, diagnostics, data storage methods, biocomputing, and more.
4. Computational protein engineering: paves the way for new nanomedicines, biocatalysts, biosensors, diagnostics, biomaterials, imaging probes, and more.
5. Immunotherapy: enables cures for many cancers, treatments for autoimmune diseases, and more.
6. Computational protein structure prediction: revolutionizes drug discovery and basic biology, synergizes with computational protein engineering.
7. Spatial transcriptomics: method for interrogation of cell and tissue biology in a holistic and multidimensional fashion to deeply understand health and disease, may lead to dramatic insights on aging, cognition, and pathology.
8. Optogenetics: powerful tool for understanding cellular physiology and neural circuits, may greatly enhance brain-machine interfacing (with the help of gene therapy).
9. Expansion microscopy: physically enlarges biological samples to multiply resolution. Making major strides in connectomics, vastly enhancing study of spatial organization of cells and tissues in general, synergizing with spatial transcriptomics.
10. Longevity and Precision Medicines: pharmacological, gene therapy, and other methods of treating aging may extend human lifespan and dramatically reduce the prevalence of most aging-related diseases.
11. Bioprinting: produces replacement tissue and may enable manufacturing of replacement organs. Also greatly aids study of tissue biology and provides platforms for drug testing.

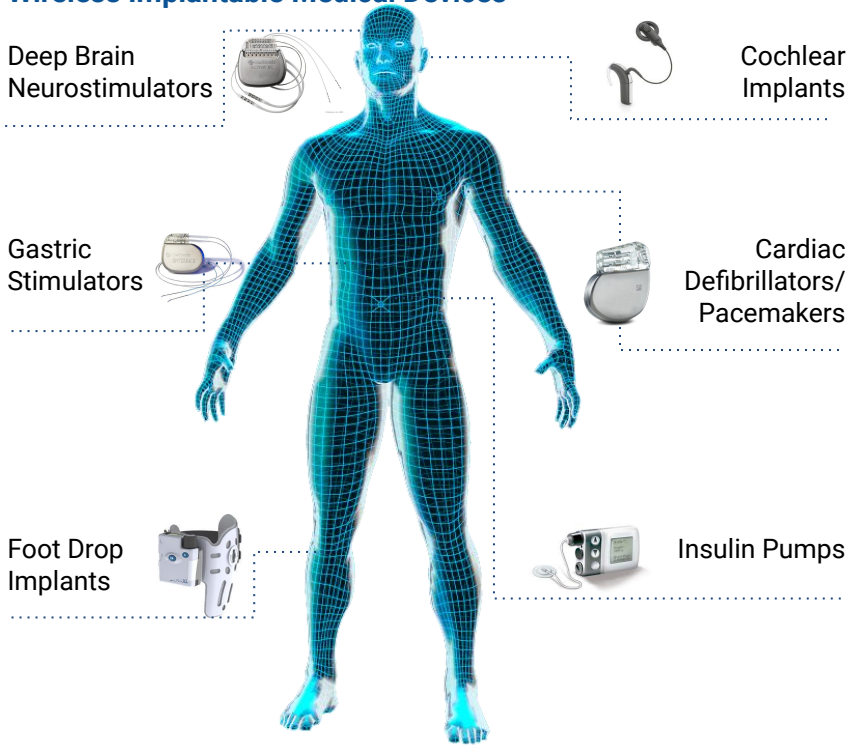
3.3 Emerging Longevity Treatments & Technologies

Top-20 Cutting-Edge Biotechnologies in Development

12. Organ-on-a-chip systems: may greatly reduce the need for animal models in research, helping to understand organ microenvironments and organ physiology in general, serving as platform for drug testing and discovery.
13. Organoids: may greatly reduce the need for animal models in research, helping to understand organ physiology (especially in context to 3D structure and function), serving as platforms for drug testing and discovery, contributing to understanding of cognition, aiding understanding of developmental biology.
14. Cryo-EM and cryo-ET: rivaling x-ray crystallography for solving high-resolution protein structures and is much easier than x-ray crystallography (especially for certain problematic samples), giving 3D images of cellular environments at sufficient resolution to see some macromolecular structural details, preserves sample integrity better than other methods.
15. Phage therapy: enables versatile and potent treatment of bacterial infections, may save the world from antibiotic resistance.
16. Synchrotron x-ray nanotomography: rapid 3D imaging in one or two colors, may help map brain structure much more rapidly than other methods. This could lead to superior brain-inspired AI and robotics, treatments for brain disease, and whole-brain simulations.
17. Tissue clearing with light-sheet microscopy: facilitates 3D imaging of tissues and even whole organs, leading to much better understanding of biological function, aids connectomics.
18. Predictive systems biology models: transforming vast biological datasets into parameters for large-scale simulations which give valuable insights. Some key examples are kinetic signaling network simulations, molecular dynamics simulations, and biophysical neuronal network simulations.
19. Injectable electronics: minimally invasive method of delivering brain-machine interface hardware, may lead to widespread biomedical and nonmedical adoption of brain-machine interfaces.
20. Minimal cells: may transform understanding of cellular physiology, may act as a superior biomanufacturing platform, may act as a superior platform for cell therapy, and more.

3.3 Emerging Longevity Treatments & Technologies

Wireless Implantable Medical Devices



Personalised Experimentation

Intelligent *in silico* experimentation	Real-time tracking of changes in health and aging biomarkers in response to ongoing treatments
Personalised in vivo experimentation on human cells	Personalised ex vivo experimentation on 3D bioprinted tissues and organs with the help of patient-specific cells
Organ-on-a-chip systems	AI-based personalised biomarker development and drug response profiling via Deep Learning and Generative Adversarial Networks

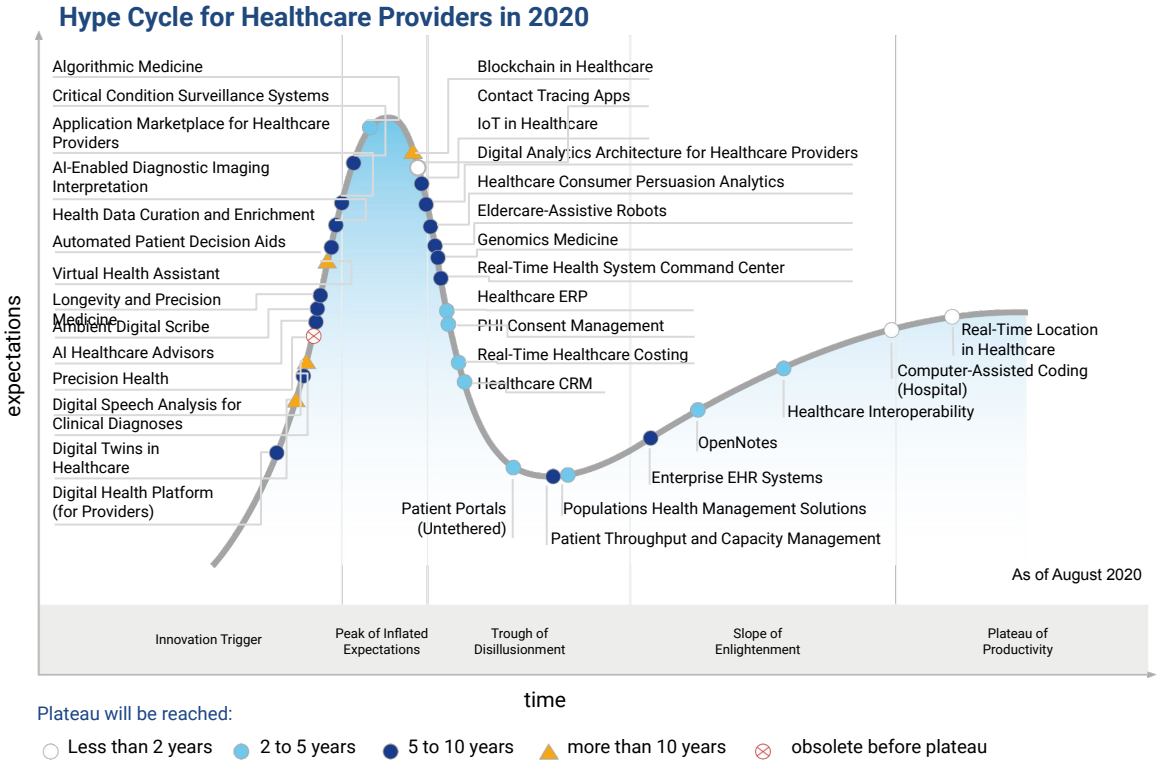
3.4 False, Overhyped, Non-Validated, and Non-Recommended Technologies & Treatments

