TECHNION
Israel Institute
of Technology

November 2024

The Technion
Healthy Aging Institute

Table **of Contents**

Executive **Summary**

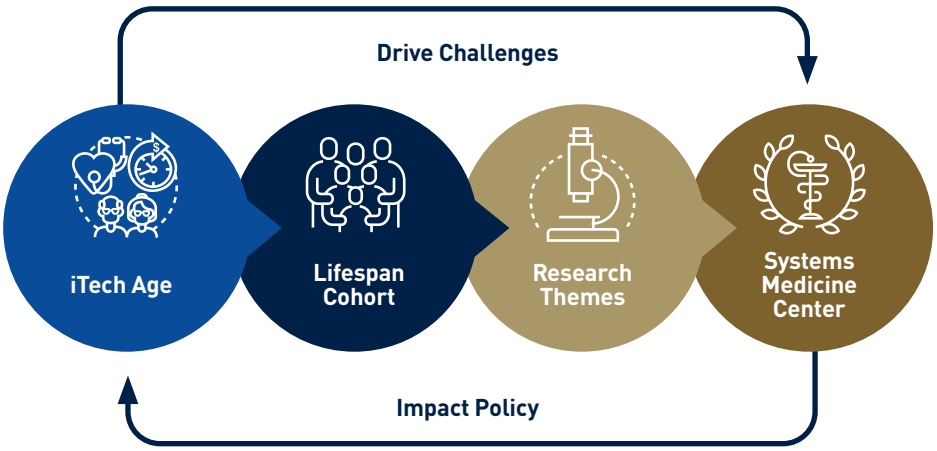
The Technion Healthy Aging Institute is a transformative initiative aimed at revolutionizing the field of aging research.

By leveraging the Technion's world-class expertise, the Institute will foster multidisciplinary collaboration and cutting-edge innovations, which will address the complex challenges of our aging society through four synergistic components described below.

- **iTechAge** is the mission control center for the Technion Healthy Aging Institute, serving to conceptualize, centralize, and oversee its scientific affairs, operations, and communications.
- The Human Health Monitoring Center will launch, populate, and maintain the **Lifespan Cohort**, a comprehensive study of aging individuals and their respective wellness markers.
- **Targeted Research** will focus activity on seven distinct research areas: cellular mechanisms of aging, systems aging, cognition and motor function, personalized medicine and biomarkers of aging, personalized food and drug interventions, assistive technology for independent living, and community.
- The **Systems Medicine Center** is an integrative unit for quantifying biology at the cellular and molecular levels.

Collectively, these four initiatives will ensure the Technion Healthy Aging Institute's effectiveness as an engine of progress in this vital area of research. ■

The Technion Healthy Aging Institute is unique due to the Lifespan Cohort. This clinical cohort will be set up as a shared university resource to be leveraged by the breadth of Technion scientists, physicians, and engineers. The design of this cohort is pivotal to the Institute's success and differentiation.



An Aging **Global Population**

Medical breakthroughs that occurred during the last century have greatly increased life expectancy, to the extent that the World Health Organization (WHO) predicts that by 2030, individuals aged 60 and over will outnumber those under 10 years of age. Beyond that, by 2050, it is estimated that roughly 2.1 billion people will be over the age of 60, and 426 million people will have reached and surpassed the age of 80 — doubling and potentially tripling the older adult population in the world today.

On the one hand, people are enjoying longer lives, and many will remain active members of society, contributing to their communities and the economy for many more years than prior generations. However, as one ages, both physical and mental capacities gradually decrease, and the risk of diseases and debilitating conditions grows with a person's lifespan. This truth casts a shadow on the quality of life of many older citizens and the impact on society at large, as many nations are already encountering unsustainable burdens on both healthcare and national social welfare programs.

Effectively preparing for this new aging reality has become a high priority on the global scale. In 2022, the U.S. National Academy of Medicine declared that bridging the difference between lifespan and healthspan (how long we live in good health) is the greatest challenge in medicine today, since extending life without ensuring that those additional years are healthy often leads to significant individual suffering, and increased societal resource pressures. In recognition of this reality, the United Nations has declared the 2020s the Decade of Healthy Aging — highlighting the high degree of importance, and even urgency, of meeting all the complex challenges associated with improving the quality of life for older people around the world.

Aligning lifespan with healthspan is the single most important goal of the National Academy of Medicine's Global Roadmap for Healthy Longevity Program, which strives to improve people's physical, mental, and social well-being, and promote longevity. To achieve this vision requires a worldwide multidisciplinary effort to improve our health, social, and physical infrastructure; to make new discoveries concerning the causes of aging; and to develop technology to solve problems in this area. **The establishment of centers like the Technion Healthy Aging Institute — which integrates evidence-based medicine, insights on biological aging, and the design of novel interventional solutions — is a necessary stepping-stone to fulfilling this vision.** ■

The Technion at the **Forefront of Human Health**

Recognizing that human health is one of the grand challenges of the 21st century, the Technion founded the Technion Human Health Initiative (THHI) in 2020 to support multidisciplinary research that can be translated into real and measurable improvements in human health.

THHI's mission is to leverage the research work of investigators from different academic disciplines, build a framework that drives collaborations, and promote research and education that cross disciplinary boundaries. As such, the Technion has positioned itself at a strategic advantage for developing a Healthy Aging Institute that will rise to the challenge of bridging the gap between lifespan and healthspan.

