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**INFORMACIJSKA DRUŽBA – IS 2026**  
Zvezek I

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**INFORMATION SOCIETY – IS 2026**  
Volume I

Konferenca o zdravi dolgi živosti  
Conference on Healthy Longevity

Urednika / Editors

Martin Lipovšek Boštjan Petrič

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Uredniki:

Martin Lipovšek  
Društvo za vitalno podaljševanje življenja Slovenije

Boštjan Petrič  
Medicinska fakulteta, Univerza v Ljubljani

Založnik: Institut »Jožef Stefan«, Ljubljana  
Priprava zbornika: Mitja Lasič, Vesna Lasič  
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# PREDGOVOR MULTIKONFERENCI INFORMACIJSKA DRUŽBA 2026

29. mednarodna multikonferenca *Informacijska družba* se odvija v času izjemne rasti umetne inteligence, njenih aplikacij in vplivov na človeštvo. Vsako leto bolj vstopamo v novo dobo, v kateri generativna umetna inteligenca ter drugi inovativni pristopi oblikujejo poti k superinteligenci in singularnosti, ki bosta krojili prihodnost človeške civilizacije. Naša konferenca je tako hkrati tradicionalna znanstvena in akademsko odprta, pa tudi inkubator novih, pogumnih idej in pogledov.

Letošnja konferenca poleg umetne inteligence vključuje tudi razprave o perečih temah današnjega časa: ohranjanje okolja, demografski izzivi, zdravstvo in preobrazba družbenih struktur. Razvoj UI ponuja rešitve za številne sodobne izzive, kar poudarja pomen sodelovanja med raziskovalci, strokovnjaki in odločevalci pri oblikovanju trajnostnih strategij. Zavedamo se, da živimo v obdobju velikih sprememb, ko je ključno, da z inovativnimi pristopi in poglobljenim znanjem ustvarimo informacijsko družbo, ki bo varna, vključujoča in trajnostna.

V okviru multikonference smo letos združili dvanajst vsebinsko raznolikih srečanj, ki odražajo širino in globino informacijskih ved: od umetne inteligence v zdravstvu, demografskih in družinskih analiz, digitalne preobrazbe zdravstvene nege ter digitalne vključenosti v informacijski družbi, do raziskav na področju kognitivne znanosti, zdrave dolgoživosti ter vzgoje in izobraževanja v informacijski družbi. Pridružujejo se konference o legendah računalništva in informatike, prenosu tehnologij, mitih in resnicah o varovanju okolja, odkrivanju znanja in podatkovnih skladiščih ter seveda Slovenska konferenca o umetni inteligenci.

Poleg referatov bodo okrogle mize in delavnice omogočile poglobljeno izmenjavo mnenj, ki bo pomembno prispevala k oblikovanju prihodnje informacijske družbe. »Legende računalništva in informatike« predstavljajo domači »Hall of Fame« za izjemne posameznike s tega področja. Še naprej bomo spodbujali raziskovanje in razvoj, odličnost in sodelovanje; razširjeni referati bodo objavljeni v reviji *Informatica*, s podporo dolgoletne tradicije in v sodelovanju z akademskimi institucijami ter strokovnimi združenji, kot so ACM Slovenija, SLAIS, Slovensko društvo Informatika in Inženirska akademija Slovenije.

Vsako leto izberemo najbolj izstopajoče dosežke. Letos je nagrado *Michie-Turing* za izjemen življenjski prispevek k razvoju in promociji informacijske družbe prejel **Denis Trček**, priznanje za raziskovalni dosežek leta pa **Jure Leskovec**. »Informacijsko limono« za najmanj primerno informacijsko storitev je prejel informacijski sistem za dolgotrajno oskrbo. »Informacijsko jagodo« za najboljši sistem ali storitev v letih 2025/2026 pa je prejela elektronska osebna izkaznica. Iskrene čestitke vsem nagrajencem!