The lack of an international and regional framework, both legal and regulatory, may lead to the misinterpretation of Longevity and Anti-Aging. They are not to be confused with mechanical and purely cosmetic elimination of external signs of aging - something that plastic surgery and cosmetology concern themselves with.

The True Longevity and Precision Medicine is the solution of the internal problems of the human body and normalisation and restoration of its organs and systems. Thanks to that, the two key results are achieved:

1) Life expectancy increases (due to the neutralisation of a whole set of "harmful" factors, including but not limited to, genetic predisposition to certain diseases, lifestyle defects, hormonal imbalance, lack of vitamins and trace elements);

2) Quality of life improves (physically, psychologically, sexually and in many other respects).



Source: Gartner

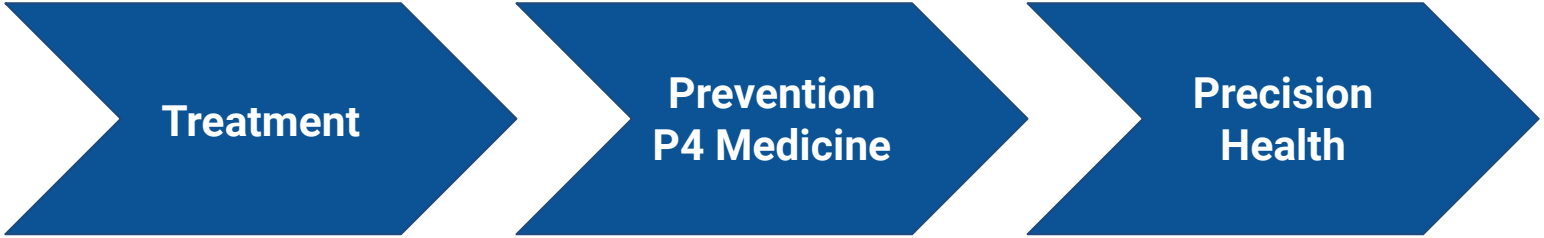
Section 4:
Longevity and Precision Medicine Guide

AGING
ANALYTICS
AGENCY

4.1 The Role of Aging Biomarkers in Longevity Research

Lifestyle and **behavioral modifications** may help slow down the decline and keep the **organism** in the best possible state for its chronological age, a term commonly referred to as "**healthy aging**". To understand the differences between the "**healthy aging**" and "unhealthy aging", evaluate the effects of the many lifestyle choices and a variety of emerging **longevity** interventions, it is essential to be able to track the rate of aging **and develop a comprehensive set of aging biomarkers**.

The use of precise, actionable and available ageing **biomarkers** with high TRL (technology readiness level) score is essential to be able to **support transition** from "**classical**" medical paradigm (**diagnosing** and treating diseases when they occur) to **the prevention medicine paradigm** and more generally to P4 Medicine (**predictive, preventative, personalized, participatory**), and finally to precision health — **creating** a framework of **activities and interventions for healthy people** to **help them stay healthy** longer and never actually develop diseases in the first place, **rather than treating them**.



Jamie Metzl for Longevity Technology: "First, we're increasingly understanding the biomarkers of aging. And that is giving us a language of measurement. We can assess with more precision whether certain interventions are working or not working. With the new tools of AI and machine learning we're really seeing is a super convergence of different technologies that are all pushing forward, including the science of human Longevity."

4.1 The Role of Aging Biomarkers in Longevity Research

Longevity and Precision Medicine is Longevity and Precision Medicine driven by Deep Aging Biomarkers.

This definition is laconic, but extremely informative. Longevity and Precision Medicine itself is a complex and dynamic field driven by multimodal data analysis, constant reevaluation, annotation and repetition to provide qualitative and quantitative results using AI algorithms applicable in clinical practice.

Longevity and Precision Medicine is the next generation of Longevity and Precision Medicine that evaluates patient parameters within a reference range for the ideal age of the patient (typically 20-30 years) and seeks to close the gap between current parameters and parameters of maximum physical performance for the ideal age. Deep aging clocks as quantifiable, trackable and accurate biomarkers of aging are an indispensable component of Longevity and Precision Medicine. Without the ability to measure biological age and how it changes as a result of interventions, Longevity and Precision Medicine cannot be applied.

This area of medicine will revolutionise healthcare and change the worldview of everyone — doctors, politicians and, above all, patients. An important aspect of Longevity and Precision Medicine is the use of AI methods and medical decision support systems based on knowledge management. Currently Longevity and Precision Medicine is at the stage of its development.

Types of Traditional Medical Specialisation:

- Age related diseases
- Regenerative medicine
- Reproductive medicine
- Rehabilitation medicine
- Aesthetic medicine
- Sports medicine
- Wellness & SPA

4.1 The Role of Aging Biomarkers in Longevity Research

Age-related diseases are illnesses that occur as people get older. Age-related pathologies are the most common diseases of modern mankind. Treatment of age-related diseases is directly related to the prolongation of human life.

Regenerative medicine offers treatments for aging at tissue and cellular level. Regenerative medicine has a powerful potential to treat previously incurable diseases like diabetes mellitus, cardiovascular disease, chronic renal failure, osteoporosis, spinal cord injury.