The Technion is distinct from other institutions hoping to tackle this grand challenge in its ability to harness technology development along with cutting-edge science and medicine. In addition, the Technion, being an Israeli institution, is positioned to partner with Israel's world-renowned national healthcare system, through its HMOs and auxiliary hospitals, to generate a much larger impact than a standalone academic effort could achieve.* ■

*For example, Israel was a leader in COVID-19 vaccination initiatives due to the effectiveness of its national health system.

The Technion Healthy Aging Institute:

The Vision

The Technion intends to harness its world-class resources and expertise to propel groundbreaking research and development that will benefit the growing number of older adults in Israel and around the world.

Poised to be the spearhead of the Technion Human Health Initiative, the Technion Healthy Aging Institute will bring together a large community of world-leading researchers, faculty members, postdocs, and graduate students from diverse academic backgrounds, and will stimulate cutting-edge initiatives.

The two major goals for the Healthy Aging Institute are:

1. To advance groundbreaking research and develop solutions that address the diverse challenges of aging, improving the lives of older adults in Israel and across the globe.

2. To build the collaborative multidisciplinary platform necessary to tackle this grand challenge and transform innovations into holistic solutions that impact people's lives.

The field of aging encompasses a spectrum of research fields. Molecular mechanisms at the single-cell level; the body's immune and hormonal systems; the environment that elderly individuals live in: all contribute to age-associated physiological and cognitive decline. The Technion Healthy Aging Institute will be structured to optimize its impact locally, nationally, and globally. The Institute will benefit from access to clinical health data collected via state-of-the-art molecular measurements from individuals tracked over years. These unique data will be a valuable resource driving the activities supported by the Institute. ■

Why the Technion Healthy Aging Institute **Stands Out**

The Lifespan Cohort: This unique clinical cohort will be set up as a shared university resource to be leveraged by the breadth of Technion scientists, physicians, and engineers. The design of this cohort is pivotal to the Institute's success and differentiation. In particular, the Lifespan cohort stands out due to:

- **A Pyramid Design to Maximize Novel Discoveries to Accelerate Global Impact**
  Making discoveries requires high-resolution expensive data whereas making medical impact requires profiling large populations. The Lifespan Cohort design tracks hundreds of people using state-of-the-art technology at the Technion, thousands in affiliated hospitals measuring a limited number of assays, hundreds of thousands and more through partnerships with the Israeli healthcare ecosystem and beyond; ensuring inference of novel discoveries to population-level implications and vice versa so that epidemiological observations are connected to driving mechanisms.

- **A 360-degree View to a System Level Challenge**
  Designed as a shared university resource, the Lifespan Cohort spans from micro-level of cells to the macro level of communities. Through its breadth, the Cohort brings together researchers from across the Technion to work together across disciplinary divides to bring a holistic approach to a complex problem that is rarely contained in one research direction.

- **Closing the Loop: From Discovery to Intervention**
  As a world-leading technical institution, the Technion prides itself in making discoveries that impact the real world. As such, the Lifespan Cohort is focused on basic discovery research as well as application-oriented interventions and engineering solutions. Through repeated visits and testing, we will close the loop to assess the effects of the interventions on the same study subjects in which they were observed, building a foundation for precision medicine and data-driven guided intervention. ■

4 Four **Synergistic Elements**

The new Technion Healthy Aging Institute will consist of four different components, each functioning as an independent center of activity. There will be intensive interaction among the four to ensure maximum overall impact.

- **I. iTechAge**
- **II. Human Health Monitoring Center and the Lifespan Cohort**
- **III. Targeted Research**
- **IV. Systems Medicine Center**

I. iTechAge

iTechAge is the think tank and mission control for the Technion Healthy Aging Institute, serving to conceptualize, centralize, and oversee its scientific affairs, operations, and communications.

The main goal of iTechAge is to drive and fine-tune research at the Institute such that it maximizes impact on the challenges of aging. iTechAge will establish continuous dialogue between the cutting-edge research occurring at the Technion and needs of communities, healthcare and governmental organizations at the local, national, and global level. In addition, it will provide, build, and maintain the resources, data, and infrastructure needed to accelerate the research ecosystem and ensure that research outcomes are transformed into real-world solutions. To further advance aging-related research, iTechAge will support new faculty recruitment by obtaining startup funds for incoming faculty strategically picked across key areas of aging research to synergize with existing faculty members.

Several steering committees will be formed to ensure that the Technion Healthy Aging Institute functions optimally: a scientific steering committee responsible for setting and executing strategic goals; a clinical steering committee that will design and oversee the Human Health Monitoring Center (HHMC, see below) clinical studies; and a data and analytics steering committee in charge of data standardization, privacy, and storage solutions for samples and data. In addition, iTechAge will contain the Institute's central administration, public outreach programs, project management support, and oversight of educational activities, including a graduate program centered around aging. iTechAge's oversight, and that of the Institute at large, will be established through a scientific advisory board, consisting of world leaders in the biological, clinical, social, and policy aspects of aging.

iTechAge will bring together the best minds and tools for meeting the challenges of an aging population, while interacting with diverse partners in industry, government, education, and throughout the healthcare system. To date, over 60 Technion faculty members from a wide range of fields have already joined iTechAge and are eager to commence research.

iTechAge	
	Amount (CAD)
Personnel	
Center Head	570,080
Director	1,350,020
Administrative Assistant	867,160
Total Personnel	**2,787,260**
Outreach	721,000
Office Administration Costs	14,140
Other	28,000
Faculty Recruitment	10,500,000
Subtotal	**14,050,400**
General Infrastructure Costs	6,307,560
Technion Canada Administrative Expenses	3,314,087
Total	**23,672,047**

II. Human Health Monitoring Center and the Lifespan Cohort

Aging is a challenge that requires tackling the problem from multiple fronts to achieve success. To address this, one must build a comprehensive view of human health that encompasses a rich data set that includes the molecular, physiological, and social aspects of aging.

