

From researcher to entrepreneur and back - my personal story -

Gordan Lauc
University of Zagreb
Genos Ltd

Effects of phosphate group of piridoxal phosphate on binding to alkaline phosphatase

Diploma work, summer 1991



Biochemistry of stress

Stressin and Natural Killer Cell

War Stress in the Former Yugoslavia

M Flögel, S Š Goreta and G Lauc
University of Zagreb, Zagreb, Croatia

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impairments including suicide, homicide, and other types of violence.

Historical and Political Background of the Conflict

The federal republics of prewar Yugoslavia had national and cultural identities with distinct historical backgrounds. At times in the past they were sovereign states, and they have been trying to reestablish their independence ever since they lost it. Neither the first (monarchist) nor the second (communist) Yugoslavia

Historical and Political Background of the Conflict
Migrations, Ethnic Cleansing, and Social Impact
Effects on Health
Effects on Mortality
Effects on Social Behavior and Violence
Conclusion

Biochemistry. I. Huttlera 4. 31000 Osijek, Croatia

1992 – 1994 PhD in Mainz



Institut für Physiologische Chemie

42 days (1,000 hours) in a bus

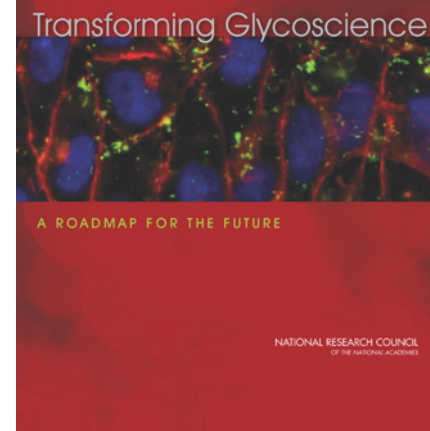


1993 – 1995 Building the lab in Zagreb



2012: US National Academies

- “glycans are directly involved in the pathophysiology of every major disease”
- “additional knowledge from glycoscience needed to realize the goals of personalized medicine and to take advantage of the substantial investments in human genome proteome research and its impact on human health”



Structural Medicine: The Importance of Glycomics for Health and Disease

European Science Foundation Policy Briefing

Contents
• Foreword | • Introduction | The Post-Genomic Era | • Glycosciences and Glycomics | The Value of 'Structure' | The Value of 'Structure' for Diagnostics, Disease and Drug Development | • Statement and Recommendations | • Expert Group on Structural Medicine: the impact of glycans and glycoscience

Foreword

Biomedical research has entered the post-genomic phase following the completion of the Human Genome project and other related sequencing efforts. The functional analysis of gene products (functional genomics) gave rise to the 'omics' disciplines including proteomics, defined as the identification and characterization of proteins and their interactions as well as of protein expression. However, proteomics does not describe post-translational modifications of proteins that are in many instances necessary for biological activity. While recent years have witnessed an unprecedented growth of knowledge in proteomics, the time for generating broad insights into post-translational modifications has now arrived, especially in the field of glycomics (glycosciences), (glycomics), (glycomics) (glycomics) and even Structural Medicine as such.

Glycomics describes and analyzes the structure of sugar molecules in glycosciences. Carbohydrates present in glycosciences such as glycolipids and glycoproteins contribute directly to their functionality. Certain glycosylation patterns give proteins specific physical, biochemical and biological characteristics and cause their structure and functional variance. Currently, some for revealing biomedical consequences of changes in the structure and metabolism of glycans are already known. These are indicators of disease such as congenital disorder of glycosylation, infectious body disease, tumors, inflammation, diabetes mellitus, immunization (allergy), drug and microbial infections. Changes in glycan structure formulates play a causative role in the development of inflammation, autoimmune diseases, immune defects and autoimmunity, infections (e.g. influenza, virus hepatitis, meningitis and HIV) and the invasion of cancer cells.

Expanded knowledge on disease related changes in glycosylation patterns and its integration in genome and proteome data provides new basic biomedical insights and

The European Medical Research Councils (EMRC) Committee of the European Science Foundation (ESF) established a task force comprised of leading European scientists in the field of glycosciences with the goal to develop a science policy briefing (SPB) addressed to national and European research organizations. The scientific experts had been nominated by the ESF Member Organizations and through a wide consultation within the European Scientific community.

The task force met on several occasions to address scientific issues and to formulate a draft policy briefing. This SPB was presented to the EMRC Standing Committee, which reviewed the recommendations in the wider context of medical research priorities.

The EMRC of ESF sees a need for an escalation of research in Structural Medicine and recommends a strong and coordinated interdisciplinary research effort on a European scale to overcome the fragmentation currently observed and to regain strength in this primarily very prominent European research domain. The European Science Foundation calls upon national and European research organizations, as well as the Structural Medicine research community, to give serious consideration to the recommendations in this Science Policy Briefing.

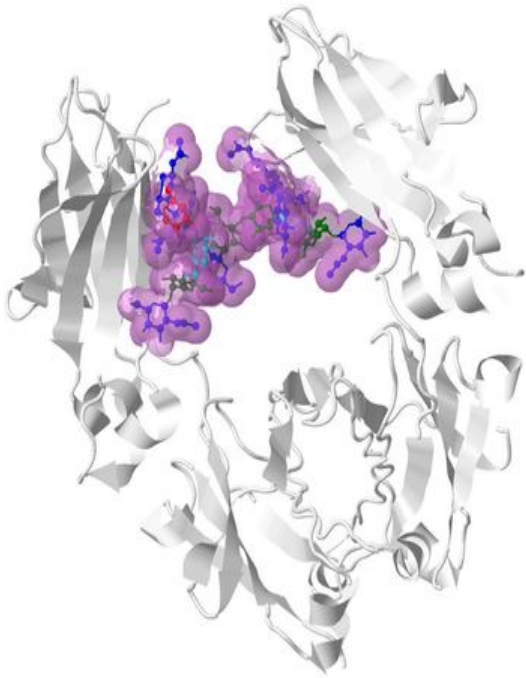
Bertil Andersson
ESF Chief Executive

Walt et al, National Academies Press, 2012

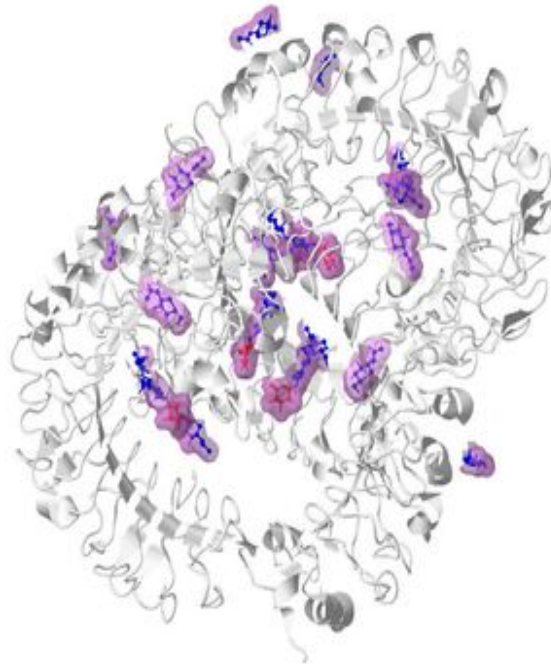
Studying a protein without its glycan is like studying a fly without its wing



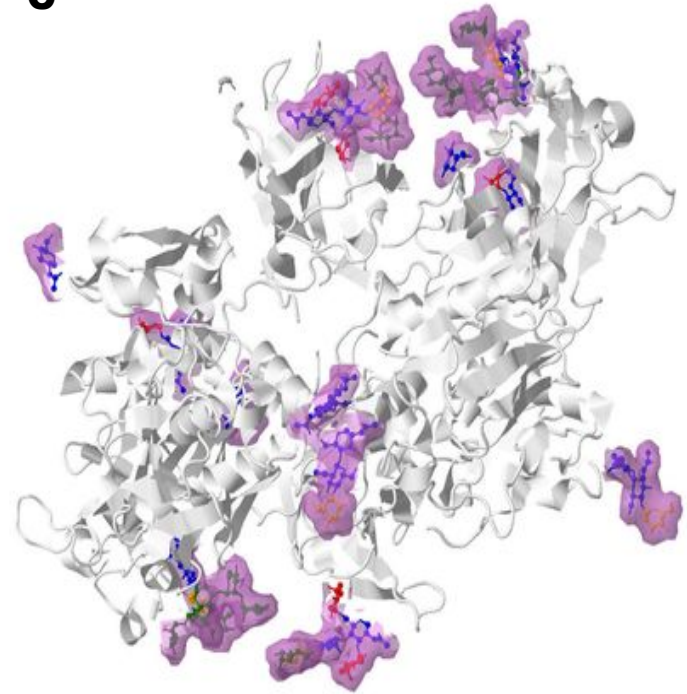
A



B



C



Glycoscience in 1990?