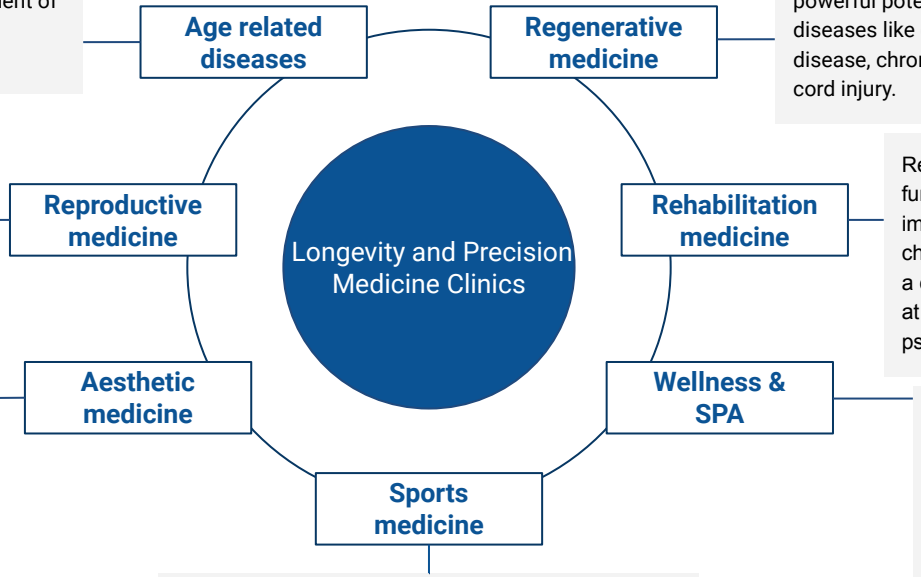
Biology views the aging of the human body as a kind of disease. Its cause is the loss of our body's ability to restore damaged tissues and organs. Regenerative medicine offers treatments for aging at the tissue and the cellular level.

Rehabilitation is the restoration of health, functional state and working capacity, impaired, diseases, injuries or physical, chemical factors. Medical rehabilitation is a complex of treatment procedures aimed at restoring the patient's physical and psychological health.

Anti-aging medicine is one of the branches of medicine, the purpose of which is to prevent age-related changes and prolong life. It is based on the principles of evidence-based medicine, and it itself identifies individual age-related changes and helps a person to effectively cope with them.

Wellness implies the complex use of methods of healing, consisting of dietology, rehabilitation programs, psychological recovery, functional training, spa treatments, etc. This combination of moderate physical activity, relaxing procedures and the healthy eating has a truly healing effect.

Sports medicine is a practical branch of medicine that studies the health, physical development and functionality of the body.



4.1 The Role of Aging Biomarkers in Longevity Research

Stage One: Research Use Only

During the research phase of development, the focus of studies is typically to evaluate effectiveness, limited-scale performance, and issues such as usability of the biomarker.

Stage Two: Healthcare-Ready

To successfully attest to Stage 2, biomarker must fulfill one public health measure, with five reporting options available to choose from.

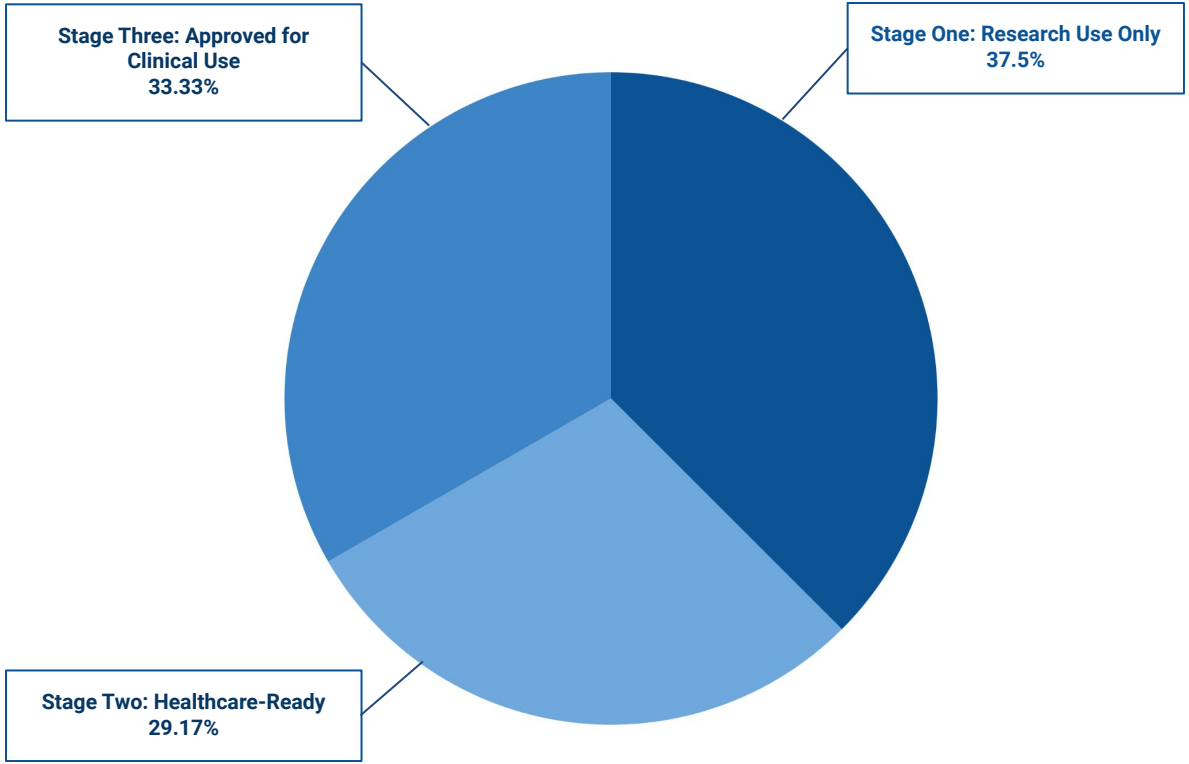
Stage Three: Approved for Clinical Use

Biomarker which successfully fulfilled stage one and stage two requirements gets the status of “Approved for Clinical Use” and can be utilised massively.

4.1 The Role of Aging Biomarkers in Longevity Research

Biomarkers are extremely promising direction of the longevity industry.

The development and **investigation of this area** require a **significant** amount of capital, efforts and time which make biomarkers of longevity difficult to move from the first stage "**Research Use Only**" to the third "Approved for Clinical Use". Around **37.5%** of biomarkers are currently on the first stage. **29.17%** of **biomarkers** of longevity are on the second stage which means they are healthcare-ready. **33.33%** of biomarkers are on the third final stage and are considered to be **approved for clinical use**.



4.1 The Role of Aging Biomarkers in Longevity Research

Stage One: Research Use Only

- LEGENDplex Human Th Cytokine Panel
- LEGENDplex Human CD8/NK Panel
- LEGENDScreen Human PE Kit
- Freenome Platform
- ImmunoMAP v.1.0
- AngiogenesisMAP v.1.0
- CytokineMAP A
- MetabolicMAP v.1.0
- DiscoveryMAP v.3.3 Panel
- CytokineMAP B
- NeuroMAP v.1.0
- InflammationMAP v.1.0
- CardiovascularMAP v.3.0
- LEGENDplex Human B Cell Panel
- Salivary Cytokine Panel
- Explorer MAP v.1.0
- HumanMAP v.2.0
- Olink Proteomics Neuro Exploratory Panel
- Olink Proteomics Cell Regulation Panel
- Olink Proteomics Cardiovascular III Panel
- Olink Proteomics Inflammation Panel
- Olink Proteomics Organ Damage Panel
- Olink Proteomics Cardiovascular II Panel
- Olink Proteomics Cardiometabolic Panel
- Olink Proteomics Oncology III Panel
- Tempus Platform
- Olink Proteomics Metabolism Panel
- Olink Proteomics Immune Response Panel
- Olink Proteomics Oncology II Panel
- Olink Proteomics Neurology Panel
- SPiDER-ßGal
- iCarbonX Platform
- cisbio Phospho-H2AX (Ser139) cellular kit
- Human v3 miRNA Assay
- Senescence Detection Kit
- Better Therapeutics Platform
- BenevolentAI Platform
- MiRXES ID3EAL miRNA Assay
- Proscia Platform
- OMIP-029
- OMIP-039
- OMIP-004
- OMIP-018
- OMIP-007
- OMIP-027