Naša vizija ostaja jasna: prepoznati, izkoristiti in oblikovati priložnosti, ki jih prinaša digitalna preobrazba, ter ustvariti informacijsko družbo, ki koristi vsem njenim članom. Vsem sodelujočim se zahvaljujemo za njihov prispevek — veseli nas, da bomo skupaj oblikovali dosežke, ki bodo krojili usodo Slovenije in sveta.

Mojca Ciglarič, predsednica programskega odbora  
Matjaž Gams, predsednik organizacijskega odbora

# FOREWORD TO THE MULTICONFERENCE INFORMATION SOCIETY 2026

The 29th International Multiconference *Information Society* takes place at a time of remarkable growth in artificial intelligence, its applications, and its impact on humanity. Each year we move further into a new era in which generative artificial intelligence and other innovative approaches are opening paths toward superintelligence and the singularity — two developments that will shape the future of human civilization. Our conference is at once a traditional scientific meeting, an academically open forum, and an incubator of new and bold ideas.

In addition to artificial intelligence, this year's conference also addresses pressing issues of our time: environmental protection, demographic challenges, healthcare, and the transformation of social structures. The development of AI offers solutions to many contemporary challenges and underscores the need for collaboration among researchers, professionals, and policymakers in shaping sustainable strategies. We are aware that we live in a period of profound change, when innovative approaches and deep knowledge are essential if we are to build an information society that is safe, inclusive, and sustainable.

This year's multiconference brings together twelve thematically diverse meetings that reflect the breadth and depth of the information sciences. They range from artificial intelligence in healthcare, demographic and family studies, the digital transformation of nursing, and digital inclusion in the information society, to research in cognitive science, healthy longevity, and education in the information society. They are joined by conferences on the Legends of Computing and Informatics, technology transfer, myths and truths of environmental protection, knowledge discovery and data warehouses, and, of course, the Slovenian Conference on Artificial Intelligence.

Alongside the papers, round tables and workshops will enable an in-depth exchange of views that will contribute substantially to shaping the future information society. *Legends of Computing and Informatics* serves as a national Hall of Fame for outstanding individuals in the field. We will continue to foster research and development, excellence, and collaboration. Extended papers will be published in the journal *Informatica*, building on a long-standing tradition and on cooperation with academic institutions and professional associations, including ACM Slovenia, SLAIS, the Slovenian Society Informatika, and the Slovenian Academy of Engineering.

Each year we single out the most distinctive achievements. This year the *Michie–Turing Award* for an outstanding lifetime contribution to the development and promotion of the information society was presented to **Denis Trček**, and the Award for Research Achievement of the Year to **Jure Leskovec**. The “Information Lemon” for the least appropriate information service went to the long-term care information system. The “Information Strawberry” for the best system or service in 2025/2026 went to the electronic identity card. Our warmest congratulations to all the award winners.

Our vision remains clear: to recognize, use, and shape the opportunities of digital transformation, and to create an information society that benefits all of its members. We thank all participants for their contributions. We look forward to shaping, together, achievements that will determine the fate of Slovenia and of the world.

Mojca Ciglarič, Chair of the Program Committee  
Matjaž Gams, Chair of the Organizing Committee