W.E.G Muller



**DIG Glycan
differentiation kit**

Int. J. Dev. Biol. 35: 289-295 (1991)

Human brain

IVICA KRAČIĆ

¹Department of Chemistry and Biochemistry, School of Medicine, University of Zagreb, Republic of Croatia, Yugoslavia and ²Institute of Zoology, University of Hohenheim, Stuttgart, Germany

ABSTRACT

disease were a was only regis two-fold incre gestation. The fraction in all re GT1b. During p only be detecte birth and 20-30 characterized cortical regions cortex, there w (visual) cortex there was no change in individual gangliosides. In hippocampus, GD1a moderately decreased, whereas other fractions were stable. In the cerebellar cortex, GD1b and GT1b fractions



Saul Roseman



Nathan Sharon



Yuan C. Lee



Harry Schachter



Akira Kobata



Raymond Dwek

1995 – 2007 Glycobiology of Stress

Stressin and Natural Killer Cell Activity in Professional Soldiers^a

Biol. Chem., Vol. 380,

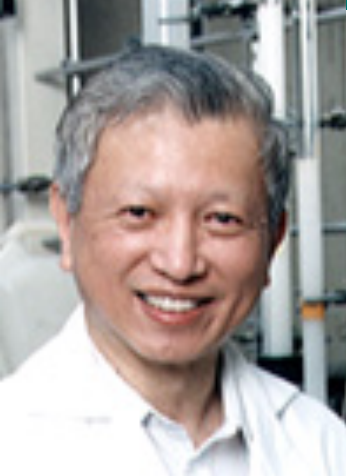
**Purification
of Stress-A**

GORDAN LAUC,^a SANJA DABELIĆ, JERKA DUMIĆ,
AND MIRNA FLÖGEL

*Department of Biochemistry and Molecular Biology, Faculty of
Pharmacy and Biochemistry, University of Zagreb, Ante Kovačića 1,
10000 Zagreb, Croatia*

Gordan Lauc^{1,*},
Sanja Dabelić¹ and

**Expression of galectin-3 in cells exposed to stress
- roles of Jun and NF- κ B**



Y.C. Lee

1997 – 1998 Johns Hopkins University, Baltimore, MD



1998 - 2010 University of Osijek School of Medicine



1999 - DNA laboratory for the identification of war victims



Identification of skeletal remains

šifra	D3S1358		VWA		FGA		amelogenin		TH01		TPOX		CSF1PO		D5S818		D13S317		D7S820		šifra	suma	!
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RMP-674	15	18	14	16	21	22	x	x	6	9	8	11	10	12	10	11	9	12	10	12	RMP-674	9	!
RMP-730	15	17	16	17	?	23	x	x	6	8	11	11	11	12	10	12	11	12	10	11	RMP-730	9	!
RMP-731	16	19	16	17	20	21	x	y	6	9	8	12	10	11	11	13	11	12	8	14	RMP-731	9	!
RMP-O-50	16	17	17	17	23	24	x	y	8	9	8	11	10	12	10	13	10	11	10	10	RMP-O-50	9	!
RMP-321	14	15	13	16	21	23	x	x	9	9,3	9	11	10	11	10	12	8	12	9	10	RMP-321	9	!
RMP-1264	15	16	16	19	20	26	x	x	6	9	8	11	10	12	11	13	8	11	10	11	RMP-1264	8	
RMP-645	14	15	17	18	21	?	x	x	8	10	8	10	11	12	10	13	11	11	10	10	RMP-645	8	
RMPO-26	15	16	15	16	20	21	x	x	8	8	8	11	10	10	11	11	11	12	9	10	RMPO-26	8	
RMPO-32	14	15	16	19	19	23	x	x	9	9,3	8	8	11	11	11	13	12	12	8	10	RMPO-32	8	
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RMP-656	16	17	16	17	22	25	x	y	9	9,3	11	12	11	13	12	13	11	11	10	10	RMP-656	8	
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RMP-704	16	18	14	16	21	25	x	x	9	9	8	11	11	11	11	13	11	11	8	9	RMP-704	8	
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RMP-811	16	18	17	18	21	22	x	x	6	9	8	11	10	11	11	12	9	12	8	10	RMP-811	8	

2002 – GGT – Gorea Genotipizacija Ltd



2004 – BioMed Reagents Ltd



BioMed Reagents Ltd *'Moving Biotechnology Forward'*

25, Claremont Place
Necastle upon Tyne
NE2 4AA
Tel: 0191 2228252 Fax: 0191 2095200
e-mail office@biomed.demon.co.uk



Glycobiology vol. 10 no. 4 pp. 357–364, 2000

Photoaffinity glycoprobes—a new tool for the identification of lectins

Gordan Lauc², Reiko T.Lee³, Jerka Dumić² and Yuan C.Lee^{1,3}

²Department of Biochemistry and Molecular Biology, Faculty of Pharmacy and Biochemistry, University of Zagreb, Ante Kovačića 1, 10000 Zagreb, Croatia and ³Biology Department, Johns Hopkins University, 3400 North Charles Street, Baltimore, MD 21218, USA

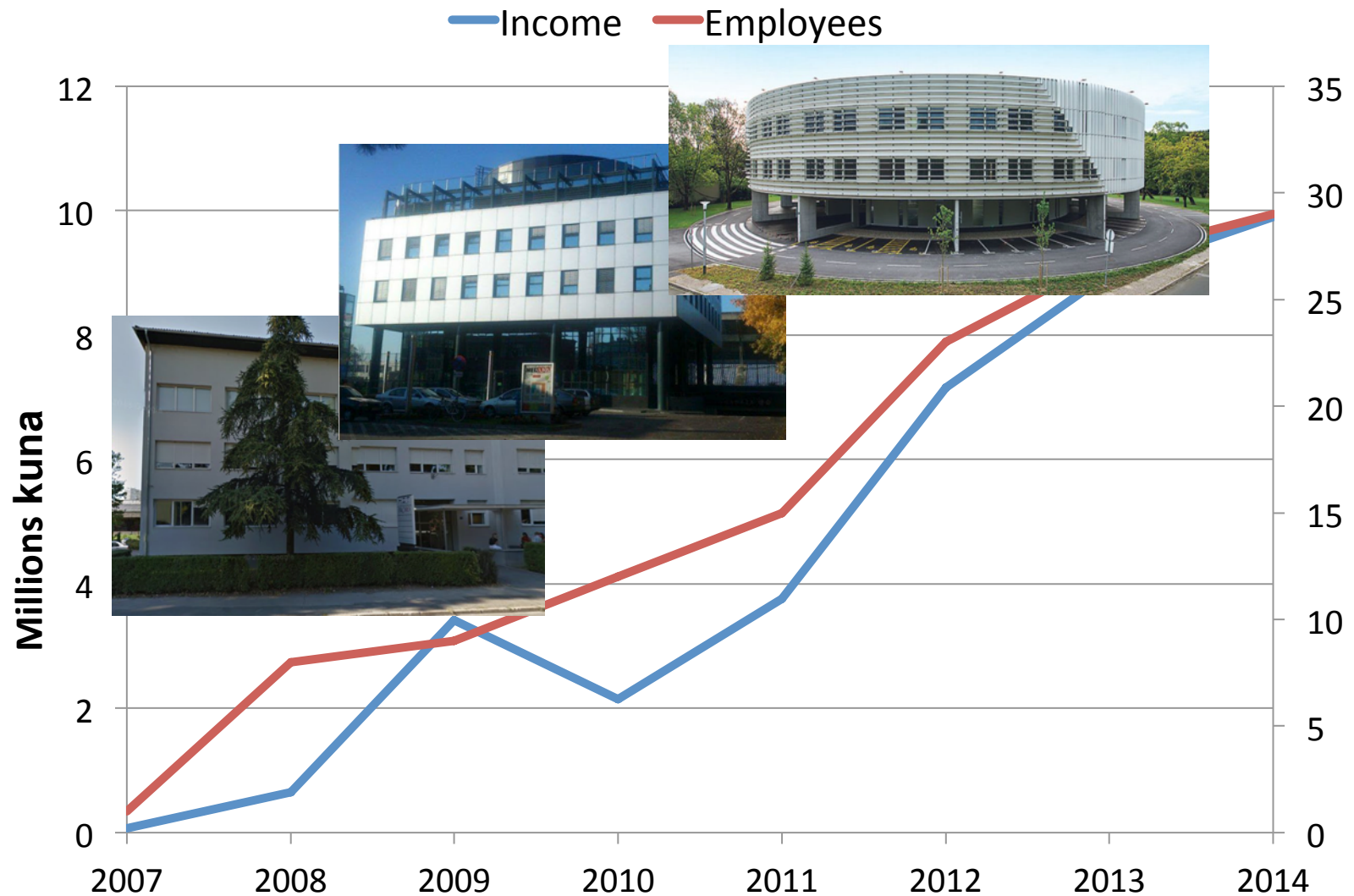
(Alhadeff, 1989; Lauc and Flögel, 1996; Kobata, 1998), and the investigation of their functions under pathological condition is expected to provide many important data for better understanding of the underlying mechanisms (Lee and Lee, 1996).