Stage Two: Healthcare-Ready

- PhotoAgeClock
- Haut.AI Skin Health
- Aging.AI
- Enlitic Platform
- Digital Nutrition Platform
- Salivary Cytokine Panel
- DNAge™ Epigenetic Aging Clock
- PathAI Platform
- Buoy Health Platform
- Epigenetic Age Analysis Version 2.0
- DNAge® Test
- KenSci Platform
- AI-Powered Radiology Assistant
- Targeted Seq. for DNA Methylation Analysis
- Genetic Age Test
- osteomiRTM validated bone biomarkers
- toxomiRTM biomarkers of toxicity
- EpiLiver
- EpiBreast
- EpiHealth
- thrombomiRTM biomarkers of platelet function
- Blood Chemistry Calculator
- EpiAging
- EpiSocialpsych
- GlycanAge Test
- Viome Gut Intelligence™ Test
- Microba Insight™
- Gut Microbiota Biohacker
- TeloYears + Advanced Ancestry Tests
- Telomere Length Test
- smartGUT™ Microbiome Test
- Telomere Length and Biological Age Testing
- TruAge™ Epigenetic Test Kit
- Epimorphy LLC

Stage Three: Approved for Clinical Use

- Aging Theranostic 1.0
- WellnessFX Premium
- InsideTracker Inner Age
- Anti-Aging #4 Comprehensive Blood and Urine Test Panel
- Healthy Aging Panel (Comprehensive)
- InsideTracker Ultimate Plan
- 10 Hormone Saliva Test Kit
- Adrenal Check
- Oxidative Stress Analysis 2.0
- NeuroGenomic™ Profile
- Female/Male Saliva Profile II - Test Kit for 6 Hormone Level Imbalances
- Comprehensive Adrenal Stress Profile
- Metabolic Analysis Profile (Organic Acids)
- ImmunoGenomic® Profile
- CardioGenomicPlus™ Profile
- Advanced MethylDetox Profile
- Adrenal Stress Profile
- Advanced MethylDetox Profile + Thelomere Length
- aCGH RGCC
- PhysioAge Biomarkers of Aging Test
- Health + Ancestry Service
- Immune-Frame
- Cytokine Panel
- Biomarker Panel
- CarePredict Platform
- Babylon Health Platform
- Health Reviser Platform
- MEDIAGE™ Biological Age Measurement System
- AGE-Reader mu Test
- Cytokine Panel, TH1
- Carnitine Panel
- Google's DeepMind Health AI Platform
- CD21 (Dendritic Cell) by Immunohistochemistry
- Regulatory T-Cell Panel
- CD57+ NK Cells, Peripheral Blood by Flow Cytometry
- B-Cell Memory and Naive Panel
- Natural Killer Cell and Natural Killer T-Cell Panel
- CD4+ T-Cell Recent Thymic Emigrants
- AgeMeter
- Cytokine Panel
- Hepatic Function Panel
- Ada Symptom Checker app

4.1 The Role of Aging Biomarkers in Longevity Research

Blood-based biomarkers of AD provide a cost- and time-effective way to enhance the utility of CSF and imaging biomarkers, such as the first step in a multistage screening and diagnostic process that is common in medical practice

The human gut microbiome is a complex ecosystem that both affects and is affected by its host status. Previous metagenomic analyses of gut microflora revealed associations between specific microbes and host age.

Measures of physical capability, that is, a person's ability to perform the physical tasks of everyday living, are useful markers of current and future health.

MicroRNAs - single-stranded and non-coding RNA molecules of 21–23 nucleotides that regulate broad spectrum of biological activities, were proposed as signatures of aging.

Blood-based Biomarkers	**Morphological, Physical and Physiological Biomarkers**	**Transcriptomic Proteomics Biomarkers**	**Combinations of biomarker categories: "Digital Avatars"**
Gut/Skin Microbiome Biomarkers	**Immunological Biomarkers**	**Neurological Biomarkers**	**Epigenetic Biomarkers**

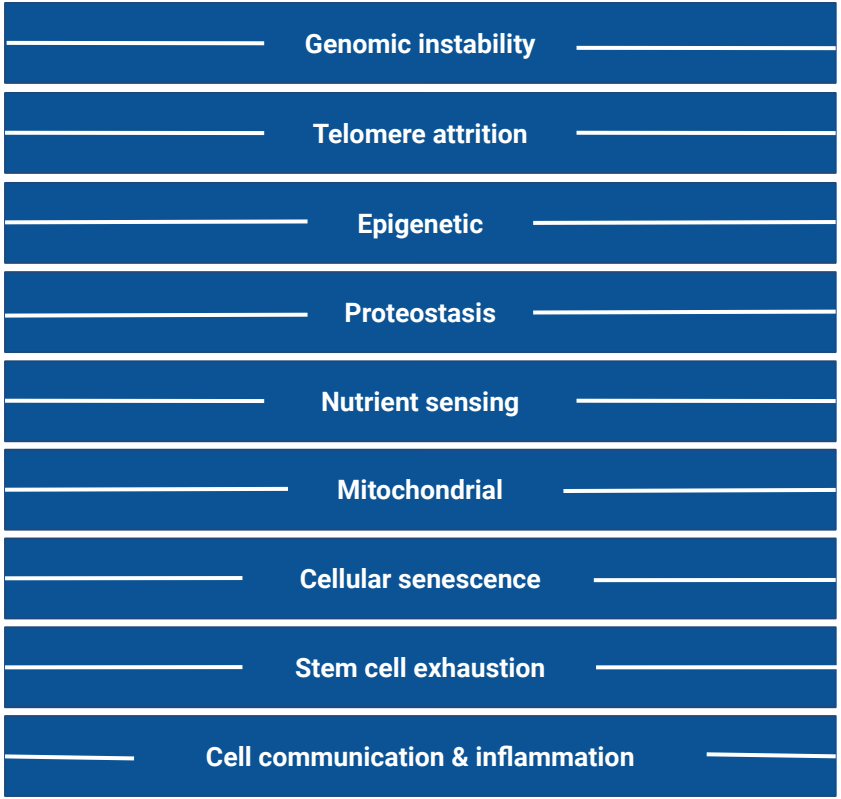
Digital Avatar shifts away from testing therapies using conventional model organisms toward more human-centered approach, due to the enormous flow of biological digital data that will be extracted continuously.

Epigenetic DNA methylation clock signature is increasingly applied as a biomarker to estimate aging disease susceptibility and mortality risk. Epigenetic clock signature is used as a lifestyle management tool to monitor healthy aging.

It is focused on age-related immune function and inflammatory factors. Longitudinal studies comparing immune cells or function with mortality, or with age-related functions.

Neurological biomarkers track the progression of a disease and use non-invasive behavioral performance on objective cognitive tasks as an indicator or predictor of disease status.

