OGAN GUREL MD MPHIL

I am Distinguished Invited Professor (Management of Innovation) at DGIST (Daegu Gyeongbuk Institute of Science & Technology) as well as Founder & CEO of NovumWaves, a new venture advancing biomedical terahertz applications, and also hold additional academic appointments as Honorary Fellow at the University of Melbourne and Visiting Professor at the Libera Accademia Belle Arti (Brescia, Italy). I also serve as Chief Medical Officer (Acting) at Nessa Hearing (Singapore) and Chair of the Advisory Board for Posture360 (Seoul). Previously, I was Chief Innovation Officer at Campus D, a Seoul-



based startup incubator/Fab Lab and served over four years as a Director in the CTO office (MOT & Open Innovation groups) at the Samsung Advanced Institute of Technology (SAIT). My over 30 years experience in healthcare spans multiple sectors:



biomedical science, clinical medicine, strategy consulting, business development, executive management, marketing, and R&D, with direct expertise in medical devices, mobile health, healthcare IT, and medical imaging. Prior to surgical training at the Massachusetts General Hospital, I obtained an M.D. *Alpha Omega Alpha* from Columbia University, also doing graduate work in structural biology and earned a Bachelor's in Biochemical Sciences *cum laude* from Harvard College. Authoring over 15 academic papers and conference proceedings and co-inventor on three patents, I have given keynote addresses and other speeches at business and scientific conferences and seminars worldwide.

ACADEMIC & SCIENTIFIC My research focuses on protein electrodynamics as applied to terahertz





BUSINESS I am the Founder and Chief Executive Officer of NovumWaves, Ltd., a new venture focusing on advancing biomedical terahertz applications. Previously, as Chief Innovation Officer at Campus D and Senior Advisor for Innovation at DRB Holdings, I supported the startup portfolio and existing business units in all things related to innovation as well as new product and service initiatives, assisting also with strategy, idea generation, and outside partnerships with funding sources and research institutions. While at the Samsung Advanced Institute of Technology (SAIT), I participated in a wide range of projects including developing Samsung's healthcare technology strategy in the fields of medical imaging, robotics, neuromorphic computing, mobile healthcare, and new medicines. I also worked in technology sourcing and sensing as well as supporting broader company-wide sales and marketing efforts in healthcare. Previously at the Aesis Group, I served as Chief Executive Officer at **Duravest**, **Inc**—a publicly traded holding company focusing on convergent medical technologies. As VP and Medical Director at Sq2, LLC – a leading healthcare intelligence think-tank and consultancy serving hospitals and health systems – I led research teams providing thought leadership on topics such as, Surgical Services, Cancer Care, Cardiovascular Services, Procedure Centers, Imaging, Outpatient Care, Neurosciences & Orthopedics, Payment & Finance, ICU, Emergency Depts, Hospital of the Future, Diabetes, and Asthma.



Most notably, I was the principal architect and developer of the industry-leading Impact of Change[™] healthcare utilization forecasting system based on a unique differential equation model integrating demographic, sociocultural, financial and technology drivers to predict change. While at Sg2 I also served as clinical lead for strategy consulting projects at hospitals nation-wide, supported marketing and business development (helping to drive sales from startup to nearly \$12M in three years) and represented the company for any clinical-facing functions. Prior to Sg2, I served at the blue-chip management consultancy **Booz, Allen & Hamilton** engaged in a number of strategy projects for Fortune 500 healthcare and life sciences clients. During that time, I completed the firm's mini-MBA program for advanced degree professionals. I have also consulted to medical device firms, specifically with European (EMEA) and FDA clinical trial development, monitoring and oversight.

CLINICAL On the clinical side, I received my M.D. with honors (*Alpha Omega Alpha*) from the **Columbia University College of Physicians & Surgeons** (P&S) and completed surgical internship at the **Massachusetts General Hospital** (MGH) with a joint appointment as Clinical Fellow in Surgery at the **Harvard Medical School** (HMS). I am also experienced in international medical relief work having served during the Kosovo **NATO** military campaign (with the **International Medical Corps**) and the 1999 earthquake in Turkey. I continue to teach the Mini-MD worldwide (see above). I am fluent in French and German, intermediate in Korean, and elementary in Turkish, Italian, and Russian.