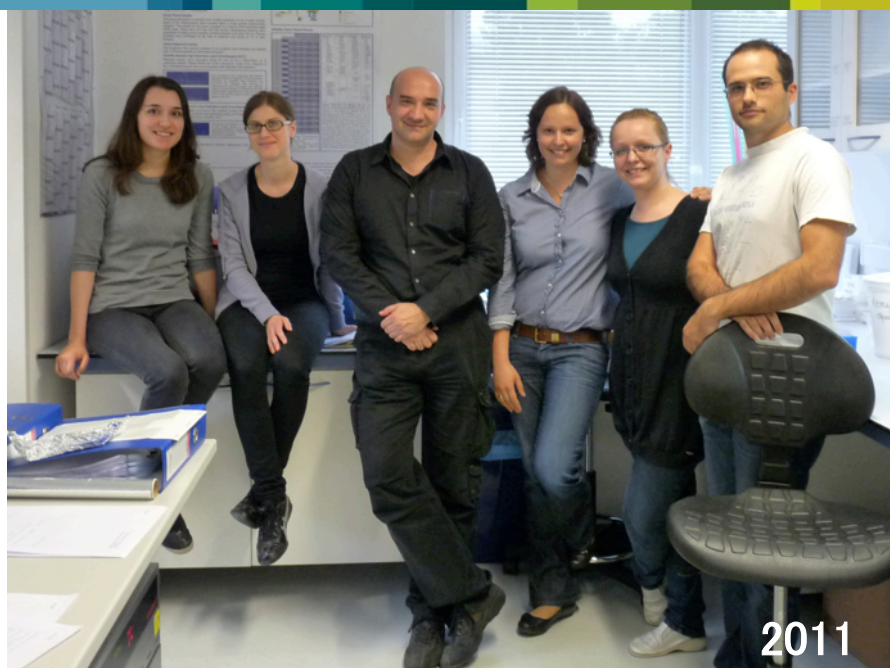
One of the proposed functions of the carbohydrate structures

Genos was incorporated in April 2007 as a forensic DNA laboratory

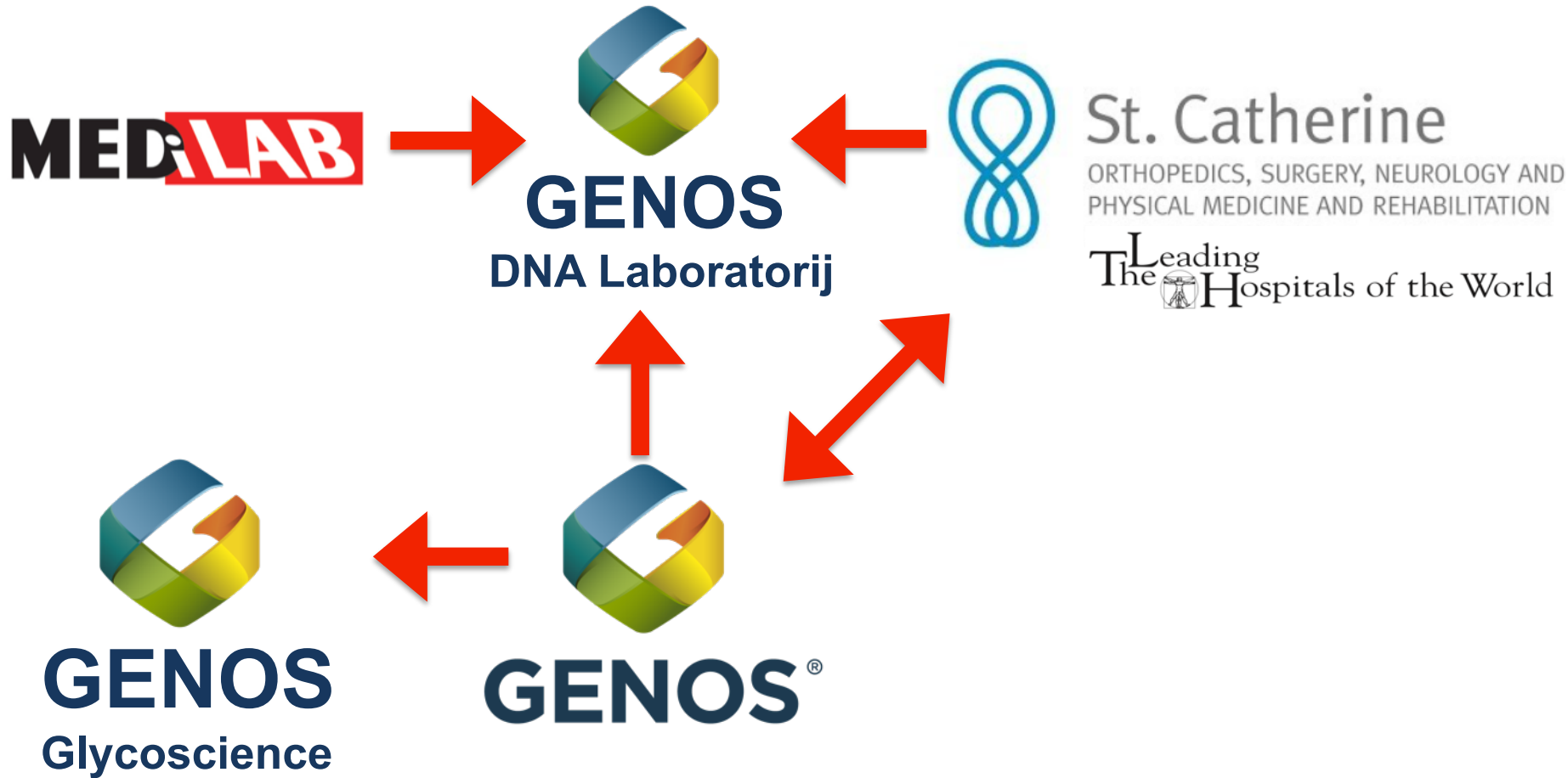


Since 2007 Genos is growing organically





Structure of Genos group in 2017



GLYCANAGE[®]

Today Genos employs 34 researchers

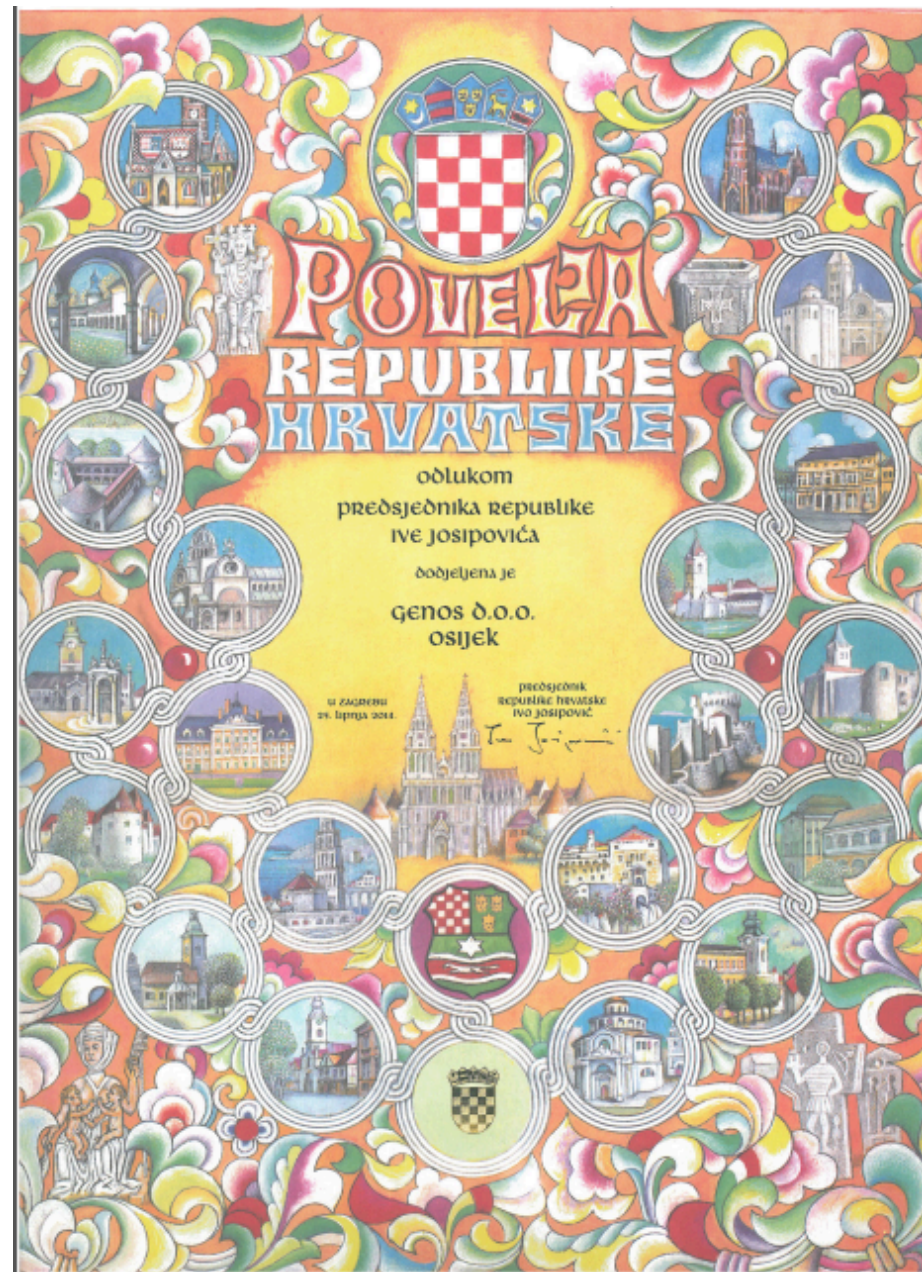
1. Prof. dr. sc. Gordan Lauc
2. Prof. dr. sc. Dragan Primorac
3. Prof. dr. sc. Damir Marjanović
4. Prof. dr. sc. Olga Gornik
5. Doc. dr. sc. Aleksandar Vojta
6. Doc. dr. sc. Snježana Džijan
7. Doc. dr. sc. Andrea Skelin
8. Doc. dr. sc. Ivo Ugrina
- 9. Dr. sc. Maja Pučić Baković**
- 10. Dr. sc. Mislav Novokmet**
- 11. Dr. sc. Vedrana Škaro**
- 12. Dr. sc. Petar Projić**
- 13. Dr. sc. Irena Trbojević Akmačić**
- 14. Dr. sc. Frano Vučković**
- 15. Dr. sc. Ivan Gudelj**
- 16. Dr. sc. Jerko Štambuk**
17. Dr. sc. Marija Pezer
18. Dr. sc. Olga Zayceva
19. Dr. sc. Thomas Klarić