4.1 The Role of Aging Biomarkers in Longevity Research



- **Genome instability** refers to a high frequency of mutations within the genome of a cellular lineage;
- **Telomeres**, the tandem-repeated hexamers form protective complexes in association with specific proteins that together with telomerase regulate telomere length;
- **Epigenetic** modifications represent potential molecular elements which control relevant physiological and pathological features, thereby contributing to the natural history of human disease;
- **Proteostasis** is the dynamic regulation of a balanced, functional proteome. The proteostasis network includes competing and integrated biological pathways within cells;
- **Nutrient sensing** is a cell's ability to recognise and respond to fuel substrates such as glucose;
- **Mitochondrial** include the history and clinical neurological exam, structural and functional imaging studies of the brain, muscles and other organs;
- **Cellular senescence** is defined as a condition in which a cell no longer has the ability to proliferate;
- **Stem cell exhaustion** is the age-related deficiency of stem cells. This particular hallmark is directly responsible for many of the physical problems associated with aging;
- **Inflammation** is a protective response of cells to pathogens, infection or tissue damage. It involves the coordinated communication of different immune cells and blood vessels.

4.2 Compact Longevity and Precision Medicine Diagnostic Complex

Service Portfolio

- **Diagnostics of age-related pathologies** - a standard medical consultation which involves lab analysis of the samples of the patient's biomaterial. Its purpose is to run biochemical tests, conduct genetic research, determine biomarkers of aging, and identify the patient's predisposition to age-related pathologies. It can also be done by any independent laboratories chosen by the patient.
- **A series of diagnostic procedures**, such as ECG, dynamometry, BMI assessment, fundus examination, measurement of blood pressure, etc.
- **Extended examination:** an ultrasound scan of the neck vessels (to determine the thickness of the intima media) and vessels of the lower extremities, echography of the heart, radiography of the respiratory organs, an ultrasound scan of the abdominal organs (if it is necessary to clarify the diagnoses, the patient may seek consultations of relevant medical experts).
- **A series of geriatric tests** to determine the deterioration of cognitive and physical abilities.
- **Evaluation of biological age** (based on the survey and analysis of biomarkers of aging).
- **Prognosis of the occurrence of diseases** and **life expectancy.**
- **Treatment of age-related pathology with the supervision of the patient** (periodic examinations, prescription and adjustment of therapy, and lifestyle).
- **Carrying out simple manipulations**: injections, drip transfusion of solutions.
- **Correction of age-related metabolic and hormonal disorders** (hormone therapy).
- **Recommendations regarding lifestyle** (nutrition, sleep, physical activity, and nutritional supplements).
- **The use of innovative and promising methods**: stem cells, gene therapy, etc.

4.2 Compact Longevity and Precision Medicine Diagnostic Complex

A Longevity Cabinet (Longevity and Precision Medicine Cabinet) can exist as an **independent medical structure**. As a rule, it is created by one or more specialists that are well known to the interested audience, have the appropriate medical qualifications (especially in geriatrics or other similar specialties), enjoy a good reputation, and have a scientific and professional interest in the area. Oftentimes, having an interest in this area of science and medicine plays a far greater role than specialisation in geriatrics. This is because geriatrics has a slightly different purpose and is one of the directions in Longevity and Precision Medicine.

In addition, such a Cabinet **can be integrated into the structures of larger private or public medical institutions**.

Personnel qualifications (General practitioner or specialisation):

- Neurology;
- Cardiology;
- Therapy;
- Endocrinology;
- Geriatrics, etc.

Structure of the Longevity Cabinet

- 1-2 Qualified Doctors, 1-2 Nurses (Optional)
- 2-3 Rooms for Examination and Manipulation

Equipment Used in the Longevity Cabinet

- Medical Furniture and Equipment
- Office Equipment
- Means for Manipulations and Consumables
- A Compact Set of Medical Equipment for Diagnostics and Treatment

4.3 Optimal Longevity Preventive Treatment Complex

Let's consider **the configuration of a typical Medium-sized Longevity and Precision Medicine Clinic**. It can exist as an independent structure or be part of a larger medical center providing a wide range of medical services.

As it has already mentioned in **the classification of Longevity and Precision Medicine Clinics**, some of them specialise in the assessment and correction of the biological age with the help of regenerative and restorative medicine. They also concern themselves with the prevention and treatment of age-related diseases. Others combine aesthetic medicine, cosmetology, SPA and wellness directions, which are given less attention in this report.

All these clinics are biased toward either of these two directions. Some of them **place an emphasis on the therapeutic approach**, while others **pay more attention to the aesthetic component of medical care**.

Tentatively, we can **divide** such a clinic into **two independent departments**:

Longevity-Therapeutic, Geriatric

Structure:

- 1-2 qualified doctors specialising in various fields; nurses (at least 2-3 procedural nurses); 2 laboratory technicians; 4 nurses; 4 administrators; a director; an accountant; a lawyer responsible for AHP;
- 2 rooms for examination and manipulation for each specialist; a resident's office, a nursing office, a director's office; an ancillary services office; a hall, corridors, and rooms for storing inventory, consumables, and medical waste (it all depends on the number of specialists and estimated throughput).

Aesthetic Medicine and Cosmetology

Structure:

- 1-2 qualified doctors specialising in various areas of cosmetology and plastic surgery; nurses (at least 2-3 procedural nurses), 4 nurses, administrative staff (see above);
- Surgical department (1-2 operating rooms with auxiliary rooms); 1-2 rooms for examination and manipulation for each specialist; massage rooms; a physiotherapy room; a gym; a SPA area; corridors; rooms for storing equipment, supplies, and medical waste (it all depends on the number of specialists and estimated throughput).

4.3 Optimal Longevity Preventive Treatment Complex

Longevity Treatment Department

Personnel Qualifications:

- General practitioners, doctors of the following specialisations: neurology, cardiology, therapy, endocrinology, geriatrics, orthopedics, gynecology, urology-andrology, oncology, allergology-immunology, gastroenterologist-nutritionist, biochemist, radiation diagnostician. All specialists have a narrow specialisation and a field of medical interests in the field of Longevity and Precision Medicine, treatment of age-related diseases, anti-age.

Services:

- Initial consultation for patients in the clinic;
- Diagnostics of age-related pathologies (biochemical tests and genetic tests to determine biomarkers of aging and predisposition to age-related pathologies);
- Diagnostic procedures (ECG, dynamometry, BMI assessment, fundus examination, blood pressure measurement, etc);
- Conducting a series of geriatric tests to determine the deterioration of cognitive and physical abilities.

Equipment:

- Medical furniture and equipment, Office equipment, Means for manipulations and consumables, X-ray equipment (ideally CT, MRI);
- Stethoscopes, tonometers, dynamometer, neurological hammer, scales, tape measures, height meters, ophthalmoscopes, etc.
- Apparatus for cytoplasmapheresis;
- ECG cardiograph, 1-2 ultrasound devices of an expert class for all types of examination, Densitometer, Complex "uro-gynecological office";
- Biochemical analyser, hematology analyser, urine analyser, auxiliary laboratory equipment: centrifuges, etc.

Important! All diagnostic and treatment procedures are carried out on the basis of a precise and personalised approach (ideally, the clinic should meet the 4P and Longevity and Precision Medicine criteria).

4.3 Optimal Longevity Preventive Treatment Complex

Aesthetic Medicine and Cosmetology Department

Personnel qualifications:

- Plastic surgeons and anesthesiologists, resuscitators, cosmetologists, dermatologist-trichologist, nutritionist, physiotherapist, sports medicine doctor, endocrinologist, psychologist, massage therapists;
- All specialists specialise in anti-age cosmetology and focus on solving aesthetic problems associated with age.