Large studies, following aging populations around the world, mostly focus on public health, gerontology, cognition and other social determinants of aging, with scant molecular data. An alternate design has small aged cohorts on which high-resolution molecular data is collected with scant physiological measurements. At present, few studies exist in the world that routinely collect all of these data layers, and none support the full design and infrastructure needed for multidisciplinary aging and wellness research. The lifespan cohort described below will collect high-resolution molecular data, augmented by advanced physiological monitoring methodologies and social wellness tracking and integrating engineering disciplines such as biomechanics, food engineering, and AI. This combination will allow for connecting layers of molecular and physiological data providing insights to the molecular changes underlying the physiological aging.

The Human Health Monitoring Center will provide Technion researchers the ability to efficiently profile, at high resolution, the physiological (clinical and molecular) status of healthy and unhealthy patient volunteers. The Center will launch, populate, and maintain the Lifespan Cohort, a comprehensive study of aging individuals and their respective wellness markers, profiled by analyzing clinical, biological, environmental, physiological and social data. This flagship project will recruit over 1,000 volunteers tracked longitudinally, starting from adults as young as 18 and spanning all decades of life. These volunteers will undergo a series of clinical tests on a regular basis, and their environmental and social interactions will be tracked through wearables and questionnaires. Blood and other biospecimens will be collected

and used to generate extensive molecular data. These data will accrue over time and will be of great value to scientists researching a broad range of fields related to aging. Beyond that, the Technion expects to build, through partnerships with Israel's leading hospitals and HMOs, a large (10,000 and more people) cross-sectional (i.e., single timepoint) study that can provide population-level associations on particular diagnostics as well as validation of discoveries identified in the Lifespan cohort.

The activity of this groundbreaking flagship project will be conducted in state-of-the-art facilities in the soon-to-be-completed Wolfe Center for Translational Medicine and Engineering, located on the Rambam Health Care Campus and adjacent to the Rappaport Faculty of Medicine on the Technion's Haifa campus.

A fully equipped clinic, staffed by skilled medical personnel, will carry out physiological tests and collect biological samples from each volunteer, in the following domains:

- Cardiovascular: tests such as echocardiograms, stress tests, etc.
- Gait and Motion: physical assessment of various motion indices, including functional parameters
- Cognition: monitoring attention, memory, visuospatial, language, and reasoning skills
- Wellness and Nutrition: lifestyle, behavioral and social interactions and performing nutritional intervention studies

The above-mentioned facilities will also include a fully equipped Biobank for collecting, processing, and storing clinical samples.

The establishment of the Human Health Monitoring Center, augmented by the Lifespan Cohort initiative, represents a transformative initiative that will provide a large-scale, comprehensive study of aging and wellness. Thanks to the valuable longitudinal medical data that will be collected by the Human Health Monitoring Project, the Institute will foster multidisciplinary research at the Technion that will advance human health.