1. MSc Genadij Razdorov
2. MSc Jasminka Krištić
3. MSc Lucija Klarić
4. MSc Ivona Beceheli
5. MSc Marina Martinić
6. MSc Julija Jurić
7. MSc Marija Vilaj
8. MSc Ivana Duvnjak
9. MSc Maja Hanić
10. MSc Anita Slana
11. MSc Jelena Šimunović
12. MSc Elham Memariam
13. MSc Iwona Woycik
14. MSc Anne-Marie Patenaude
15. MSc Azra Frkatović

Genos – the most innovative SME in Croatia



Genos was awarded “Charter of the Republic of Croatia”



Genos is part of the National Centre of Research Excellence in Personalised Healthcare



Republika Hrvatska
Ministarstvo znanosti,
obrazovanja i sporta



Europska unija
Zajedno do fondova EU



REPUBLIKA HRVATSKA
Ministarstvo regionalnoga razvoja
i fondova Europske unije



EUROPSKI STRUKTURNI
I INVESTICIJSKI FONDOVI



Operativni program
KONKURENTNOST
I KOHEZIJA

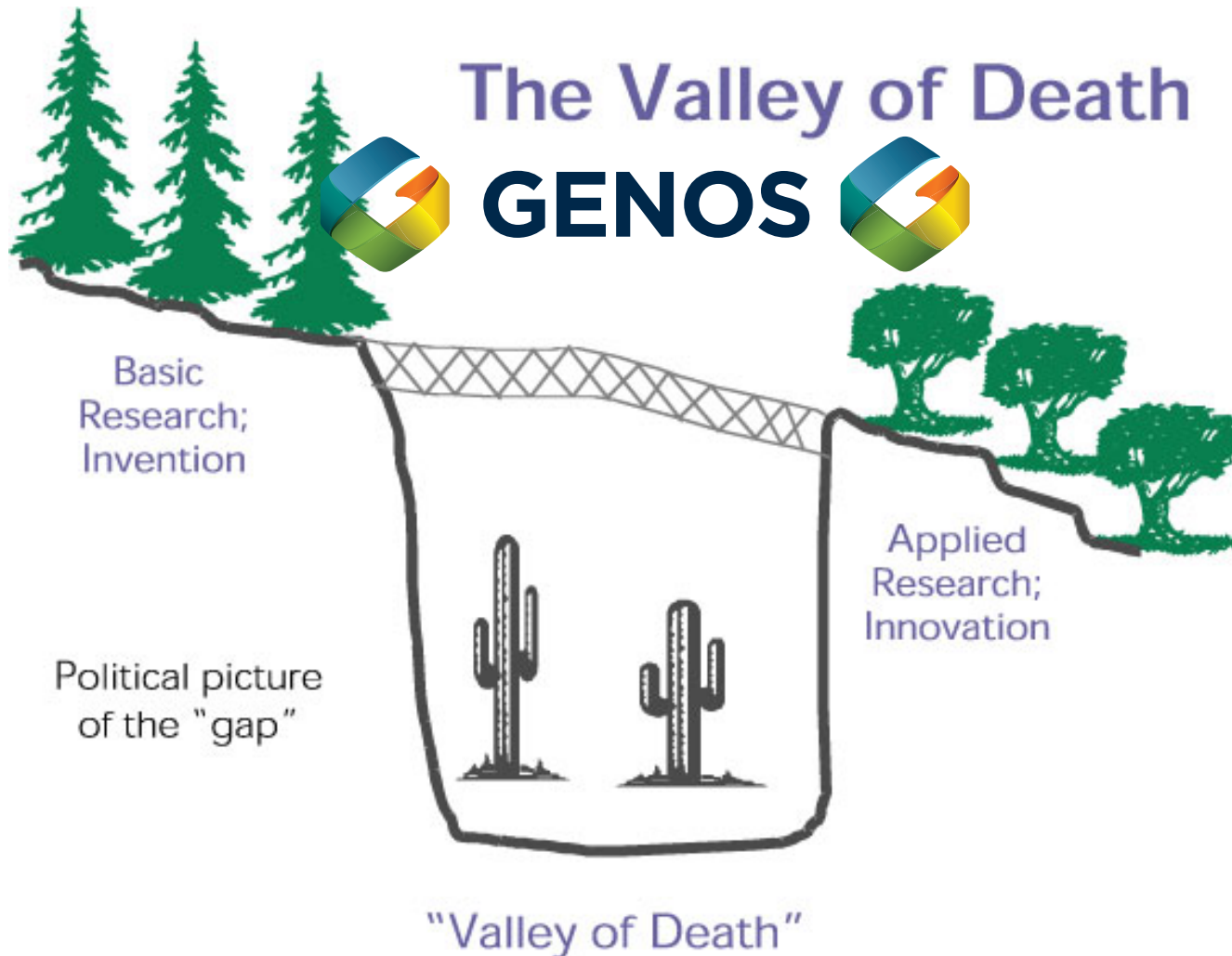
The best place to work for researchrs in industry

TheScientist
BEST PLACES
TO WORK
INDUSTRY 2013

RANK IN 2013	RANK IN 2012	COMPANY NAME	HEADQUARTERS LOCATION
1	-	Genos Ltd	Zagreb, Croatia
2	-	Vitae Pharmaceuticals	Fort Washington, Pennsylvania
3	-	Acceleron Pharma	Cambridge, Massachusetts
4	-	OpenEye Scientific Software, Inc.	Santa Fe, New Mexico
5	4	Wyatt Technology Corporation	Santa Barbara, California
6	-	Genentech (a member of the Roche Group)	South San Francisco, California
7	-	Millenium: The Takeda Oncology Company	Cambridge, Massachusetts



By combining academic and commercial funding Genos is bridging the “valley of death”



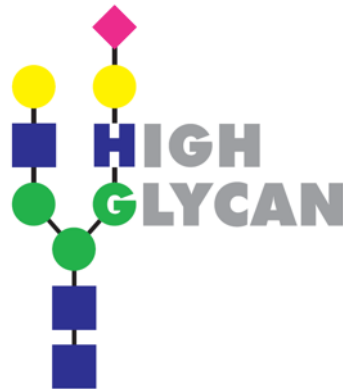
Genos is/was a partner in six FP7 i five H2020 projects



GLYCOMET



PainOmics



GlyCoCan



SYSCID

GlySign

ImForFuture

BackUP

MIMOmics $\hat{\sigma}^2$



Genos was awarded Euro 7.5 million through six FP7 and five H2020 research projects