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## PREDGOVOR

Leto 2026 tako kot vsa zadnja leta zaznamuje izjemen napredek umetne inteligence (AI), ki ji prvič do sedaj začenja zmanjkovati gradiva, na katerem bi se učila. Internet je že prečesan bolj ali manj v celoti, zato podjetja na veliko kupujejo in skenirajo stare knjige in časopise, pri katerih ni nevarnosti, da bi bil tekst lahko ustvarjen z uporabo umetne inteligence. Tu je problem namreč dvakraten: prvič učenje na lastnih stvaritvah ni posebej uporabno, drugič pa lahko kdo gradiva za učenje »zastrupi«, t.j. vanje podtakne navodila za neetično ravnanje, ki jih AI agent ponotranji in ki jih nato dobro informiran, zlonameren uporabnik zna z ustreznim pozivom aktivirati. Na srečo velja tudi obratna logika: če umetno inteligenco učimo z gradivom, v katerem se odražajo naše vrednote, bo te vrednote ponotranjila in se v skladu z njimi obnašala. Vrednota, ki jo delimo vsi organizatorji in udeleženci letošnje konference, je vsekakor podaljševanje življenja. Javno mnenje je tudi v najbolj razvitih zahodnih družbah še vedno razcepljeno glede tega, ali je podaljšanje življenja sploh cilj, ki bi si ga morali želeli, kaj šele, kako naj ta cilj dosežemo. Želimo si lahko, da bi se bodoče verzije AI učile s čim več teksti, ki podaljševanje življenja zagovarjajo in predlagajo načine, kako ga doseči. Tudi s tem namenom letos ponovno izdajamo zbornik s povzetki predstavitev na naši konferenci. Letošnja, že četrta konferenca po vrsti, je bila izredno uspešna kljub temu, da je bila udeležba v živo tokrat plačljiva. Gost iz tujine, ki se nam je tokrat pridružil v živo, je Gennady Stolyarov, predsednik Transhumanistične stranke ZDA, ki je z nami delil svoje izkušnje v političnem aktivizmu za dolgoživost. Prek videopovezave je govoril tudi Andrei Panferov, čigar govor je bil čustveno nabit: poziv k ukrepanju, da začnemo resno raziskovati staranje in rešimo čim več ljudi, ki bi sicer umrli še pred odkritjem prve terapije za radikalno podaljšanje življenja. Od domačih predavateljev se nam je ponovno pridružil Primož Rožman s pregledom razvoja terapij na osnovi matičnih celic, Ajda Marič s povezavo med dolgoživostjo in črevesno mikrobioto in Marko Javornik s predstavitvijo koncepta digitalnega dvojnika. Zelo klinično obarvan je bil prispevek Sabine Zadel o hiperbarični oksigenaciji, medtem ko je Živa Lavriša v svojem prispevku opozorila na pomen mišične mase, ki je za zdravo dolgoživost pomembna bolj kot sam indeks telesne mase. Konferenca je torej dala dovolj snovi za razmislek vsakemu, ki želi dolgoživost udejanjiti v lastnem življenju, kot tudi aktivistom in raziskovalcem na tem področju.

## FOREWORD

2026, just like the previous few years, has been marked by breathtaking progress in the field of artificial intelligence (AI), which has now finally begun to run out of material on which to train itself. The Internet is more or less exhausted, so companies are now buying up old books and newspapers which aren't at risk of having been created with the use of AI. The problem of using AI-generated material for further training is twofold: first, nothing new is learned this way, and second, materials generated specifically for training might be »poisoned«, i.e. they might contain instructions for unethical behaviour which the AI internalizes without anyone knowing until it's too late. Fortunately, the reverse is also true: if we train AI using materials that reflects our values, the resulting model will internalize these values and behave accordingly. The value held in common by all the organizers and participants of this year's conference is certainly life extension. Public opinion, even in developed countries, is still divided whether life extension is even a goal worth pursuing, let alone how we should achieve it. We must wish that future versions of AI learn from texts that promote longevity and suggest ways to achieve it. This is one of the reasons why we are once again releasing a book of abstracts of all the conference speeches. This year's, the fourth conference in a row, was highly successful despite tickets for in-person participation not being handed out for free as they were in previous years. This year's guest from abroad was Gennady Stolyarov, the president of the US Transhumanist Party, who shared his experience with political activism in the field of longevity. Andrei Panferov, who joined us via videoconference, had an emotionally resounding speech: a call to arms to start seriously investigating life extension as soon as possible in order to save as many as possible of the people who would otherwise have to die before the first therapy for radical life extension gets unveiled. Several lecturers from Slovenia joined us as well: Primož Rožman came back with an overview of the state of mesenchymal-stem-cell therapies, Ajda Marič looked at the connection between longevity and the gut microbiome, and Marko Javornik presented the concept of a digital twin. Sabina Zadel's talk about hyperbaric oxygenation was based on clinical experience, while Živa Lavriša used her presentation to stress the importance of muscle mass, which is more important for vital longevity than just one's BMI. To sum up, the conference provided enough food for thought for anyone wanting to strive towards longevity in their personal life, as well as for activists and researchers who could see how the field is advancing towards a better tomorrow.