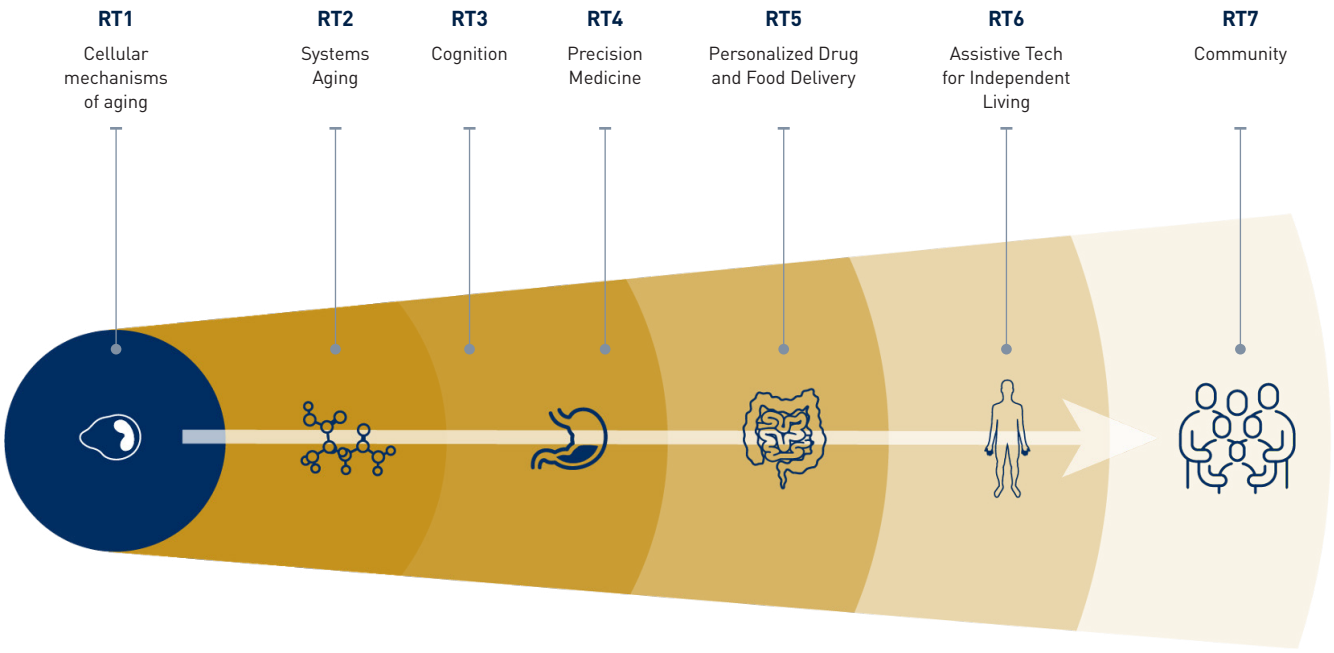
Human Health Monitoring Center

	Amount (CAD)
Construction (Wolfe Center)	1,358,000
Personnel	
Lab Technicians	1,190,000
Data Engineer/IT	951,300
Operations & Logistics PM	634,480
Clinical Coordinator | Clinical Cohort	1,212,540
Nurse	941,220
Physician	523,180
Nutritionist	260,400
Total Personnel	**5,713,120**
Services	
Biobanking	1,417,500
Basic Phenotyping Cost	6,142,500
High Res Molecular Phenotyping Cost	5,740,000
Total Services	**13,300,000**
Equipment	
Biobank	4,739,000
Clinic	1,008,000
Consumables & Disposables	378,000
Total Equipment	**6,125,000**
Facility & Maintenance	
Cleaning Maintenance & Computation Costs	392,000
Management Fees & City Tax	134,400
Instruments Service Agreements & Insurance	560,000
Office Administration Costs	14,140
Other	28,000
Total Facility & Maintenance	**1,128,540**
Subtotal	**27,624,660**
General Infrastructure Costs	12,401,480
Technion Canada Administrative Expenses	6,515,883
Total	**46,542,023**

III. Targeted Research

True to the global road map of healthy longevity, and recognizing the multiscale challenges that aging poses, the Technion Healthy Aging Institute has defined seven distinct research themes, organized from the microlevel detrimental processes that occur at the cell level and other biological systems, up to macrolevel challenges posed at the community and population level.

Each such research theme is headed by one or two Technion faculty members who are experts in that field and that are committed to accelerating cutting-edge, aging-related multidisciplinary research at the Technion. Each theme brings together the combined expertise of different investigators to tackle specific challenges and labs that share similar fields of interest yet tackle the challenge from a different angle.



The research themes include:

Cellular Mechanisms of Aging: Multiple biological processes have been implicated with cellular breakdown due to age. Using state-of-the-art, high-resolution methodologies, this research theme focuses on understanding those mechanisms, slowing and reversing them by studying molecular changes at the individual cell level and at single molecule resolution — spurring the discovery of novel therapeutic directions. This research theme is led by Assoc. Prof. Arnon Henn (Faculty of Biology) and Asst. Prof. Ayalla Shiber (Faculty of Biology).

Systems Aging: Aging is characterized by significant systemic changes such as altered metabolism, dysregulated hormone levels, and heightened inflammation. Driven by high-resolution longitudinal profiling, research will focus on system studies of immune-aging and alterations in the endocrine system, their adverse impact on overall body health, the ability to fight infections, and response to therapeutics. Such knowledge can guide the development of drugs and vaccines tailored to individuals over the age of 60 and devise interventions to delay and reverse our systemic aging process. This research theme is led by Asst. Prof. Noga Ron Harel (Faculty of Biology) and Assoc. Prof. Shai Shen-Orr (Faculty of Medicine).

Cognition and Motor Function: The rapidly growing aging population underscores an urgent need for precise and personalized assessments, and mitigation of cognitive and motor functions. Decline in brain function is one of the most prominent and fundamental consequences of aging. This research theme focuses on precise evaluation of brain activity using fMRI and EEG, improving memory performance, and enhancing motor skills, aimed at optimizing daily functions and sharpening sensory processing. Better understanding of neural mechanisms impacting an individual's cognitive and motor capacities, and identification of biomarkers for these processes, will allow the development of personalized interventions for treatments, paving the ways to promoting healthy brain aging. This research theme is led by Assoc. Prof. Firas Mawase (Faculty of Biomedical Engineering) and Assistant Prof. Ben Engelhard (Faculty of Medicine).

Personalized Medicine and Biomarkers of Aging: Personalized science-driven innovations are necessary to effectively drive the lifespan trajectories of healthy individuals. Biomarkers of aging are crucial for our understanding of the complex and multifaceted aging process. These biomarkers are measurable indicators that provide insights into the biological changes occurring in an individual over time. In the context of personalized medicine, biomarkers of aging play a pivotal role in tailoring interventions and treatments to address the specific needs of an individual, considering their unique aging

trajectory and health profile. The Technion's strength in developing novel technologies will facilitate generating accurate and sensitive assays designed for real-world impact. These, as well as standard tools, will then be used for discovering preventive and clinical decision-supported biomarkers that can better assess functional capability and aging associated health threats than existing clinical tests and chronological age. This research theme is led by Assoc. Prof. Yoni Savir (Faculty of Medicine).