Projekt	Bespovratno financiranje
FP7 - GlycoBiom	750.000
FP7 - HighGlycan	1.030.000
FP7- IBD-BIOM	1.060.000
FP7 - MIMOmics	290.000
FP7 - PainOmics	1.040.000
FP7 - HTP-GlycoMet	620.000
H2020 - GlyCoCan	450.000
H2020 - SYS-CID	880.000
H2020 - GlySign	490.000
H2020 - ImForFuture	250.000
H2020 - Backup	620.000



Human Genetics Unit

Alan Wright

Nick Hastie



Mark McCarthy



Nenad Šestan



Dermot McGovern

Erasmus MC



Eric Sijbrand



Tim Spector

Imperial College
London

Nish Chaturvedi



HARVARD
MEDICAL SCHOOL

Galit Alter

Peter Nigrovic



Weill Cornell
Medicine-Qatar

Karsten Suchre



Vlatka Zoldoš



Dragan Primorac



Steve
Pavletic



Gastone Castelani
Daniel Remondini

Novosibirsk State University



Y. Aulchenko, F.

Kolpakov, M. Filipenko



UNIVERSITY OF TARTU



estonian genome center

Krista Fisher, Tonu Esko



Pauline Rudd



MAX-PLANCK-GESELLSCHAFT

Daniel Kolarich



Harry Campbell

Jim Wilson

Igor Rudan



Manfred Wuhrer

Jeanine Houwing

Helmholtz Zentrum münchen

German Research Center for Environmental Health

Christian Gieger, Jan Krumsiek



Wei Wang



Wei Wang



NATIONAL INSTITUTE
FOR HEALTH AND WELFARE

Markus Perola

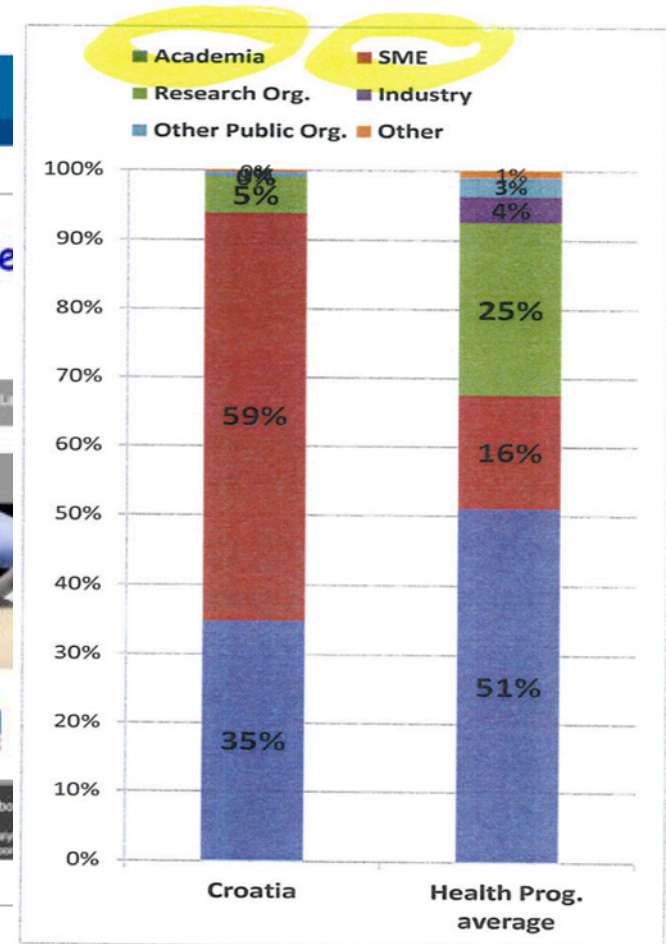
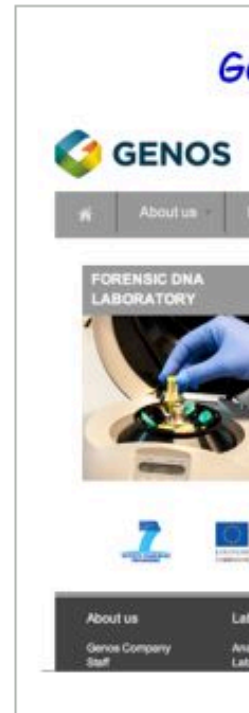


www.genos-glyco.com

Genos was presented as a success story during inauguration of H2020 u Brussels



Home



Jyrki Katainen, vice-president of EC named Genos the “**prime example of the type of business the Investment Plan for Europe aims to support**”



europa.eu/!RB48Ck

Genos DNA laboratory is selling different genetic tests in Croatia

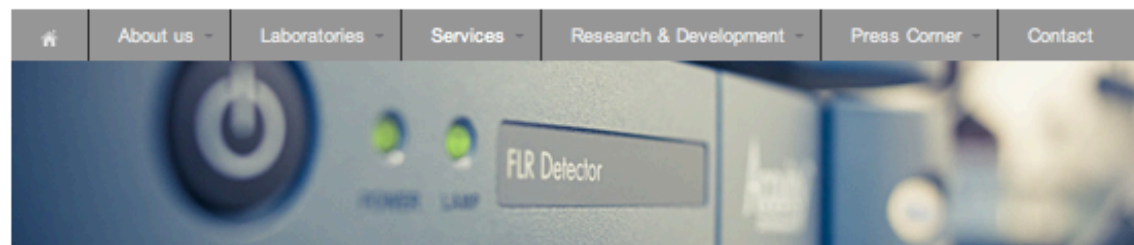


MEDLAB



St. Catherine

ORTHOPEDICS, SURGERY, NEUROLOGY AND
PHYSICAL MEDICINE AND REHABILITATION
SPECIALTY HOSPITAL



Tests - Human DNA
Tests - Animal DNA
Expertise
Pricelist



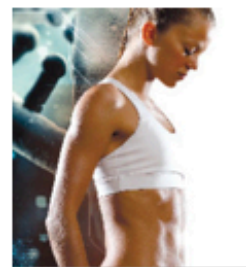
Coagulation Factors DNA
Test

Chromosomal Abnormalities
Test (Rapid Trisomies Test)

Non-Invasive Prenatal Sex
Determination



Lactose Intolerance DNA
Test



GENPerform Test



GENFat test



Genos is the global leader in glycan profiling for clinical and epidemiological studies

nature|methods

TECHNOLOGY FEATURE

Metabolism: sweeter paths in glycoscience

Vivien Marx

Carbohydrates are tough molecules to study, but glycoscientists are developing and democratizing the needed tools.

Stanford: Carolyn Bertozzi; **Harvard:** Richard Cummings; **Genos:** Gordan Lauc

Genos successfully competes for funding that supports innovation in industry



Republika Hrvatska
Ministarstvo znanosti,
obrazovanja i sporta



Centar kompetencija u personaliziranoj medicini

- Genos - DNA Laboratorij d.o.o.
- Institut Ruđer Bošković
- Prirodoslovno-matematički fakultet
- Farmaceutsko-biokemijski fakultet
- Medicinski fakultet Osijek
- Institut za antropologiju
- Dječja bolnica Srebrnjak
- Medi-lab d.o.o.
- Gen-info d.o.o.
- Motus Melior d.o.o.



GENOS
DNA Laboratorij

1. Farmakogenomika
2. Upravljanje farmakoterapijom
3. Individualizirani pristup dijabetesu
4. Stanična i regenerativna medicina
5. Tekuća biopsija
6. Razvoj molekularnih biljega za predviđanje ishoda trudnoće, ranog rasta, neurorazvoja i neuroloških poremećaja
7. Personalizirana reproduktivna medicina
8. Neinvazivna prenatalna medicina – NIPD
9. Razvoj alata za mijenjanje epigenoma



REPUBLIKA HRVATSKA
Ministarstvo regionalnoga razvoja
i fondova Europske unije



EUROPSKI STRUKTURNI
I INVESTICIJSKI FONDovi



Operativni program
KONKURENTNOST
I KOHEZIJA

Centar kompetencija u molekularnoj dijagnostici

- Genos d.o.o.
- Klinika za infektivne bolesti dr. Fran Mihaljević
- Dječja bolnica Srebrnjak
- Medicinski fakultet Split
- Farmaceutsko-biokemijski fakultet
- Prirodoslovno-matematički fakultet
- Institut Ruđer Bošković
- Kineziološki fakultet
- BioGnost d.o.o.
- Exaltum Ultra d.o.o.



1. Razvoj metoda za analitiku glikana
2. Razvoj setova za personaliziranu medicinu
3. Glikanski biomarkeri u predikciji i korekciji narušenog zdravlja
4. Genske predispozicije za sport i promjena biomarkera starenja organizma uslijed rekreativnog bavljenja sportom.