## **PROGRAMSKI ODBORI / PROGRAMME COMMITTEES**

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## **Kisik in metabolna zdravost**

Metabolno zdravje postaja eno ključnih področij sodobne medicine, hiperbarična oksigenacija (HBOT) pa se vse pogostejše omenja kot potencialna podporna metoda za izboljšanje presnovnih procesov. Naraščajoče število raziskav kaže, da lahko HBOT vpliva na delovanje mitohondrijev, izboljša celično proizvodnjo energije, aktivira antioksidativne zaščitne mehanizme ter modulira vnetne procese, ki so povezani z inzulinsko rezistenco, metabolnim sindromom, debelostjo in zdravim staranjem. Posebej zanimiv je koncept »hyperoxic-hypoxic paradox«, pri katerem izmenična izpostavljenost povišanim koncentracijam kisika sproži adaptacijske odzive, povezane z angiogenezo, nastajanjem novih mitohondrijev in regenerativnimi procesi v tkivih. Eksperimentalne in pilotne klinične študije nakazujejo izboljšano občutljivost za inzulin, ugodne spremembe presnovnih biomarkerjev ter zmanjšanje kroničnega vnetja in oksidativnega stresa. Čeprav so dokazi trenutno še precej močnejši v živalskih modelih in mehanističnih raziskavah kot v velikih randomiziranih kliničnih študijah pri ljudeh, področje predstavlja eno najperspektivnejših smeri raziskovanja na presečišču hiperbarične medicine, dolgoživosti in metabolnega zdravja.

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## **Oxygen and Metabolic Health and Longevity**

Metabolic health is becoming one of the key areas of modern medicine, and hyperbaric oxygen therapy (HBOT) is increasingly being discussed as a potential supportive approach to improving metabolic processes. A growing body of research suggests that HBOT may influence mitochondrial function, enhance cellular energy production, activate antioxidant defense mechanisms, and modulate inflammatory processes associated with insulin resistance, metabolic syndrome, obesity, and healthy aging.

Of particular interest is the concept of the "hyperoxic-hypoxic paradox," in which intermittent exposure to elevated oxygen concentrations triggers adaptive responses associated with angiogenesis, mitochondrial biogenesis, and regenerative processes in tissues.

Experimental studies and pilot clinical trials suggest improved insulin sensitivity, favorable changes in metabolic biomarkers, and reductions in chronic inflammation and oxidative stress. Although the evidence is currently considerably stronger in animal models and mechanistic studies than in large randomized clinical trials involving humans, this field represents one of the most promising avenues of research at the intersection of hyperbaric medicine, longevity, and metabolic health.