Personalized Food and Drug Interventions: The combination of medicine, nutrition, and food technology with big data and AI make it possible to personalize effective interventions, ranging from tailored nutrition to personalized medicines. Researchers will develop scalable food and pharmaceutical interventions that could be commercialized to reshape public health, including tailored solutions for boosting immunity and, potentially, controlled modulation of immunological aging. This research theme is led by Prof. Uri Lesmes (Faculty of Biotechnology and Food Engineering).

Assistive Technology for Independent Living: For older adults, maintaining independence, mobility, and overall well-being during their daily activities is a serious concern. Through a multidisciplinary approach, researchers will focus on creating user-friendly and accessible assistive devices that cater to the unique needs and preferences of each individual, promoting autonomy and reducing the burden on caregivers and healthcare systems. These include wearable devices, motion sensors, feedback systems, smart home automation, and telehealth systems. This research theme is led by Asst. Prof. Arielle Fischer (Faculty of Biomedical Engineering).

Community: The presence of a community (or lack thereof) has a dramatic impact on all areas of life for the elderly, including physiological functioning, mental health, and the ability to continue to fulfill their social roles as family members and professionals. Research will focus on the relationships between the elderly, the community, and the home. Multidisciplinary teams or researchers from the Technion and from community institutions will perform data-driven studies from the perspective of urban sociology. This research theme is led by Assoc. Prof. Merav Aharon-Gutman (Faculty of Architecture and Town Planning).

For each of these seven themes, seed money for research will be awarded based on annual calls for proposals, with plans to grant two seed grants per theme each year. To qualify for seed funding, the proposed research must be multidisciplinary in nature, hold promise for discoveries that maximize health and societal impact, and must be driven by real-world human data by utilizing data or samples generated in the Human Health Monitoring Center.

Targeted Research	
	Amount (CAD)
Services	
Preclinical Facilities	483,000
Total Services	**483,000**
Equipment	
Research Equipment	1,540,000
Additional/Other Equipment	3,801,000
Consumables & Disposables	868,000
Total Equipment	**6,209,000**
Seed Funding	4,368,000
Subtotal	**11,060,000**
General Infrastructure Costs	4,965,100
Technion Canada Administrative Expenses	2,608,737
Total	**18,633,837**

IV. Systems Medicine Center

Our ability to understand and model how the systems in our bodies work together holds the promise for accelerating biomedical breakthroughs.

There is a need to develop new modeling methodologies to help understand the complex and diverse clinical manifestations of aging. Systems medicine and integrative molecular-clinical modeling make it possible to accelerate biomedical breakthroughs, especially for complex conditions such as aging. This involves developing novel technologies, operating cutting-edge equipment, and providing high-quality, experienced professional support.

The Systems Medicine Center is an integrative unit for quantifying biology at the cellular and molecular levels. The Systems Medicine Center will lower the barrier of entry for performing top-tier human studies at the Technion by serving as a hub for streamlined coordination of sample selection, shipment, and data generation. The Center will support basic researchers by employing dedicated personnel expert in clinical trials protocol design and regulatory affairs, dropping barriers of entry and enabling a strong influx of Technion researchers to perform impactful human based studies.

The Systems Medicine Center will provide sophisticated research facilities that will benefit all stakeholders affiliated with the Technion Healthy Aging Institute, including iTechAge, the Human Health Monitoring Center, and the various research projects. It will coordinate and conduct molecular measurements and phenotyping as well as other advanced tests using cutting-edge instruments and equipment.

To this end, the Systems Medicine Center will acquire the equipment to substantially increase the throughput of the services currently provided by the core facilities, as well as hire a small number of dedicated personnel. In addition, it will serve as a beta-site/testbed for testing of novel measurement technologies developed by Technion faculty as part of the Healthy Aging Institute and beyond. By offering centralized technological and professional services, the new Systems Medicine Center will accelerate research on human health at the Technion by lowering the overhead for obtaining data and simultaneously enabling the highest standards of data quality.

Systems Medicine Center

	Amount (CAD)
Personnel	
Project Manager/Clinical Coordinator | SMC	504,000
Technician	504,000
Total Personnel	**1,008,000**
Equipment	
Core Facility Development	8,120,000
Total Equipment	**8,120,000**
Subtotal	**9,128,000**
General Infrastructure Costs	4,097,800
Technion Canada Administrative Expenses	2,153,038
Total	**15,378,838**

In summary, the Technion Healthy Aging Institute represents a transformative initiative aimed at revolutionizing the field of aging research. By leveraging the Technion's world-class expertise, the Institute will foster multidisciplinary collaboration and cutting-edge innovations to address the complex challenges of growing old. Through its four new centers — iTechAge, the Human Health Monitoring Center, Targeted Research, and the Systems Medicine Center — the Institute will provide a comprehensive platform for advancing scientific understanding and developing real-world solutions to improve the health, well-being, and quality of life for older adults. With its commitment to groundbreaking research, policy influence, and global collaboration, the Technion Healthy Aging Institute is poised to make a significant impact on the aging population in Israel and worldwide. ■

Total Budget

	Phase 1 (Y1-2)	Phase 2 (Y3-5)	Phase 3 (Y6-9)	Total ($)
Total iTech Age	707,610	12,700,020	10,264,413	23,672,047
Total Human Health Monitoring Center	919,901	19,425,708	26,196,414	46,542,023
Total Targeted Research	849,137	9,871,216	7,913,484	18,633,837
Total Systems Medicine Center	-	7,271,926	8,106,912	15,378,838
Total (CAD)	**2,476,648**	**49,268,870**	**52,481,223**	**104,226,745**

Funding **Opportunities**

Generous donations can be made to name one of the four components of the Technion Healthy Aging Institute.