Equipment:

- Medical furniture and equipment; office equipment;
- Means, tools for manipulation and consumables;
- Equipment for operating rooms (operating table, lighting, equipment for anesthesia and condition monitoring, operating equipment, various types of suction, means and equipment for urgent resuscitation, including a defibrillator);
- All kinds of hardware cosmetology equipment (ultrasonic, laser mechano-wave, radio frequency, ultrasonic, combined, etc);
- Massage tables;
- Physiotherapy equipment (based on various physical principles);
- Gym equipment;
- Equipment for the spa department (hydromassage baths, cryosauna, dry and wet saunas, vertical and horizontal solariums).

Important! Medical and diagnostic procedures are carried out on the basis of a precise and personalised approach.

4.3 Optimal Longevity Preventive Treatment Complex

Aesthetic Medicine and Cosmetology Department

Services:

- Consultation of a cosmetologist-dermatologist and physiotherapist;
- Provision of aesthetic cosmetology services (e.g. moisturising, care, peeling, etc. based on nutri-cosmeceutical preparations and products, face massage, and face lifting);
- Provision of anti-aging cosmetology services (e.g. thread lifting, injections of botulinum toxin, hyaluronic acid, biorevellant drugs, drugs stimulating production of collagen and elastin and their substitutes, mesotherapy, contour plastics, using skin fibroblasts and other drugs based on stem cells);
- Apparatus cosmetology and physiotherapy, for muscle stimulation, facelift, elimination of puffiness, lymphatic drainage, fat burning, etc;
- Plastic surgery (various types of face and body plastics);
- Elimination of skin defects (acne, wrinkles, cellulite, etc.)
- Services of an anesthesiologist-resuscitator;
- Nutritionist services (selection of a diet, recommendations on the use of nutraceuticals and food supplements);
- Dermatologist-trichologist;
- Endocrinologist (consultation, diagnosis of problems, and selection of hormone replacement therapy);
- Sports medicine doctor (developing individual programs for body correction, muscle strengthening, combating sarcopenia, and physical training);
- Medical and corrective massage;
- Physiotherapy procedures;
- SPA procedures;
- Psychological counseling.

Section 5:
Appendix (Profiles of Clinics)

AGING
ANALYTICS
AGENCY

Lumen Healthcare Clinic

Through its preventive and regenerative medicine, Lumen clients health expectancy can be improved by up to 15 years. While life can include periods of frailty, addiction and disease, Lumen aspires to challenge consensus and have a real impact on health. Lumen determines which therapeutic strategies will optimiьe their clients' current and future health. Lumen tells their clients which lifestyle adjustments they need to make to improve their health in the long term.

Location	Geneva
Number of Employees	100+
Foundation Year	2018
Specification	It specialises in Anti-Aging, Cellular Therapies, Longevity and Precision Medicine, Regenerative & Aesthetic Medicine, Microbiote Rejuvenation, Checkup & Early Diagnosis, Stem Cells.

Services and Treatments

Micronutrition & food supplements: Restoring the balance of the intestinal ecosystem, nutraceuticals prescription

Regeneration of the microbiota: regeneration on an exchange of the microbiota, epigenetic rejuvenation

Hormonal health: hormone therapy, food supplements in line with age, elimination of toxins

Check-up & early diagnosis: "Healthcare Optimisation" check-up, genetic profile, innovative biological assessment, "Gut microbiota" check-up

Bern University Hospital

INSELSPITAL
UNIVERSITÄTSSPITAL BERN
HÔPITAL UNIVERSITAIRE DE BERNE

The University Hospital of Bern "Inselspital", located in Bern, is one of the five university hospitals of Switzerland. Currently, the hospital employs a staff of over 7,200 and provides care for 250,000 patients each year. It also provides practical training to 600 medical students and over 1,000 other healthcare professionals.

Location	Bern
Number of Employees	7000+
Foundation Year	1354
Specification	It specialises in Bioinformatics, Big Data, Blood and Marrow Transplantation, Cell Therapies, Genetic Testing.

Services and Treatments

Nutritional Advice: Metabolism consultation, Neuroendocrine tumors, Osteometabolism nutrition, thyroid consultation

Clinical Genomics Lab: Clarification of hereditary diseases and genetic predispositions, Prenatal diagnosis

Clinical Trials: Chemotherapy, Stem Cell Transplantations, Cardiovascular, Anti-Cancer Drugs

Geriatrics: Advanced preventing and treatment for Age-Related Macular Degeneration, Alzheimer's, Glaucoma, Osteoarthritis

Geneva University Hospitals

HUG was created in 1995, and is part of a tradition of excellence in medicine and science dating back hundreds of years. The group brings together 10 Geneva public hospitals and 40 outpatient units throughout the canton of Geneva, and together they form the leading **Swiss University Hospital**.

Location	Geneva
Number of Employees	10,000+
Foundation Year	1995
Specification	It specialises in Big Data, Robotic Surgery, Stem Cell Therapies, Genetic Medicine, Elderly Care, Psychiatry, Chronic Pain

Services and Treatments

Personalised care: A team of multidisciplinary consultants chooses the right treatment for your health condition

Advanced Age Medicine Center: Cognition / memory consultations, Continence, Fall and Osteoporosis (CHEOPS), Community geriatrics unit

Interventional radiology: Chemoembolisation or TACE, Chemosaturation, Radio Frequency Ablation

Center for Medical Genomics: Personalised genomic analyses, Multidisciplinary approach, organisation of genome boards

Lausanne University Hospital

The Lausanne University Hospital is one of the five university hospitals in Switzerland. It is linked to the Faculty of Biology and Medicine of the University of Lausanne. The university hospital acts as a general university hospital for people living in the Lausanne area, covering all areas of medical treatment. It also serves as a hospital offering acute and specialist care for the whole Canton of Vaud and parts of French-speaking Switzerland.

Location	Lausanne, Vaud
Number of Employees	10,000+
Foundation Year	1890
Specification	It specialises in Personalized and Predictive Oncology (Tumor Genotyping), Robotic Surgery, Research on Metabolism, Nutrition, Ageing, and Associated Diseases

Services and Treatments

Department of Oncology : Cancer Screening, All Phase Clinical Trials, Proton Therapy, Tumour Boards

"Health Valley": a unique environment of university hospitals, research centres and numerous start-ups specialising in healthcare

Genomic Medicine: Adult neurogenetics, Lipid genetics, genetic Ophthalmology

Geriatric care: on-cite research on geriatric care, holistic approach to assessment, care at home, in acute care, in a rehabilitation center

University Hospital Zurich

USZ Universitäts Spital Zürich

The University Hospital of Zurich is the university hospital of Zürich, Switzerland. With its 43 divisions and institutes (Institute for Regenerative Medicine IREM, IREM - Center for Prevention and Dementia Therapy and others), the hospital is known for its achievements in health care, research, and teaching. It offers state-of-the-art treatment for a broad range of illnesses.

Location	Zürich
Number of Employees	8000+
Foundation Year	1208
Specification	It specialises in personalised regenerative cell therapies, preventive health checks, mathernity, endocrinology, blood tests, age-related diseases, sexual health, and geriatric medicine.