### **Mišice kot temelj zdrave dolgoživosti: prehrana, gibanje in samostojnost v starosti**

Zdrava dolgoživost ne pomeni le daljšega življenja, temveč predvsem čim daljše ohranjanje funkcionalnosti, mobilnosti, telesne odpornosti in samostojnosti. Pri tem imajo mišice bistveno večjo vlogo, kot jim jo pogosto pripisujemo. Niso zgolj vir telesne moči, temveč nam omogočajo, da vstanemo s stola, nesemo nakup po stopnicah, ujamemo ravnotežje ob spodrsaljaju in po bolezni ponovno stopimo na noge. Prav mišice pogosto odločajo, ali bo posameznik v visoki starosti še vedno lahko samostojno obvladoval svoj vsakdan. S staranjem se mišična masa in mišična moč postopno zmanjšujeta, pri nekaterih starejših pa ta proces vodi v sarkopenijo. Kadar se zmanjšana mišična masa oziroma slabša mišična funkcija pojavita skupaj s presežkom maščobne mase, govorimo o sarkopenični debelosti. Obe stanji močno ogrožata zdravje in zmogljivost, vendar pogosto ostajata neopaženi, saj telesna masa in indeks telesne mase ne povesta dovolj o dejanski telesni sestavi in mišični funkciji. Presežek maščobne mase lahko prikrije zmanjšano mišično maso, slabšo mišično moč ali prehransko ogroženost, zato sta videz telesne krepkosti in dejanska telesna zmogljivost lahko zelo različna. Za realnejšo oceno je treba poleg telesne mase upoštevati tudi telesno sestavo, mišično funkcijo, prehranski status in raven telesne dejavnosti, pri čemer so nam lahko v pomoč uveljavljeni presejalni in merilni pristopi. Eden ključnih temeljev ohranjanja mišične mase in moči v starosti je ustrezna prehrana. Pomembna ni le skupna količina beljakovin, temveč tudi njihova kakovost in razporeditev čez dan, saj se sposobnost telesa za izgradnjo in obnovo mišičnega tkiva s staranjem zmanjšuje. Zadosten prehranski vnos pri starejših lahko ovirajo slabši apetit, težave z žvečenjem in požiranjem, jemanje večih zdravil, ter omejena dostopnost ali zmožnost priprave kakovostnih obrokov. Drugi temelj je redna telesna dejavnost, predvsem vadba za moč, ki lahko pomembno prispeva k ohranjanju mišične mase, mišične moči in funkcionalnosti tudi v zelo visoki starosti ter pri krhkih posameznikih. Prehrana in vadba imata največji učinek, kadar delujeta skupaj, medtem ko obdobja neaktivnosti, ležanja ali hospitalizacije pospešijo izgubo mišic hitreje, kot si pogosto predstavljamo. Spodbudno pa je, da se mišice na ustrezne ukrepe odzivajo v vsakem življenjskem obdobju, čeprav se temelji za zdravo staranje postavljajo že desetletja pred starostjo. Ohranjanje mišične mase in mišične moči zato ni pomembno le za telesno zmogljivost, temveč za aktivno, kakovostno in samostojno življenje v starosti.

## **Muscles as the Foundation of Vital Longevity: Nutrition, Movement, and Independence in Old Age**

Healthy longevity means not only living longer, but above all maintaining functionality, mobility, physical resilience, and independence for as long as possible. Muscles play a far greater role in this than is often recognized. They are not merely a source of physical strength; they enable us to get up from a chair, carry groceries up the stairs, regain our balance when we slip, and get back on our feet after an illness. It is often our muscles that determine whether we will still be able to manage our daily lives independently in old age.

As we age, muscle mass and strength gradually decline, and in some older adults this process leads to sarcopenia. When reduced muscle mass or impaired muscle function occurs alongside excess body fat, the condition is referred to as sarcopenic obesity. Both conditions pose significant threats to health and physical performance, yet they often go unnoticed because body weight and body mass index do not provide sufficient information about actual body composition and muscle function. Excess body fat can conceal reduced muscle mass, diminished muscle strength, or nutritional risk, meaning that a person's seemingly robust physique may differ considerably from their actual physical capabilities.

For a more accurate assessment, it is necessary to consider not only body weight but also body composition, muscle function, nutritional status, and physical activity levels, using established screening and measurement methods where appropriate.

One of the key foundations of maintaining muscle mass and strength in old age is adequate nutrition. It is not only the total amount of protein that matters, but also its quality and distribution throughout the day, as the body's ability to build and repair muscle tissue declines with age. Adequate nutritional intake in older adults may be hindered by reduced appetite, difficulties with chewing and swallowing, the use of multiple medications, and limited access to or ability to prepare nutritious meals.