Additionally, donations of $18,000 CAD and above are welcome to support the highest priorities of the Technion Healthy Aging Institute. Funding Phase 1 is the first priority for the Institute. ■

Donor **Recognition**

The highest form of donor recognition bestowed by the Technion is inclusion in the President's Circle.

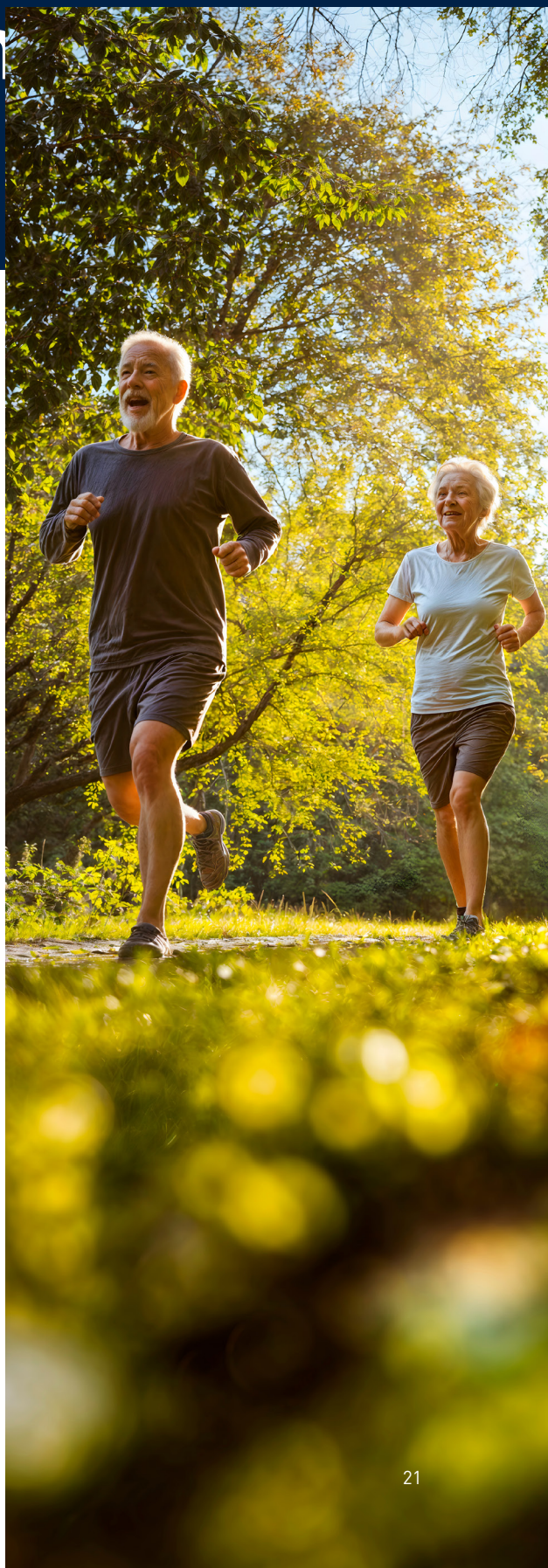
This extraordinary honor is awarded by the University to its most devoted friends upon reaching the milestone of the equivalent of **$10 million** USD in support. Donors who provide the equivalent of **$1 million** USD in support and above are bestowed the title of Technion Guardian and are honored by physical and digital plaques situated in a most prominent central campus location.

Gifts of under the equivalent of $1 million USD will be recognized in the form of digital plaques situated in the foyer of Churchill Auditorium, whose dome is one of the most noted features of the Technion. These will be divided into the following levels (CAD equivalent):

- $500,000 – $999,999
- $250,000 – $499,999
- $100,000 – $249,999

Gifts starting at the equivalent of **$100K USD** will be listed in the President's Report, the official annual report of the Technion. Gifts are listed in one printed version of the Report; recognition appears when gifts reach 50% completion.

Additionally, donors will receive an annual report of activities carried out within the Technion Healthy Aging Institute. ■



Thank You

The Technion reserves special gratitude for those who support its research initiatives. These gifts, which help expand the frontiers of knowledge in specific academic disciplines, represent the very best of the spirit of discovery for which the Technion is globally renowned.

Support for research ensures that the Technion is at the forefront of academic institutions, attracting new cadres of highly accomplished faculty and promising students. The gift you have bestowed for aging research allows researchers in this area to usher in the next wave of discoveries that will benefit the Technion and the world now that the University has commenced its second century of operation.