REPUBLIKA HRVATSKA
Ministarstvo regionalnoga razvoja
i fondova Europske unije



Operativni program
KONKURENTNOST
I KOHEZIJA

Through joint projects Genos secured over Euro 40 million for Croatian public research institutions



Sv. Katarina

SPECIJALNA BOLNICA ZA ORTOPEDIJU,
KIRURGIJU, NEUROLOGIJU I FIZIKALNU
MEDICINU I REHABILITACIJU



Medicinski fakultet Osijek
Sveučilište J.J. Strossmayera u Osijeku



**SVEUČILIŠTE U SPLITU
MEDICINSKI FAKULTET**



**INSTITUT ZA
ANTROPOLOGIJU**



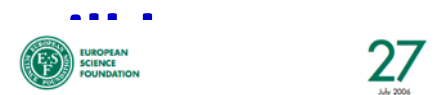
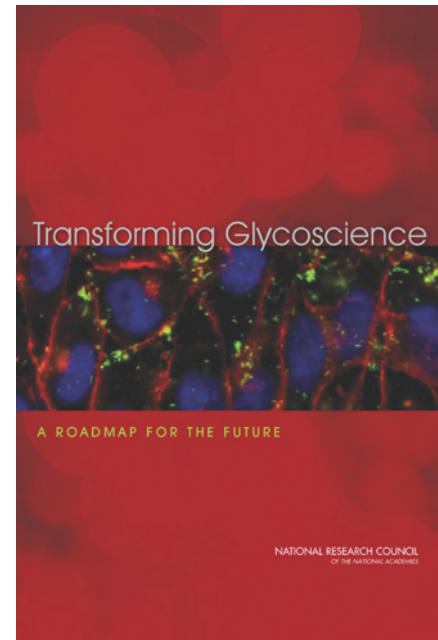
**Psihijatrijska
bolnica
"Sveti Ivan"
Zagreb**

Researchers from 11 countries work or worked in Genos (China, Russia, Canada, Australia, Germany, Netherlands, Poland, Iran, Serbia, Kosovo and BiH)



2012: US National Academies

- “glycans are directly involved in the pathophysiology of every major disease”
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European Science Foundation Policy Briefing

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Foreword

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Glycomics describes and analyzes the structure of sugar molecules in glycosciences. Carbohydrates present in glycosciences such as glycolipids and glycoproteins contribute directly to their functionality. Certain glycosylation patterns give proteins specific physical, biochemical and biological characteristics and cause their structure and functional variance. Currently, some far-reaching biomedical consequences of changes in the structure and metabolism of glycans are already known. These are indicators of disease such as congenital disorder of glycosylation, infectious body disease, tumors, inflammation, diabetes mellitus, immunological, drug and microbial infections. Changes in glycan structure formulates play a causative role in the development of inflammation, autoimmunity, immune defects and autoimmunity, infections (e.g. influenza, virus hepatitis, meningitis and HIV) and the invasion of cancer cells.

Expanded knowledge on disease-related changes in glycosylation patterns and its integration in genome and proteome data provides new basic biomedical insights and

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The EMRC of ESF was a need for an escalation of research in Structural Medicine and recommends a strong and coordinated interdisciplinary research effort on a European scale to overcome the fragmentation currently observed and to regain strength in this primarily very prominent European research domain. The European Science Foundation calls upon national and European research organizations, as well as the Structural Medicine research community, to give serious consideration to the recommendations in this Science Policy Briefing.

Bertil Andersson
ESF Chief Executive

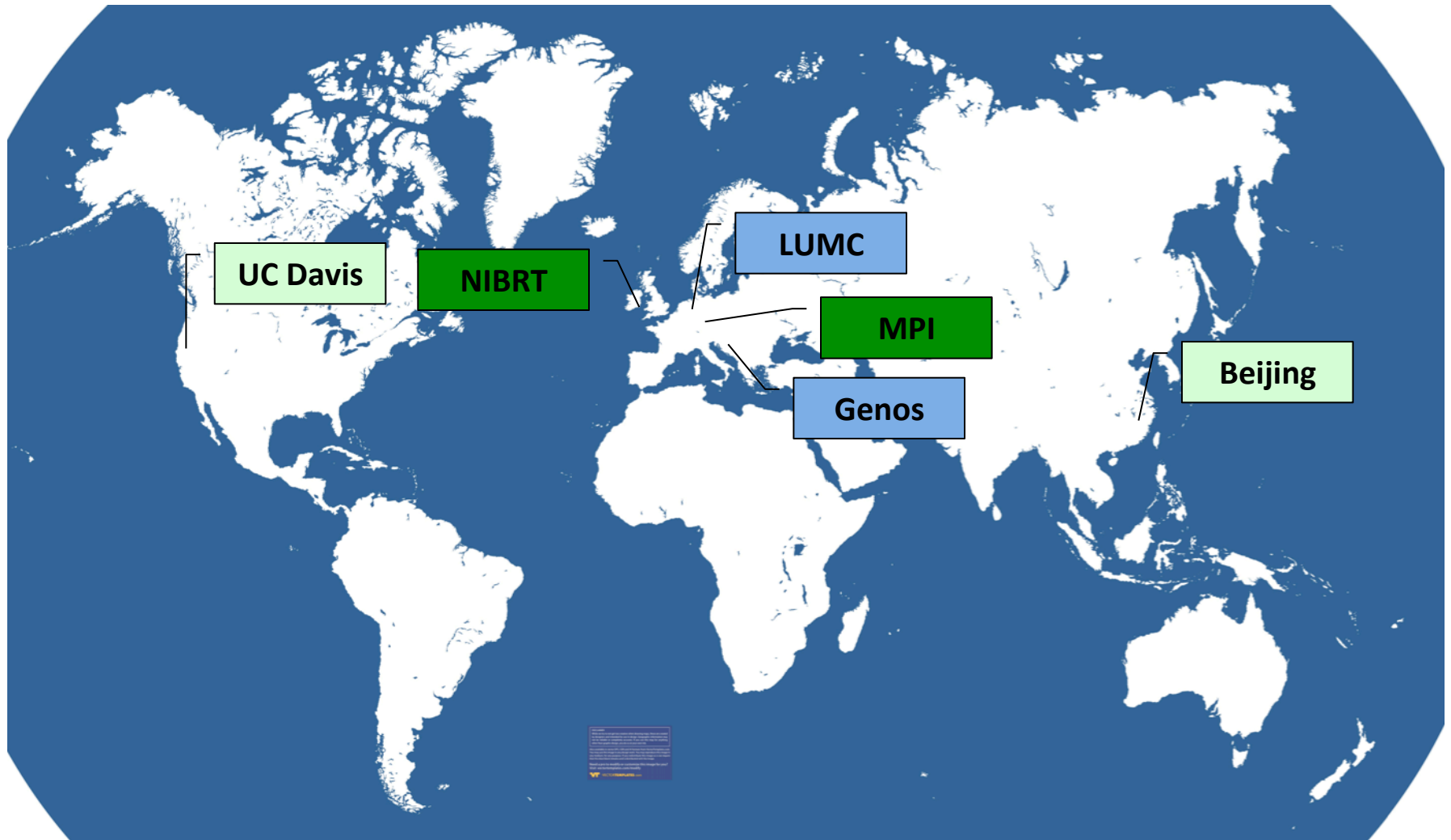
Walt et al, National Academies Press, 2012

8 / 10 best selling drugs in Europe are glycoproteins

	2008	2009	2010	2012	2013
1	Lipitor (atorvastatin)	Lipitor (atorvastatin)	Seretide (fluticasone/ salmeterol)	Humira (adalimumab)	Humira (adalimumab)
2	Seretide (fluticasone/ salmeterol)	Seretide (fluticasone/ salmeterol)	Lipitor (atorvastatin)	Seretide (fluticasone/ salmeterol)	Seretide (fluticasone/ salmeterol)
3	Plavix (clopidogrel)	Plavix (clopidogrel)	Humira (adalimumab)	Herceptin (trastuzumab)	Enbrel (etanercept)
4	Herceptin (trastuzumab)	Enbrel (etanercept)	Enbrel (etanercept)	Enbrel (etanercept)	Herceptin (trastuzumab)
5	Enbrel (etanercept)	Herceptin (trastuzumab)	Herceptin (trastuzumab)	Lipitor (atorvastatin)	Mabthera (rituximab)
6	Zyprexa (olanzapine)	Humira (adalimumab)	Lovenox (enoxaparin)	Mabthera (rituximab)	Remicade (infliximab)
7	Lovenox (enoxaparin)	Lovenox (enoxaparin)	Mabthera (rituximab)	Lovenox (enoxaparin)	Lovenox (enoxaparin)
8	Glivec (imatinib)	Glivec (imatinib)	Avastin (bevacizumab)	Remicade (infliximab)	Avastin (bevacizumab)
9	Pantozol (pantoprazole)	Zyprexa (olanzapine)	Remicade (infliximab)	Avastin (bevacizumab)	Lucentis (ranibizumab)
10	Symbicort (budesonide/ formoterol)	Mabthera (rituximab)	Glivec (imatinib)	Spiriva (tiotropium)	Lyrica (pregabalin)
Biological					