Services and Treatments

University Heart Center: Interdisciplinary heart teams, state-of-the-art heart transplant technology

Clinic for Endocrinology, Diabetology and Clinical Nutrition: Hormonal therapy, Weight regulation, cutting-edge diabetes treatments

Comprehensive Cancer Center: Chemotherapy, Anti-Cancer Drugs, numerous clinical trials

Geriatric care: intensive and interprofessional early rehabilitation with daily workouts, with diet designed to rebuild muscle

Montreux Medical Center

Montreux Medical Center develops and embodies years of experience in biotechnology to position itself as a Swiss leader in regenerative cellular medicine .Montreux Medical Center uses adult stem cells derived from adipose tissue directly isolated from the patient (autologous stem cells). Collection from fat cells is also one of the richest sources of mesenchymal stem cells stimulating repair and regeneration.

Location	Montreux, Vaud canton
Number of Employees	100+
Foundation Year	1988
Specification	It specialises in personalised regenerative cell therapies, preventive health checks,, blood tests, age-related diseases, plastic surgery

Services and Treatments

Stem Cells: Personalized autologous stem cells treatment, State-of-the-art processing and separation technology of Stem Cells

Natural Cell Extract: Strengthen the self-healing capabilities, mobilization and activation of cells, increase the concentration of repair cells in the body

Detoxification: Heavy-metal toxicity and Hardening of the arteries and high blood pressure

Integrative Medical Solutions: health check-up, aesthetic/reconstructive surgery, vascular surgery, anti-aging regenerative practices

Cereneo

Cereneo is one of the world's leading clinics in the field of stroke, trauma and brain disease rehabilitation. Their patients receive a personally tailored treatment plan, including the latest therapy methods and innovative technology.

Location	London, UK
Number of Employees	100+
Foundation Year	2012
Specification	It specialises in personalized neurorehabilitation: movement therapy, speech- and language therapy, neuropsychology

Services and Treatments

Brain Health: Alzheimer's Disease, Cognitive Decline, Stroke, Parkinson's disease, Traumatic brain injuries

Advanced Equipment: Dynamic Partial Body Weight Support (DBWS), Split-Belt Treadmill, Indego® Exoskeleton by Parker Hannifin

Comprehensive rehabilitation: inpatient rehabilitation, speech and movement rehabilitation, telerehabilitation, robotic therapy, water therapy, daily personalised consultations with senior neurologist

Clinica Sant'Anna

Known since its foundation thanks to their popular maternity department, where almost 900 babies are born every year, the clinic also offers a wide range of health care disciplines: women's health, oncology, internal medicine, general surgery, plastic surgery, reconstructive and cosmetic surgery, and a Nescens Centre for Preventive Medicine.

Location	Lugano
Number of Employees	100+
Foundation Year	2001
Specification	It specialises in personalised regenerative medicine, preventive health checks, testing, treatments, physio, and aesthetic.

Services and Treatments

Proton Cancer Centre: Cancer Screening, All Phase Clinical Trials, Proton Therapy, Tumour Boards

Robotic Surgery: Percutaneous Mitral Valve Repair with Mitraclip, Renaissance® Robotic Surgical System, Da Vinci® Robotic Surgical System

Clinical Trials: Chemotherapy, Stem Cell Transplantations, Cardiovascular, Anti-Cancer Drugs

Advanced Screening: 320 Slice Advanced Technology, Optical Coherence Tomography, Gallium 68 (g68), mri g scan

Clinique Générale Ste-Anne

The clinic offers high-quality medicine and highly personalized nursing care in the following areas: orthopaedics, neurosurgery, gynaecology, general surgery and ENT, as well as oncology and pain therapy. Experienced and reputed specialists practise at the clinic. With the state-of-the-art technical infrastructure at their disposal, they are able to offer patients diagnostic services, treatment and rehabilitation that are second to none.

Location	Fribourg
Number of Employees	1000+
Foundation Year	Old 1817, New 2010
Specification	It has specialises in personalized regenerative cell therapies for aesthetics, preventive health checks.

Services and Treatments

Cancer Centre: Cancer Screening, All Phase Clinical Trials, Proton Therapy, Tumour Boards

Robotic Surgery: Cyberknife®, a laser treatment alternative to surgery, to patients include complex brain tumours, prostate cancer

Advanced Imaging: State-of-the-art X-ray, CT, and MRI scanners, Ultrasound diagnostics

Age-related diseases: Cardiac physiology, The Diabetes Centre, Outpatient Chemotherapy Department

Privatklinik Villa im Park

Swiss Medical Network is a group of Swiss private clinics. The group's clinics are located in the French, German and Italian parts of Switzerland. Swiss Medical Network clinics offer their Swiss and foreign patients multidisciplinary medical care, diagnostics and hospitalisation. The group's clinics are distinguished by innovative quality of treatment, excellent medical infrastructure, an international medical coordination department and accredited translators, as well as hotel service of the highest level

Location	Rothrist, Aargau
Number of Employees	100+
Foundation Year	1983
Specification	It specialises in spinal surgery, breast care, gastroenterology, hepatobiliary and hepatology surgery, sports and exercise medicine, urgent care, urology, and robotic surgery

Services and Treatments

Proton Cancer Centre: Cancer Screening, All Phase Clinical Trials, Proton Therapy, Tumour Boards

Robotic Surgery: Repair with Mitraclip, Renaissance® Robotic Surgical System, Da Vinci® Robotic Surgical System, Cyberknife®

Clinical Trials: Chemotherapy, Stem Cell Transplantations, Cardiovascular, Anti-Cancer Drugs

Advanced Screening: 320 Slice Advanced Technology, Optical Coherence Tomography, Gallium 68 (g68), mri g scan

Klinik Pyramide am See

The Klinik Pyramide am See with its extravagant design is situated idyllically in the park along the left shore of Lake Zurich. Offering a wonderful and extraordinary atmosphere, it is up to now the only hospital receiving the Esprix-Award - a Swiss quality prize for Business Excellence. It is well-respected for its premium medical care and services and its unique concept of approaching the patient who always feels in comfortable and secure environment. Particular emphasis is placed on the individual and personal care patients receive keeping them always at the centre of attention.

Location	Zürich
Number of Employees	100+
Foundation Year	Old 1841, new 1998
Specification	It specialises in personalized cardiology and respiratory diseases

Services and Treatments

Heart Treatments: Anticoagulant clinics, Aortic programme, Cardio-oncology, Complex coronary disease

Lung Treatments: Cancer services, Chronic obstructive pulmonary disease, Cystic fibrosis (adults), General respiratory medicine

Clinical Support: Critical care and anaesthesia, Advanced Imaging, Laboratories, Non-clinical teams

Paediatrics: Cardiac morphology, Children's cardiac care, Children's long-term ventilation service, Children's sleep and ventilation

Nescens Clinique de Genolier

Preventive health and anti-aging center of excellence. Located near Geneva, this clinic offers medical assessments and specialised consultations, as well as medical stays, aimed at maintaining your state of health and preserving your youth capital.

Location	Genolier, Vaud
Number of Employees	200+
Foundation Year	2015
Specification	It specialises in aesthetic procedures and anti-aging hormonal treatment.