Appendix: Institute Leadership

The Technion Healthy Aging Institute will be headed by Technion faculty members whose fields of interest are germane to the subject at hand and who are strongly committed to the vision of an innovative hub based at the Technion that will advance scientific and technological research for the benefit of the world's population.

Prof. Shai Shen-Orr: Founding Director of the Technion Healthy Aging Institute

The Technion Healthy Aging Institute is the brainchild of Prof. Shai Shen-Orr, and he will serve as the founding director of the Institute.

Prof. Shai Shen-Orr is a computational biologist who specializes in applying computer science and information technology to biology and medicine, particularly immunology. Since 2012, he has headed the multidisciplinary Systems Immunology & Precision Medicine Laboratory at the Technion's Ruth and Bruce Rappaport Faculty of Medicine and is the co-director of Tech.AI, the Technion's Artificial Intelligence umbrella organization, where he oversees AI efforts across the Technion in biomedicine. Prof. Shen-Orr has been a member of and led multiple international consortia and collaborations. Prof. Shen-Orr is also the co-founder and chief scientist of CytoReason, a company aimed at making medicine predictable through the use of molecular-level computational models of disease to improve the probability of success in drug development.

Prof. Shen-Orr is developing analytical methodologies for unraveling the complexities of the immune system, which he has applied to understanding the workings of the immune system in disease and aging. He is also identifying diagnostic biomarkers that evaluate immune health, and, in particular, a metric that gauges one's "immune age," a more accurate measure of health than chronological age. His work could advance the diagnosis and treatment of immune-related diseases. His research has been cited over 20,000 times, and he has co-authored over 50 scholarly papers.

Dr. Neta Milman: Executive Director

Dr. Neta Milman is senior staff scientist in the Systems Immunology & Precision Medicine Laboratory at the Ruth and Bruce Rappaport Faculty of Medicine. Her research interests include the effect of aging on the immune system and spatial modeling of inflammation in barrier tissues. Dr. Milman has extensive experience in experimental design, project management, and generation of multidimensional data in clinical studies. She serves on the administrative core of a large longitudinal, National Institutes of Health study, coordinating exchange, synergy, and activities of the research projects and clinical and immune monitoring cores.

Research Themes Leaders

Assoc. Prof. Arnon Henn: Co-lead, Cellular Mechanisms of Aging

Assoc. Prof. Arnon Henn is the head of the Cellular Biology & Biophysics of Molecular Motors Laboratory in the Faculty of Biology at the Technion. He joined the Technion in 2011 after postdoctoral training at Yale University's Department of Molecular Biophysics and Biochemistry. Currently, he is working in an academy–industry consortium on the aging of mitochondria that will yield new understanding and treatments for mitochondrial diseases and caused-related aging.

Assoc. Prof. Henn has mentored over 20 graduate students and half a dozen postdoctoral researchers. Currently, his lab focuses on understanding organelle trafficking by molecular motors in non-neuronal and neuronal cell lines. Many aging diseases, primarily neurodegenerative diseases, are associated with impaired organelle trafficking. This is key to dynamically studying biomarkers in the aging process; hence, this is instrumental to both diagnostics and curing.

Asst. Prof. Ayala Shiber: Co-lead, Cellular Mechanisms of Aging

Asst. Prof. Ayala Shiber is the head of the Molecular Protein Biogenesis Lab, focused on the research of protein folding and misfolding in health and in neurodegenerative diseases, in the Faculty of Biology at the Technion. She has received multiple competitive grants from various agencies, including the Israel Science Foundation and the European Research Council. She joined the Technion in 2019 after a joint postdoctoral position at the Molecular Biology Center of Heidelberg University, and the German Cancer Research Center. Her main research objective is to resolve the long-standing question: How do cells direct their proteome to fold to their native, functional state and avoid misfolding diseases characteristic of neurodegeneration? Her lab studies the role of the ribosome as a platform for coordinating protein folding and complex assembly pathways, by advanced techniques targeted at capturing translation snapshots, in living cells. The lab further develops tools for studying single-molecule mRNA–protein interactions, combining super-resolution imaging, direct RNA sequencing nanopore platform, and biophysical techniques at the atom level.

Asst. Prof. Noga Ron-Harel: Co-lead, Systems Aging

Asst. Prof. Noga Ron-Harel is the head of the Immunometabolism and Aging Lab at the Technion. She graduated from the Technion (B.Sc., summa cum laude) and the Weizmann Institute of Science, and did her postdoctoral training at Harvard Medical School. Asst. Prof. Ron-Harel has received multiple competitive grants from the Israel Science Foundation, the European Research Council, and the American Federation for Aging Research. Her research group works on immune aging with a special focus on T lymphocytes, cells of the adaptive immune system that play a central role in the immune defense against intruders, mediate vaccination, and support tissue homeostasis and function. An aged or dysfunctional T cell immunity is sufficient to promote organ aging and multiple age-related morbidities. Research in the Ron-Harel lab investigates the other direction of this interaction, to define how the *in vivo* microenvironment in the aged host dictates T cells aging trajectories.