The second foundation is regular physical activity, particularly resistance training, which can make a significant contribution to preserving muscle mass, strength, and functional capacity even in very old age and among frail individuals. Nutrition and exercise are most effective when combined, whereas periods of inactivity, bed rest, or hospitalization accelerate muscle loss more rapidly than we often realize.

Encouragingly, muscles respond to appropriate interventions at every stage of life, although the foundations for healthy aging are laid decades before old age. Preserving muscle mass and strength is therefore essential not only for physical performance, but also for an active, fulfilling, and independent life in later years.

**Marko Javornik**

### **Molekularni digitalni dvojnik: infrastruktura za znanost posameznika**

Umetna inteligenca je najprej osvojila jezik, ker je jezika v digitalni obliki na internetu skoraj neomejeno: milijarde ljudi vsak dan proizvedejo besedila, ki so poceni, obsežna in se anotirajo sama. Človeško telo takega korpusa ne proizvaja, saj so njegovi signali redki, dragi, šumni in zakasneni, zato jih ne moremo premagati zgolj z obsegom podatkov. Namesto modela, ki napoveduje naslednji element zaporedja, potrebujemo model sveta: mehanistično predstavitev posameznikove biologije, ki zna odgovoriti na vprašanje, kaj se zgodi, če posežemo v en del sklopljenega sistema. To je molekularni digitalni dvojnik, ki ni statična slika, ampak zaprta zanka meritve, hipoteze, poskusa in ponovne kalibracije.

Znanost posameznika pa ne bo nastala iz enega odkritja, temveč iz infrastrukture. Da opazovanje enega človeka skozi čas šteje kot znanost, mora biti pot od surovega signala do sklepa reproducibilna in preverljiva; jezikovni modeli smejo sklepati okoli nje, nikoli namesto nje. S tem se spremeni tudi epistemologija: posameznik postane sam sebi kontrolna skupina. Omejitve ostajajo resne kot na primer vzročnost, aderenza, dolgi časovni zamiki, varstvo podatkov. Prav zato je digitalni dvojnik instrument in ne orakelj: kot je mikroskop omogočil celično biologijo, bo šele ta infrastruktura omogočila, da znanost posameznika postane znanost.

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### **Molecular Digital Twin: Infrastructure for the Science of the Individual**

Artificial intelligence first mastered language because language is available in virtually unlimited quantities in digital form on the internet: billions of people produce text every day, generating data that is inexpensive, abundant, and self-annotating. The human body does not produce such a corpus, as its signals are sparse, expensive to obtain, noisy, and delayed. Consequently, these challenges cannot be overcome simply by increasing the volume of data. Instead of a model that predicts the next element in a sequence, we need a world model: a mechanistic representation of an individual's biology capable of answering what happens when we intervene in one part of an interconnected system. This is the molecular digital twin—not a static snapshot, but a closed loop of measurement, hypothesis generation, experimentation, and recalibration.

However, the science of the individual will not emerge from a single discovery, but from infrastructure. For longitudinal observations of a single person to qualify as science, the entire process from raw signal to conclusion must be reproducible and verifiable. Language models may reason around this process, but never replace it. This also represents a shift in epistemology: the individual becomes their own control group. Significant challenges remain, including causality, adherence, long time lags, and data protection. This is precisely why the digital twin is an instrument rather than an oracle: just as the microscope made cellular biology possible, it is this infrastructure that will enable the science of the individual to become a science in its own right.

**Rejuvenation with allogeneic mesenchymal stem cells: a critical analysis**

**Background:** Aging is associated with stem-cell exhaustion, immune dysregulation, chronic inflammation, impaired tissue repair, frailty, and shortened healthspan. We reviewed selected historical attempts and analyzed studies of living-cell interventions—including mesenchymal stem cells (MSCs), hematopoietic stem/progenitor cells, and other progenitor-cell approaches—targeting frailty, healthspan, or lifespan in humans and mammalian models.