<http://gabionline.net/Reports/Biologicals-dominate-Europe-s-best-sellers>

High-throughput glycomics is globally deficient



NIH is launching dedicated calls to develop methods for glycan analysis

Funding Opportunity Title	Novel and Innovative Tools to Facilitate Identification, Tracking, Manipulation, and Analysis of Glycans and their Functions (U01)
Activity Code	U01 Research Project – Cooperative Agreements
Announcement Type	Reissue of RFA-RM-16-022
Related Notices	None
Funding Opportunity Announcement (FOA) Number	RFA-RM-17-030
Funding Opportunity Title	Innovative Adaptations to Simplify Existing Technologies for Manipulation and Analysis of Glycans (U01)
Activity Code	U01 Research Project – Cooperative Agreements
Announcement Type	Reissue of RFA-RM-16-023
Related Notices	None
Funding Opportunity Announcement (FOA) Number	RFA-RM-17-029

Genos and our partners already invested over Euro 30 million in glycan analysis and analysed over 50,000 samples

Cohort	Plasma glycome	IgG Glycome
10001 Dalmatian	2,000	4,000
Orcades	2,000*	2,000
TwinsUK	4,000	4,500
KORA	–	2,000
SABRE	2,000	–
Global population study	–	2,700
FINNRISK	–	1,200
Estonian biobank	–	1,300
China	1,000	1,000
CRC	2,000*	2,000
IBD	3,000	5,700
SLE	–	1,200
Type 1 Diabetes	1,000	1,000
Type 2 Diabetes	–	3,000
Down syndrome	–	800
Low back pain	800	2000
PTSD	600	600
Total	18,400	35,000*

* Analysed in NIBRT

Genos performed glycan analysis for multiple clinical studies

ARTHRITIS & RHEUMATOLOGY
Vol. 67, No. 00, Month 2015, pp 00-00
DOI 10.1002/art.39273
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CLINICAL RESEARCH www.jasn.org

Systemic Lupus Erythematosus Is Associated With Decreased unosuppressive Potential of the IgG Glycome

Glycosylation Profile of IgG in Moderate Kidney Dysfunction

Clara Barrios,^{*,†} Jonas Zierer,^{*,‡} Ivan Gudelj,[§] Jerko Štambuk,[§] Ivo Ugrina,[§] Ev
María José Soler,[†] Tamara Pavić,^{||} Mirna Šimurina,^{||} Toma Keser,^{||} Maja Pučić-B
Massimo Mangino,^{*} Julio Pascual,[†] Tim D Spector,^{*} Gordan Lauc,^{§||} and Crist

ić,¹ Jasminka Krišić,¹ Ivan Gudelj,¹ Maria Teruel Artacho,² Toma Keser,³
aja Pučić-Baković,¹ Jerko Štambuk,¹ Irena Trbojević-Akmačić,¹ Clara Barrios,⁴
Cristina Menni,⁵ Youxin Wang,⁶ Yong Zhou,⁷ Liufu Cui,⁸ Haicheng Song,⁸

ORIGINAL ARTICLE

REVIEWS

Mutations in *HNF1A* Re Plasma Glycan Profile

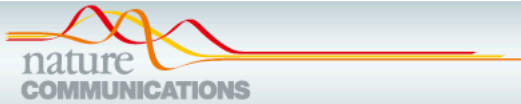
Gaya Thanabalasingham,^{1,2} Jennifer E. Hu
Igor Rudan,^{6,7} Anna L. Gloyn,^{1,2} Caroline
Ana Muzinic,⁵ Neelam Hassanali,¹ Maja Pucic,⁵ Amanda J. Bennett,¹ Abdelkader Essafi,³
Ozren Polasek,⁷ Saima A. Mughal,^{1,2} Irma Redzic,⁹ Dragan Primorac,^{7,10} Lina Zgaga,⁶ Ivana Kolcic,⁷
Torben Hansen,^{11,12,13} Daniela Gasperikova,¹⁴ Erling Tjora,^{15,16} Mark W.J. Strachan,¹⁷

The role of glycosylation in IBD

Evropi Theodoratou, Harry Campbell, Nicholas T. Venham, Daniel Kolarich, Maja Pučić-Baković,
Vlatka Zoldoš, Daryl Fernandes, Iain K. Pemberton, Igor Rudan, Nicholas A. Kennedy, Manfred Wuhrer,
Elaine Nimmo, Vito Annese, Dermot P.B. McGovern, Jack Satsangi and Gordan Lauc

Abstract | A number of genetic and immunological studies give impetus for investigating the role of
glycosylation in IBD. Experimental mouse models have helped to delineate the role of glycosylation in intestinal
mucins and to explore the putative pathogenic role of glycosylation in colitis. These experiments have been

Genos is leading integration of glycomics in “big data” science



ARTICLE

DOI: 10.1038/s41467-017-00453-3

OPEN

Multivariate discovery and replication of five novel loci associated with Immunoglobulin N-glycosylation

Xia Shen^{1,2,3}, Lucija Klarić^{1,3,4}, Sodbo Sharapov^{5,6}, Massimo Mangino^{7,8}, Zheng Ning²,



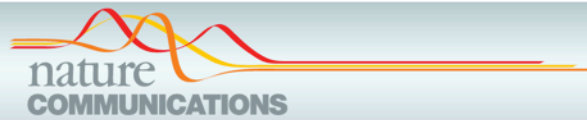
ARTICLE

DOI: 10.1038/s41467-017-01525-0

OPEN

Network inference from glycoproteomics data reveals new reactions in the IgG glycosylation pathway

Elisa Benedetti¹, Maja Pučić-Baković², Toma Keser³, Annika Wahl^{4,5}, Antti Hassinen⁶, Jeong-Y Lin Liu⁷, Irena Trbojević-Akmačić², Genadij Razdorov², Jerko Štambuk², Lucija Klarić^{2,8,9}, Ivo U Maurice H.J. Selman¹², Manfred Wuhrer¹², Igor Rudan⁸, Ozren Polasek^{13,14}, Caroline Hayward Harald Grallert^{4,5,15}, Konstantin Strauch^{16,17}, Annette Peters⁵, Thomas Meitinger¹⁸, Christian Gieg Marija Vilaj², Geert-Jan Boons^{7,19}, Kelley W. Moremen⁷, Tatiana Ovchinnikova²⁰, Nicolai Bovin²⁰, Sakari Kellokumpu⁶, Fabian J. Theis^{1,21}, Gordan Lauc^{2,3} & Jan Krumsiek^{1,14}



ARTICLE

Received 10 Aug 2016 | Accepted 16 Dec 2016 | Published 27 Feb 2017

DOI: 10.1038/ncomms14357

OPEN

Connecting genetic risk to disease end points through the human blood plasma proteome

Karsten Suhli¹,
Johannes Ra²,
Marija Pezer³,
Yasmin A. M⁴,
Gabi Kastner⁵

Diabetes Care

N-Glycan Profile and Kidney Disease in Type 1 Diabetes

<https://doi.org/10.2337/dc17-1042>

Mairéad L. Bermingham,¹ Marco Colombo,²
Stuart J. McGurnaghan,¹
Luke A.K. Blackburn,¹ Frano Vučković,³
Maja Pučić-Baković,³
Irena Trbojević-Akmačić,³ Gordan Lauc,³
Felix Agakov,⁴ Anna S. Agakova,⁴
Gordon S. Smith,⁵ & G. S. Smith^{2,5}



Contents lists available at ScienceDirect

BBA - General Subjects

journal homepage: www.elsevier.com/locate/bbagen



IgG glycan patterns are associated with type 2 diabetes in independent European populations