THE WALL STREET JOURNAL. The Boston Blobe



THOUGHT LEADERSHIP & MEDIA As a noted healthcare technology expert and futurist, I have given keynote speeches worldwide, addressing emerging technologies, mobile healthcare, the future of healthcare, R&D strategy and innovation. My commentaries have been published in prominent publications, including the *Wall Street Journal* and I was a regular columnist for

Midwestbusiness.com, the Midwest's leading technology newsletter. I hosted serveral InTimeTV series, including *Insights in Medicine*, *Eye on Harvard*, and *Nanotech Today*. Most recently, I have contributed a health & wellness column for *Seoul Magazine* and also authored a novel, a 21st century version of the *Faust* legend, called *Waves*. A screenplay is currently being written.



OGAN GUREL MD MPHIL			
	Curriculum \	litae	
Birth Date: Birth Place Citizenship Languages	e: Ankara, Turkey D: U.S.A.	Marital Statu Childre Visa Statu nediate), German	n: One IS: Korea F-2-7 (Exp12/20/2021)
P: Bi	aekhyeon-dong Alpharium 204-902 angyoyeok-ro 145 undang-gu, Seongnam-si epublic of Korea 13530 Mobile):	<u>umni.harvard.edu</u> / <u>og14@columbia.edu</u> http://www.linkedin.com/in/ogangurel +82 (010) 2672-9152
	EDUCATION AND	Training	
Undergrad	UATE		
Dates Attended	Institution & Location	Degree Received Year	Discipline & Advisor
1982 – 1986	Harvard University Cambridge, MA	A.B. 1986 cum laude	Biochemical Sciences Prof. Martin Karplus Dr. Michael Weiss
Graduate			
1989 – 1994	Columbia University New York, NY	M.Phil. , 1991	Biochemistry & Molecular Biophysics Prof. Wayne Hendrickson
1987 – 1996	Columbia University College of Physicians & Surgeons New York, NY	M.D. 1996 (<i>ΑΩΑ</i>) ¹	Medicine
Post-Graduate			
1996 – 1997	Massachusetts General Hospita Boston, MA	Surgery, Inte	ernship
1997 – 1999	Massachusetts General Hospita Boston, MA	l Neurosurger	r y , Residency (Junior)

¹ Alpha Omega Alpha Medical Honor Society

WORK EXPERIENCE²

Dates	INSTITUTION	LOCATION	Position
2017 _ present	DGIST (Daegu Gyeongbuk Institute of Science & Technology) Management of Innovation Program	Deagu, South Korea	Visiting Distinguished Professor - (<u>Link</u> & <u>Link</u>)
2016 – present	NovumWaves Ltd	Seoul	Founder and Chief Executive Officer
2016 _ present	Nessa Pte Ltd	Singapore	Chief Medical Officer (Acting) - (Link)
2016 _ present	Posture360	Seoul	Chair of the Advisory Board
2015 2016	Campus D (on assignment from DRB – see below)	Seoul	Chief Innovation Officer
2015 2016	DRB Holdings Ltd	Busan, South Korea	Senior Advisor for Innovation (이사 – 기술혁신자문역)
2010 _ 2015	Samsung Advanced Institute of Technology MOT Research Center & Open Innovation Group CTO Office	Suwon, South Korea	Director (부장)
2005 _ 2010	Aesis Group LLC	Chicago	Principal
2007 _ 2008	InTimeTV	Chicago	Medical Producer & Host
2006 _ 2008	Midwestbusiness.com	Chicago	Columnist
2005 _ 2006	Duravest Inc	Chicago, Montreal & Munich	Chief Executive Officer

² Work experience is listed in reverse chronological order. All other listings are chronologically listed.

2001 _ 2004	Sg2 LLC	Evanston, Illinois	Vice President & Medical Director
2001	Booz Allen Hamilton	Chicago	Associate
1997 _ 2000	Gurel Advisory	Boston & Kiel, Germany	Independent Consultant
1991 _ 1997	MCAT Intensive Review / QRx Publishing	New York	President
1987	Institut Laue Langevin (ILL)	Grenoble, France	Visiting Researcher
1986 - 1987	Polygen Corporation	Waltham, Massachusetts	Computational Chemist
1983	IBM Corporation T.J. Watson Research Labs	Yorktown Heights, New York	Research Associate
1982	New York University Courant Institute of Mathematical Sciences	New York	Instructor Summer Program in Computer Science