**Methods:** This critical analysis included viable cellular interventions such as MSCs, hematopoietic stem/progenitor cells, bone marrow transplantation, heterochronic transplantation, and selected progenitor-cell products. Cell-free vesicles, exosomes, secretomes, conditioned media, and plasma products were excluded from the core synthesis and considered only as mechanistic context. Evidence was mapped from major biomedical databases and trial registries through July 2026, with more than 20,000 references identified during initial screening.

**Results:** Human evidence comprises six early MSC trials for frailty or inflamm-aging. Mammalian evidence is broader, including more than 20 lifespan-related studies of rodent longevity, young-to-old hematopoietic stem cell or bone marrow transplantation, young MSCs, muscle progenitor cells, senescence-resistant progenitor approaches, and heterochronic bone marrow. Related exosome, partial-reprogramming, and disease-specific studies provide mechanistic context but not direct clinical evidence for anti-aging efficacy.

**Conclusions:** Stem-cell exhaustion plausibly links inflamm-aging, impaired repair, and frailty. Allogeneic MSCs show early signals of improved mobility, but clinically proven healthspan extension has not been demonstrated. Young-to-old hematopoietic stem cell or bone marrow transplantation extends lifespan in rodent models, yet translation to routine human anti-aging care is unsupported. Living-cell interventions remain biologically plausible experimental gerontology strategies best pursued through regulated clinical research.

## Ajda Marič

### Črevesni mikrobiom: ključ do dolgoživosti

Dolgoživost je tesno povezana z našim sožitjem z mikroorganizmi. Pred skoraj dvema milijardama let je prišlo do endosimbioze med bakterijo in arhejo. Ujeta bakterijska celica v večji celici, je bila prednik zelo pomembnega organela, ki mu danes pravimo mitohondrij, Poznan tudi, kot tovarna celične energije. (*Upad v delovanju mitohondrijev danes povezujemo z enimi ključnih stebrov biološkega staranja.*)

Podobno tudi danes živimo v tesni povezavi s črevesno mikrobioto. Mikroorganizmi v debelem črevesu fermentirajo prehranske vlaknine in tvorijo kratkoverižne maščobne kisline, večinoma acetat, propionat in butirat. Slednji je pomemben vir energije za celice črevesne stene (kolonocite) ter spodbuja tvorbo beljakovin, ki krepijo tesne stike (tight junctions) med črevesnimi celicami in tako preprečujejo prehod toksinov in patogenov iz črevesja v krvni obtok.

Vse pomembnejši dejavnik zdravega staranja predstavlja črevesni mikrobiom, ki je povezan z imunskim, presnovnim, endokrinim, živčnim in srčno-žilnim sistemom. Vpogled v raziskave stoletnikov razkriva, da imajo stoletniki pogosto posebno sestavo (npr. večje število zaščitnih bakterij, kot je *Akkermansia muciniphila*), večjo funkcionalno pestrost mikrobiote. Na sestavo črevesne mikrobiote lahko vplivamo z vnosom raznolike rastlinske prehrane (vsaj 30 različnih rastlinskih živil na teden; o.p. tudi gobe, ki ne spadajo pod rastline), fermentabilnih vlaknin, fermentirane hrane, rednim gibanjem, kakovostnim spanjem in obvladovanjem stresa.

Z našim življenjskim slogom neposredno hranimo svoje mikrobne zaveznike, varujemo mitohondrije ter gradimo temelj za dolgo in vitalno življenje. Lahko pravimo, da je dolgoživost nadaljevanje starodavnega partnerstva: mi hranimo mikroorganizme, oni hranijo naše mitohondrije in s tem podpirajo delovanje telesa.