Services and Treatments

Anti-aging: Hormone replacement therapy, bioindentical hormones for women, human growth and testosterone hormones

Facial aesthetics: Botox, Dermal fillers, Facial aesthetic interventions, Ultherapy

Surgical procedures: Arm and body lift, Vaser hi-def liposuction, Post-bariatric body contouring, rhinoplasty, Blepharoplasty, Facelift surgery

Clinique La Prairie

CLINIQUE LA PRAIRIE
SWITZERLAND

Pioneers in the rejuvenating science of cell therapy for more than eight decades, honing our expertise through proven technologies and creating state-of-the-art cures for this life-changing experience. Designed for people over 40 looking to recover their youth, the program's extraordinary restorative power combats the undesirable effects of aging, leaving you energised and stronger for up to 24 months.

Location	Clarens, Vaud
Number of Employees	200+
Foundation Year	2014
Specification	It specialises in Testosterone Therapy, Chronic Illness, Biohacking, Health Optimisation, Lab Testing, Nutrient Therapy, Gut Health, and Functional Medicine

Services and Treatments

Hormone Therapy: Bioidentical HRT, Testosterone Replacement Therapy, Melatonin and DHEA Therapy

IV Vitamin Therapy: Myers Cocktail IV Drip Amino Acid IV Infusions, Glutathione IV Drip, Magnesium Infusion, Vitamin B12 Shot

Aesthetic: Chemical Peels, Skin Rejuvenation, Microneedling, Spider Vein Removal, Platelet Rich Plasma and Mesotherapy

Functional Medicine: Autoimmune Diseases, Weight Loss and Management, Chronic and Adrenal Fatigue, Low Dose Naltrexone

Clinic Bad Ragaz

CLINIC
BAD RAGAZ

It isn't always easy to integrate healthy habits into everyday life. **Clinic Bad Ragaz** supports you on your journey towards change and guide you to the wellspring of a long and fulfilling life. The NEWYOU Method® is proven to help you maintain your health, prevent diseases and sustainably increase your quality of life

Location	Bad Ragaz, St. Gallen
Number of Employees	100+
Foundation Year	2018
Specification	It specialises in Hospitality, Wohlbefinden, Spa & Wellness, Medizin, Golf, Wellbeing, Rehabilitation, Regeneration, Kulinarik & Genuss, etc.

Services and Treatments

Regenerative treatment: Prolotherapy, Platelet-rich plasma therapy, stromal vascular fraction therapy, mesenchymal cell therapy

Joint rejuvenation: Cartilage wear bone treatment, Elbow arthritis and osteoporosis intervention, Shoulder pain treatment

Aesthetics: Hair loss treatment, Facial rejuvenation, Wrinkle treatment

Additional procedures: Nutritional advice, Physiotherapy, Goldic Therapy, IV Cell therapy

Klinik St. Anna in Lucerne

HIRSLANDEN
KLINIK ST. ANNA

At our Clinic St. Anna, St. Anna im Bahnhof and St. Anna in Meggen, we focus on the individual needs of our patients.Klinik St. Anna offers the highest standards of private individualised medical care with a comprehensive list of treatments and recovery therapy.

Location	Lucerne
Number of Employees	300+
Foundation Year	2015
Specification	It specialises in personalised regenerative, preventive health checks, endocrinology, and women's health.

Services and Treatments

Hormonal therapies: Hormone replacement therapy (HRT), licenced body identical hormone replacement

Women health: Premature menopause treatment, Gynaecological interventions, ovarian cysts management

Clinical trials: Chemotherapy, Stem Cell Transplantations, Cardiovascular, Anti-Cancer Drugs

Advanced assessments: DEXA scan, Sonography, Nutritional health screening, Comprehensive blood tests

Sources

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7. **Best Swiss Anti Aging Clinics and Centers.** MedicalTravel.Swiss
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9. **20 Longevity and Precision Medicine Clinics: Longevity in Switzerland**. Aging Analytics Agency
10. **Extending Healthy Life Expectancy.** The Longevity Alliance
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16. **Swiss Medical Association.** The medical directory of the FMH
17. **The List of Hospitals in Switzerland.** Swiss Yellow Pages
18. **Lumen Healthcare Clinic.** Geneva
19. **Bern University Hospital.** Bern
20. **Geneva University Hospitals.** Geneva
21. **Lausanne University Hospital.** Vaud
22. **University Hospital Zurich.** Zurich
23. **Montreux Medical Center.** Vaud
24. **Cereneo.** Lucerne
25. **Clinica Sant'Anna.** Ticino
26. **Clinique Générale Ste-Anne.** Fribourg
27. **Privatklinik Villa im Park.** Aargau
28. **Klinik Pyramide am See.** Zurich
29. **Nescens Clinique de Genolier.** Vaud
30. **Clinique La Prairie.** Vaud
31. **Medical Center Bad Ragaz.** St. Gallen
32. **Klinik St. Anna in Lucerne.** Lucerne

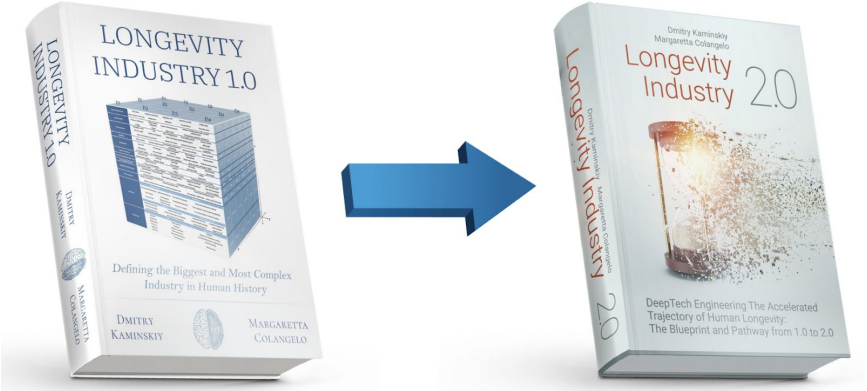
About Aging Analytics Agency

Aging Analytics Agency is the only analytical company focused exclusively on Longevity, Ageing, Geroscience, Preventive Medicine and AgeTech. Operating for over five years, it began producing reports on Longevity long before it emerged as an industry.

Aging Analytics Agency is a Supporting Partner for the UK All-Party Parliamentary Group for Longevity, a Founding Partner of the APPG for Longevity Secretariat Longevity International and an Official Member of the UN NGO Committee on Ageing. By committing available resources and mustering political will, governments of all countries can effectively tackle the aging population challenge. Doing so will help neutralise some of the most dangerous sources of economic and societal instability and help ensure economic prosperity worldwide.

Aging Analytics Agency sees its mission in transforming the ageing population challenge into an opportunity. By utilising AI-driven big data analytics, benchmarking and profiling national and local industry strategies, it aims to come up with Longevity policy initiatives and develop Longevity strategies. Aging Analytics Agency is recognised internationally as the premier analytics agency for advanced data analysis, industry reports and next-generation infographics on the topics of Aging and Longevity.

Now in its 7th year, Aging Analytics Agency has been on the frontlines of Longevity Analytics since the inception of the industry.



Longevity Industry 1.0

- Defining the Biggest and Most
- Complex Industry in Human History

Longevity Industry 2.0

- DeepTech Engineering the Accelerated
- Trajectory of Human Longevity
- The Blueprint and Pathway from 1.0 to 2.0

www.longevity-book.com

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