PLACES WORKED



Dates	Institution	Position
1982	New York University Courant Institute of Mathematical Sciences	Instructor Taught the intensive computer science course for high school students under Prof. Henry Mullish. Lectured on basic programming (Basic, Fortran, introductory Assembly language, Lisp) as well as principles of software development and software engineering.
1982	New York University Courant Institute Robotics Laboratory	Research Assistant Helped set up a new Robotic Systems Research Laboratory headed by Prof. Jacob T. Schwartz.
1983	IBM T.J. Watson Research Center Yorktown Heights Research Center	Research Associate Worked with Dr. Russell Taylor (Robotics Research Lab) to develop a high-level robotics programming language interfacing with AML.
1984	Harvard University Department of Cellular & Developmental Biology	Research Assistant Researched coated vesicles (clathrin) in the laboratory of Prof. Daniel Branton.
1985 _ 1986	Harvard University Department of Chemistry	Research Assistant Worked in the laboratory of 2013 Nobel Laureate Prof. Martin Karplus (with Dr. Michael Weiss) on NMR & NOE-constrained molecular dynamics simulations of DNA in preparation for my undergraduate senior thesis.
1987	Institut Laue-Langevin Grenoble, France Laboratory of Dr. Giuseppe Zaccaï	Visiting Researcher Developed Fourier map programs to facilitate analysis and interpretation of neutron diffraction data on selectively deuterated bacteriorhodopsin 2-D crystals. Jointly wrote JMB paper with Drs. Giuseppe Zaccaï (ILL), Jean-Luc Popot (Institut Pasteur), and Don Engelman (Yale) describing the first sequence- structure helix mapping for this molecule. Gave presentations on the molecular biology of diabetes and on molecular dynamics methodologies. Performed molecular dynamics calculations (using CHARMM) on bacteriorhodopsin (with Michel Ferrand).
1989 - 1994	Columbia University College of Physicians & Surgeons	Teaching Fellow Taught Biochemistry, Physiology & Neural Science

ACADEMIC & PROFESSIONAL APPOINTMENTS AND POSITIONS

Summer 1989	Columbia University College of Physicians & Surgeons Center for the Study of Society & Medicine	Research Associate Worked with Prof. David Rothman on the "History of Special Hospitals" in support of policy studies relating to the development of specialized clinical facilities for the then rapidly growing HIV/AIDS epidemic.
1996 _ 1999	Harvard Medical School	Clinical Fellow in Surgery
1996 _ 1999	Harvard College Mather House	Non-resident Pre-Medical Tutor Advised pre-medical students; wrote recommendations.
2001 _ 2005	Roosevelt University	Adjunct Professor Taught Cell & Molecular Biology, Mathematical Modeling in the Life Sciences, and Introduction to Bioinformatics.
2007 - 2008 (2014 Alternate)	Medical Design Excellence Awards	Juror (link + <u>PDF</u>)
2007 2010	University of Illinois – Chicago	Adjunct Assoc Professor of Bioengineering (Link)
2012 2015	Samsung Advanced Institute of Health Sciences Technology (SAIHST) SungKyunKwan University (SKKU)	Visiting Professor (초빙교수) Taught the SAIT-SAIHST Mini-MD from 2012 – 2014.
2014 – present	American Association of Physicists in Medicine (AAPM) Task Group No. 260 "Considerations for the Use of Handheld Devices for Viewing Medical Images"	Non-Voting Member (Link)
2015 – present	Korea Business Leaders Alliance (KBLA)	Innovation Ambassador (Link) Linking KBLA members with the wider technology, startup & innovation community in Korea.

2015 – present	University of Melbourne Department of Electrical & Electronic Engineering	Honorary Fellow Centre for Neural Engineering
2015 – present	Libera Accademia Belle Arti (LABA)	Visiting Professor Master "Re-Design Medicine" program (Link)
2016 – present	Frasen Inc.	Advisor (Link)
2016 _ present	Digital Health & Care Innovation Society (Singapore)	Member of the Steering Council
2016	World Citizens Organization (Seoul)	Communications Director
2017 – present	Galen Growth Asia (GGA)	Member of the Clinical Advisory Board (Link)
2017 – present	DGIST (Daegu Gyeongbuk Institute of Science & Technology) Management of Innovation Program	Visiting Distinguished Professor (Link & Link)

BOARD SCORES & EXAMINATIONS

Dates	Exam	Score
1989	National Board of Medical Examiners (NBME) Part I	Passed 745/96
1995	US Medical Licensing Exam (USMLE) Step 2	Passed 225/87
1997	US Medical Licensing Exam (USMLE) Step 3	Passed 218/87