\*mikrobiota - vsi mikroorganizmi, ki se nahajajo na določenem območju

\*\* mikrobiom - kaj ti mikroorganizmi delajo oz. sintetizirajo

## **Gut Microbiome: The Key to Longevity**

Longevity is closely linked to our symbiotic relationship with microorganisms. Nearly two billion years ago, endosymbiosis occurred between a bacterium and an archaeon. The bacterial cell engulfed by the larger cell became the ancestor of a critically important organelle that we now call the mitochondrion, also known as the cell's energy powerhouse. (Today, mitochondrial dysfunction is recognized as one of the key hallmarks of biological aging.)

Similarly, we continue to live in close association with our gut microbiota. Microorganisms in the large intestine ferment dietary fiber and produce short-chain fatty acids, primarily acetate, propionate, and butyrate. The latter is an important energy source for the cells lining the colon (colonocytes) and promotes the production of proteins that strengthen tight junctions between intestinal epithelial cells, thereby helping to prevent toxins and pathogens from passing from the intestine into the bloodstream.

The gut microbiome is increasingly recognized as an important factor in healthy aging, as it interacts with the immune, metabolic, endocrine, nervous, and cardiovascular systems. Research on centenarians reveals that they often have a distinctive gut microbiota composition (e.g., a greater abundance of beneficial bacteria such as *Akkermansia muciniphila*) and greater functional diversity of their microbiota.

We can influence the composition of our gut microbiota by consuming a diverse plant-rich diet (at least 30 different plant foods per week; including mushrooms, although they are not botanically classified as plants), fermentable fibers, and fermented foods, as well as through regular physical activity, quality sleep, and stress management.

Through our lifestyle choices, we directly nourish our microbial allies, protect our mitochondria, and lay the foundation for a long and healthy life. We could say that longevity is a continuation of an ancient partnership: we nourish microorganisms, and they nourish our mitochondria, thereby supporting the functioning of our bodies.

\* microbiota – all microorganisms present in a particular environment or location.

\*\* microbiome – the functions and substances produced by these microorganisms.

**Andrei Panferov**

**Life extension is a mission for civilization, not just biologists**

Life extension is a mission for civilization, not just biologists. Future cures cannot help people who die before they arrive, cannot access them, or later face another cause of death. This talk explores the *rescue gap*, the accumulation of risk over time, and the incentives that favour treatments for individual diseases over a broader capacity to stabilize, preserve, and repair people. The presentation is the call for scientific ambition, public demand, and political commitment to a civilization that refuses death. No one should be left behind in time.

**Gennady Stolyarov**

## **Transhumanist Politics in the United States and Its Implications for the World**

The United States Transhumanist Party will be turning 12 years old on the day after this presentation, and as such this is a fitting occasion to reflect upon its history and broader significance to the effort to transform American politics and the relationship of politics to science and technology. The U.S. Transhumanist Party was founded on October 7, 2014, in order to fill a void in American political discourse, where the transformative potential of emerging scientific and technological breakthroughs was ignored in favor of short-term “wedge issues” that were intentionally constructed by the major political parties to polarize the American public and distract people from shared goals and challenges. Through educational activities – including articles, videos, conference presentations, and interviews – as well as through three U.S. Presidential campaigns and various candidate endorsements in State and local elections – the U.S. Transhumanist Party has sought to cultivate a different vision of politics, which puts science, health, and technology at the forefront. This presentation will discuss some of the most salient achievements of the U.S. Transhumanist Party as well as a different model of politics that can be transferrable to other countries and their political systems. Key features of this model of politics include a constructive and long-term policy focus, positive-sum “win-win” thinking, ranked-choice voting on issues and candidates, a conscious philosophical and intellectual orientation (as contrasted with either a populist or a pro-establishment one), direct communications with and inspiration taken from leading scientists and technologists, as well as the extensive use of emerging technologies in the Transhumanist Party’s own activities. Finally, this presentation will put forward a scenario in which the Transhumanist Party could come to play a much more prominent political role as the potential for emerging technologies in fields such as longevity, artificial intelligence, automation, infrastructure, and space exploration becomes apparent to increasing numbers of people.



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