Assoc. Prof. Firas Mawase: Co-lead, Cognition

Assoc. Prof. Firas Mawase is a member of the Faculty of Biomedical Engineering at the Technion, and Head of the Neurorehabilitation and Sensorimotor Neuroscience Lab. He is known for his work in motor learning, neuroplasticity, cognition, and rehabilitation. His research group primarily focuses on understanding how the brain controls movement, and how this can be applied to improve motor and cognitive recovery in patients with neurological disorders. The group often uses techniques like brain stimulation, neuroimaging, and computational models to explore the dynamics of human behavior. His studies have contributed to advancing rehabilitation strategies for conditions such as stroke, enhancing patient outcomes.

Asst. Prof. Ben Engelhard: Co-lead, Neuroscience and Cognition

Asst. Prof. Ben Englehard is a member of the Ruth and Bruce Rappaport Faculty of Medicine at the Technion. He holds a B.Sc. in electrical engineering from the Technion, and earned his Ph.D. at the ELSC center at the Hebrew University in Jerusalem, where he studied cortical dynamics and learning processes using brain–machine interfaces. He then conducted his postdoctoral work at Princeton University working with Ilana Witten and David Tank, where he studied coding principles of the dopamine system during navigation-based decision making. In 2021, he opened his lab in the Ruth and Bruce Rappaport Faculty of Medicine, where he studies the neural basis of complex behaviors including learning, decision making, and social behaviors, with a focus on the dopamine system.

Assoc. Prof. Yonatan Savir: Lead, Personalized Medicine & Biomarkers of Aging

Assoc. Prof. Yonatan Savir is a member of the Rappaport Faculty of Medicine at the Technion. The research in his lab is devoted to understanding how age affects the ability of biological systems to carry out functions by taking an interdisciplinary approach using tools from engineering (AI, mathematical modeling) and experimental biology (single-cell dynamics and omics). Assoc. Prof. Savir received his bachelor's degree from the Technion in the program for dual degrees in electrical engineering and physics, summa cum laude. He subsequently completed his Ph.D. in physics of complex systems at the Weizmann Institute of Science, where he studied the principles of information processing in biological systems. He did his postdoctoral training as an HFSP fellow at Harvard Medical School. Assoc. Prof. Savir has received many prestigious awards, including the Lee Segal Prize for theoretical biology, the Alon fellowship, and the American Federation for Aging Research (AFAR) Young Investigator Award. He has vast experience in harnessing artificial intelligence for health applications, co-founded several startups, and consults for BioTech companies.

Prof. Uri Lesmes: Lead, Personalized Food and Drug Interventions

Prof. Uri Lesmes is head of the Food Chemistry, Bioactives and Digestion Lab, and director of the Carasso FoodTech Innovation Center at the Technion. He joined the Technion in 2010 after holding positions with the University of Reading (UK) and the University of Massachusetts - Amherst. He is an active researcher in the field of food science and technology with over 65 peer-reviewed publications, h-index of 36, and over 8,500 citations. His research focuses on food rational design, digestibility, and colloid research using *in vitro* human digestion models and foodomics tools. He is active on various national and international professional committees in bodies such as the European Research Council, Biotechnology and Biological Sciences Research Council (UK), the Swiss National Science Foundation, the European Federation of Food Science and Technology, and the INFOGEST scientific network.

Asst. Prof. Arielle Fischer: Lead, Assistive Technology for Independent Living

Asst. Prof. Arielle Fischer is head of the Technion BioMotion Lab in the Faculty of Biomedical Engineering, with degrees from the Technion and MIT. Her research focuses on biomechanics, wearable technology, and musculoskeletal pathologies. She has received competitive grants from the Israel Science Foundation, Ministry of Innovation, Science and Technology, and the Zuckerman Institute to support her work on human motion analysis, smart wearable devices, and sensor technologies. Her research aims to improve post-injury rehabilitation and prevent osteoarthritis and joint replacements using advanced biomechanics and AI-based approaches. She has played key roles in the European Society of Biomechanics Congress and leading research groups at International Orthopaedic Research Society meetings. Her interdisciplinary research bridges academia and industry, fostering innovation in assistive technology, rehabilitation, and athletic performance through collaborations with the Israel Olympic and Paralympic Committees.

Assoc. Prof. Meirav Aharon Gutman: Lead, Urban Sociologist - Community

Assoc. Prof. Meirav Aharon Gutman is an urban sociologist and a faculty member in the Faculty of Architecture and Town Planning at the Technion. She also heads the Technion's Social Hub. Her research centers around the development of innovative urban planning models designed to mainstream social considerations at the process of decision making in the town planning realm, as well as crime in cities, arts in cities, ethnicity, and immigration. In recent years, she has devoted time to research and policy development in the field of age-friendly cities.

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Situated in Haifa, the Technion-Israel Institute of Technology, founded in 1912, stands as Israel's oldest university, offering a wide array of degrees in science, engineering, and interdisciplinary fields to its diverse student body of over 15,000. Known for its groundbreaking research in areas such as energy, nanotechnology, and life sciences, the Technion hosts 18 academic faculties and over 60 research centers, playing a pivotal role in shaping both academic discourse and the socio-economic landscape of Israel.

With a rich history spanning a century, the Technion maintains its position as a globally recognized institution, consistently ranking among the top academic establishments worldwide. Its sprawling campus overlooking the Mediterranean serves as a hub for applied research, attracting renowned faculty members and fostering a culture of innovation and collaboration. Among its 565 faculty members are leaders in their fields, boasting numerous international honors and prizes, including three Nobel Prizes, and contributing significantly to the advancement of knowledge through their research endeavors.