TEACHING EXPERIENCE

Dates	Institution	Position & Description
1981	New York University Courant Institute for Mathematical Sciences	Guest Lecturer : Taught a series of lectures on APL to the summer program in computer science at the Courant Institute of Mathematical Sciences
1982	New York University Courant Institute for Mathematical Sciences	Instructor : Taught intensive computer science course for high school students. Taught basic programming (including Basic, Fortran, introductory Assembly language and Lisp) as well as principles of software development and software engineering.
1984 – 1985	Harvard University Bureau of Study Counsel	Tutor in biology, chemistry, biochemistry, and physics.
1991 – 1997	MCAT Intensive Review (New York City; Princeton, NJ; Boston, MA; Kansas City, MO)	President & Instructor : Developed a high-level MCAT preparation course; marketed the course nation-wide teaching more than 600 students in NYC, Princeton (NJ), Boston and the Midwest. For three years, I served the official MCAT prep provider for Princeton University.
1995 – 1996	Columbia University College of Physicians & Surgeons	Teaching Fellow in Neural Sciences Taught medical students basic neurosciences and neuroanatomy
1996 – 1999	Harvard College	Non-resident Pre-medical Tutor, Mather House
1997	Harvard Medical School	Teaching Fellow in Neuroanatomy
1996 – 1998	Harvard Medical School	Clinical Fellow in Surgery Supervising HMS medical students
2002 - 2004	Sg2, LLC	Guest lecturer at several academic institutions including Northwestern University and Rush University.
2001 – 2005	Roosevelt University	Adjunct Professor: Taught Cell & Molecular Biology, Mathematical Modeling and Introduction to Bioinformatics.
2010	Gunner Training (now Firecracker)	Editor-In-Chief & Senior Author Premedical (MCAT) Programs

2011 – 2013	Samsung Advanced Institute of Technology (SAIT)	Instructor: SAIT Mini-MD 20 session review of preclinical and clinical sciences Taught three times
2012 – 2014	Samsung Advanced Institute of Health Sciences Technology (SAIHST)	Visiting Professor : SAIHST Mini-MD 20 session review of preclinical and clinical sciences Taught four times
Feb 2013	Samsung Research America (SRA – Silicon Valley)	Instructor: SAIT-SRA Micro-MD 1 ½ day medicine review
July 2013	Samsung Research America (SRA - Dallas)	Instructor: SAIT-SRA Micro-MD 1 ½ day medicine review
Aug 2015	National University of Singapore (NUS)	Instructor: Mini-MD; one-day course - Link
Aug 2015	Singapore-Stanford Biodesign (SSB)	Instructor: Mini-MD; one-day course - Link 1 & Link 2
Oct 2015	Startup HealthTech & Peak15 (Melbourne)	Instructor: Mini-MD; one-day course - Link 1 & Link 2
Mar 2016	Libera Accademia Belle Arti (LABA University in Brescia, Italy)	Visiting Professor: Mini-MD; four-day course - Link 1 & Link 2
Apr 2016	Singapore Mini-MD	Instructor: two-day program - <u>Link</u>
Apr 2016	Mini-MD at Samyang Holdings	Instructor: one-day program
Jul 2016	Singapore Mini-MD	Instructor: two-day program - <u>Link</u>
Aug 2016	Singapore-Stanford Biodesign (SSB)	Instructor: Mini-MD; one-day course - <u>Link 1</u> & <u>Link 1</u>

Oct 2016	Seoul Mini-MD	Instructor: one-day course - Link
Jan 2017	Allianz Life Mini-MD	Instructor: In-house Corporate Mini-MD; one-day course
Feb 2017	Singapore Mini-MD	Instructor: two-day program - Link
Feb 2017	Auckland Mini-MD (Auckland University of Technology – AUT)	Instructor: two-day program - <u>Link</u>
May 2017	AXA Mini-MD (Singapore)	Instructor: In-house Corporate Mini-MD; two-day course
Sep – Dec 2017	DGIST (Daegu Gyeongbuk Institute of Science & Technology) (MOI Program)	Visiting Distinguished Professor Teaching "Technology Marketing" in the Management of Innovation Program
Aug 2017	ESSEC Business School Mini-MD (Singapore)	Instructor: Two-day course – <u>Link</u>
Jan 2018	ESSEC Business School Mini-MD Master's in Management of Health Industries Program (Singapore)	Instructor: Three-day course
Mar – June 2018	DGIST (Daegu Gyeongbuk Institute of Science & Technology) (MOI Program)	Visiting Distinguished Professor Teaching "Technology Marketing" in the Management of Innovation Program
Mar – June 2018	DGIST (Daegu Gyeongbuk Institute of Science & Technology) (MOI Program)	Visiting Distinguished Professor Teaching "Foundations of Innovation" in the Management of Innovation Program cross-registered with the College of Transdisciplinary Studies (undergraduate school)