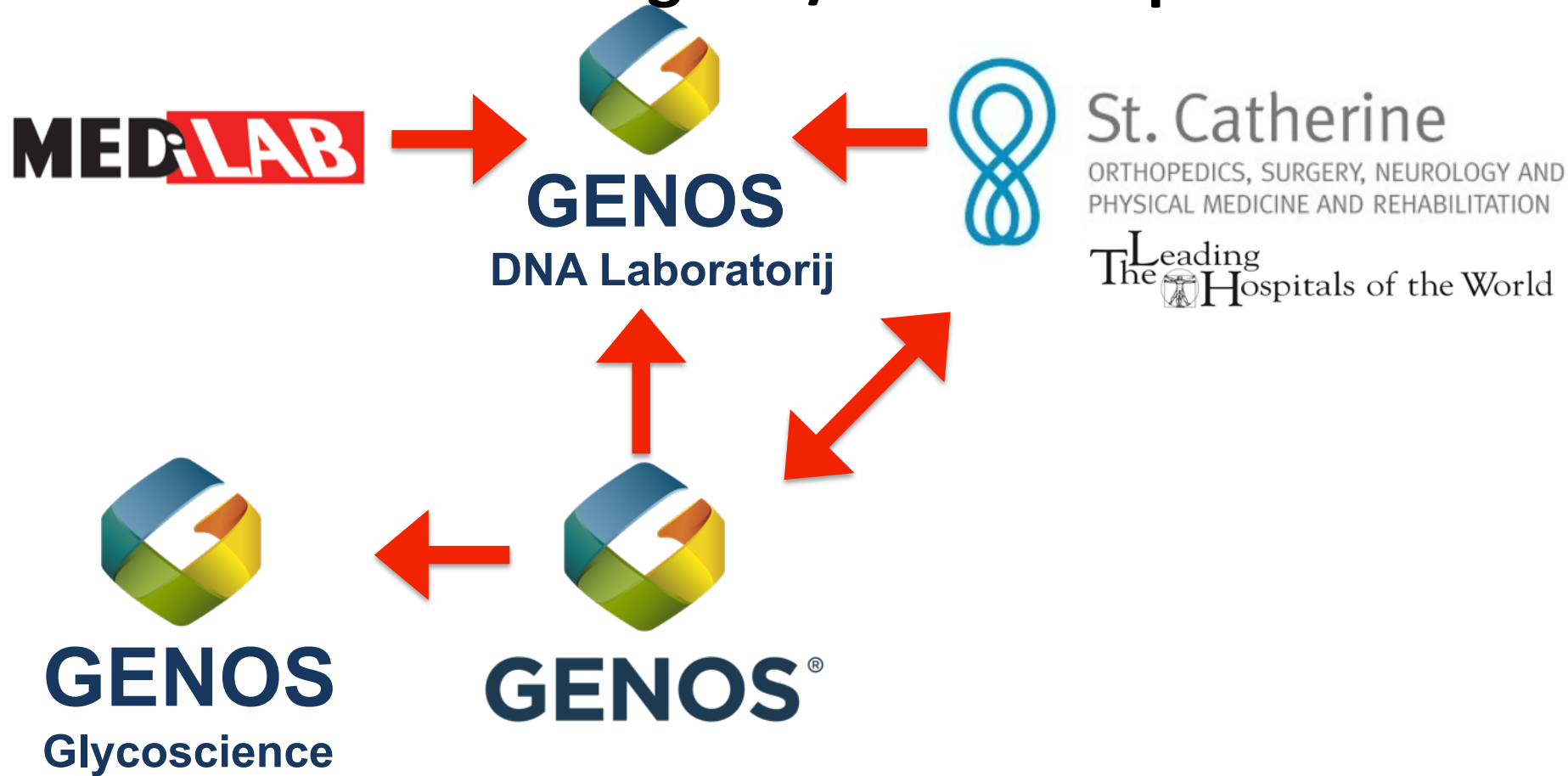
Roosmarijn F.H. Lemmers^{a,b}, Marija Vilaj^{c,1}, Daniel Urda^{d,1}, Felix Agakov^d, Mirna Šimurina^e, Lucija Klarić^{c,e,f}, Igor Rudan^g, Harry Campbell^g, Caroline Hayward^f, Jim F. Wilson^{f,g}, Aloysius G. Lieve^h, Olga Gornik^e, Eric J.G. Sijbrands^a, Gordan Lauc^{c,e}, Mandy van Hoek^{a,*}



Main Genos papers in 2017/2018

Rad	IF	RANK
Suchre et al, Nature Communications 8:14357	12.1	3/64
Shen et al, Nature Communications 8:447	12.1	3/64
Benedetti et al, Nature Communications 8:1483	12.1	3/64
Keser et al, Diabetologia 60(12):2352-2360	6.2	12/133
Bermingham et al, Diabetes Care dc171042	11.9	5/138
Krištić et al, Nature Chemical Biology, in press	15.1	5/290
Šimurina et al, Gastroenterology, in press	18.4	1/76
Clerc et al, Gastroenterology, in press	18.4	1/76
Menni et al, Circulation Research, in press	14.0	1/70

Genos is commercializing research results through a network of daughter/sister companies



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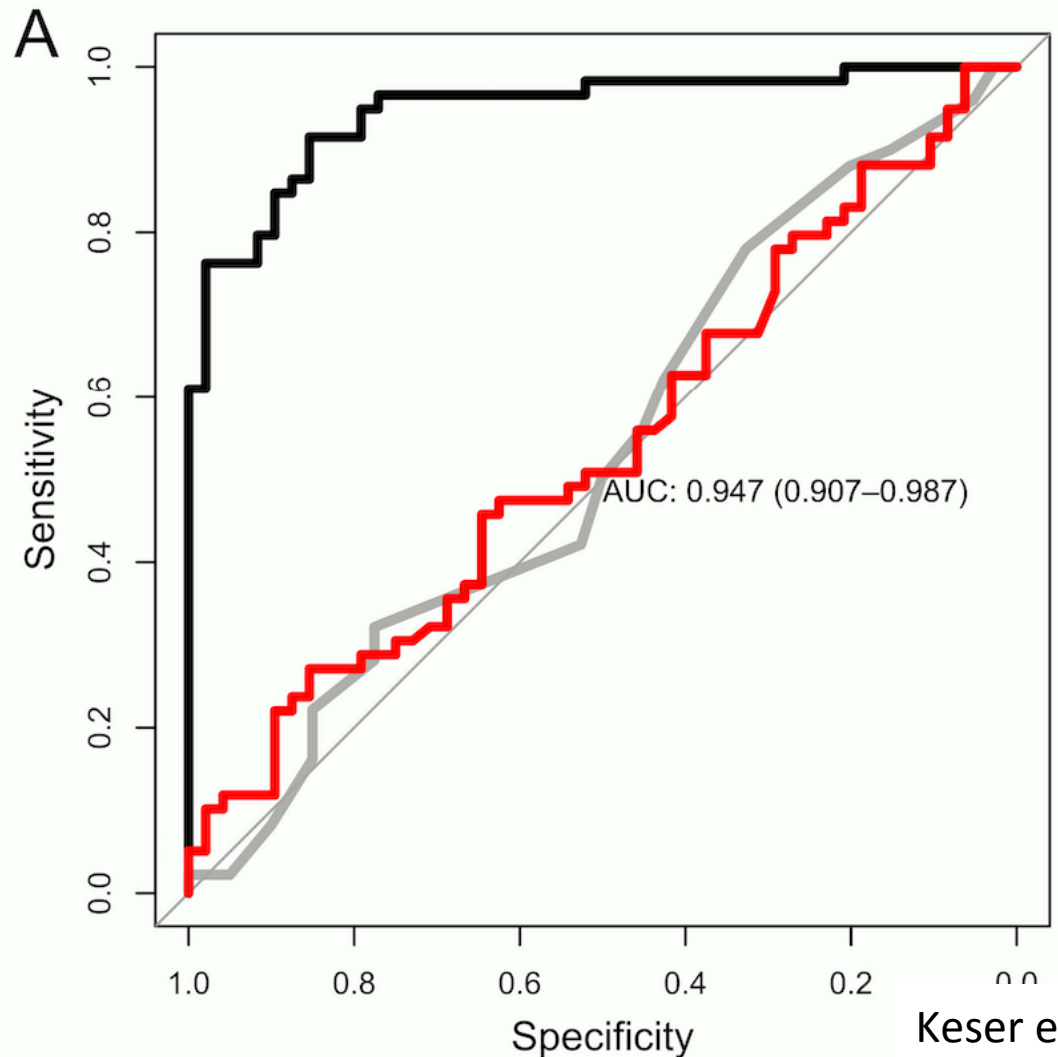
Person	Body Age
Karen La Borde	34
Johan Vystavel	59
Helen Dee	51
Dave Watts	34
Joanna Lamiri	76
Sonia Scrimshire	54

WHAT IS... Did you know that Chronological age refers to the simple blood test age compared on science. Glycan biological age is a more accurate method yet of determining our biological age - that is, the age of our body's cells. Pictured (from left): Karen La Borde, who runs a business training ski instructors with her husband and lives near Penzance, Cornwall; Johan Vystavel, a semi-retired investment adviser who lives in London with his wife; Helen Dee, a plus-size model and TV and film extra who is divorced and lives in Epsom, Surrey; Dave Watts, a retired civil servant who lives in Romford in Essex with his wife; Joanna Lamiri, from West London, who works as a web business administrator, cook and food writer, and Sonia Scrimshire who runs a consultancy and training business with her husband and lives near Leamington Spa.

197 comments 2 videos 151 shares

endanger
logical ageing,
unique and
Biological age
process than
le.

DiabRisk – Glycan biomarker for prediction of type 2 diabetes in healthy individuals



Keser et al, *Diabetologia*, 2017



Academia or industry?