Dates	Institution & Location	Description
1996	Massachusetts General Hospital BLS & ATLS certification Boston, Massachusetts	Passed Basic Life Support (BLS) and Advanced Life Support (ATLS) courses and certification
1999	International Medical Corps Skopje, Macedonia	Staff physician: provided patient care, logistical support and supervisory work in the refugee camps in Macedonia during the NATO military campaign in Kosovo.
2001	Booz-Allen Presentation Skills Chicago, IL	One-week intensive course covering presentation skills and public speaking development.
2001	Booz-Allen Mini-MBA Zurich, Switzerland	Two-week intensive course covering economics, microeconomics, business cycle theory, accounting, corporate finance, international business and other topics.
2003	Sg2 Presentation Skills course Evanston, IL	Three-day intensive course.
2009	Walk For Healthcare Chicago to Washington, DC	Walked 700 miles from Chicago to Wash, DC for healthcare reform, collecting and publishing stories along the way. (Link)
2011–2013	Samsung Electronics Korean Language classes Giheung & Suwon, South Korea	Passed Intermediate (Level 3) of the Test of Proficiency in Korean (TOPIK) examination.
2012	Samsung Electronics Global Leadership Academy (GLA) Suwon, Korea	Executive leadership training program.

SPECIAL PROFESSIONAL ACTIVITIES

HONORS & AWARDS

Dates	Award	Institution
1979–1981	Columbia University Science Honors Program (SHP)	Selective Program for High School students units
1982	National Merit Finalist	National Merit Scholarship (Link)
1982	NY State Regents Diploma	State University of New York (Link)
1982	Westinghouse Science Talent Search 3 rd Place (\$10,000 Scholarship)	Westinghouse Science Talent Search (<u>Link 1</u> + <u>Link 2</u>)
1982	Student Honoree	American Academy of Achievement (Link)
1982	IBM TJ Watson Scholar	IBM Corporation
1982–1986	Dean's List all semesters	Harvard College
1985	Varsity (Major "H") Letter	Harvard University, Department of Athletics
1986	cum laude in Biochemical Sciences	Harvard University Dept of Biochemistry & Molecular Biophysics
1987–1999	Medical Scientist Training Program (MSTP) Awardee and scholarship	National Institutes of Health (<u>Link</u>) Medical Scientist Training Program (MSTP)
1988	First HIV Center Symposium Poster Competition Special Prize	New York State Psychiatric Institute
1994	Pauling Poster Prize honorable mention	American Crystallographic Association (Link)
1995	Alpha Omega Alpha	Alpha Omega Alpha medical honor society (Link)
1996	Sciarra Prize for Excellence in Neurology	Columbia University College of Physicians & Surgeons (Link)
2011	Congressional Record citation	United States Congress (Link)

RESEARCH INTERESTS

- Protein Electrodynamics & Terahertz Medicine; Terahertz Bio interactions
- The Relationship between Technology and Corporate Structures: "Theory of the Firm" in the 4th Industrial Revolution
- History of Open Innovation and Implications for Evolving Innovation
 Paradigms

MAJOR PUBLICATIONS & PRESENTATIONS

REFEREED ARTICLES (PEER-REVIEWED)

Popot JL, Engelman DM, **Gurel O**, Zaccaï G, (1989), "Tertiary structure of bacteriorhodopsin. Positions and orientations of helices A & B in the structural map determined by neutron diffraction." *J Mol Biol.* **210**(4):829-47 Link

Jiang X, Gurel O, Mendiaz EA, Stearns GW, Clogston CL, Lu HS, Osslund TD, Syed RS, Langley KE, Hendrickson WA, (2000), "Structure of the active core of human stem cell factor and analysis of binding to its receptor Kit," *EMBO J.* **19**(13):3192-203. <u>Link</u>

Gurel O. (2008) "Diabetes: Medical vs. Surgical Disease?" *Journal of Diabetes Science* and Technology, **2**(1):135. Link 1 & Link 2

Brewer J, and **Gurel O**, (2009), "Nanomedicine: Issues of Privacy and Informed Consent," *Nanotechnology Law & Business*, **6**:45. <u>Link</u>

Kim MS, Sim TS, Kim YJ, Kim SS, Jeong H, Park JM, Moon HS, Kim SI, Gurel O, Lee SS, Lee JG, Park JC, (2012), "SSA-MOA: a novel CTC isolation platform using selective size amplification (SSA) and a multi-obstacle architecture (MOA) filter," *Lab Chip*; 12(16):2874-80. Link

Kim MS, Kim J, Lee W, Cho S-J, Oh J-M, Lee J-Y, Baek S, Kim YJ, Sim TS, Lee HJ, Jung G-E, Kim S-I, Park J-M, Oh JH, Gurel O, Lee S-S, Lee J-G, (2013), "A Trachea-inspired Bifurcated Microfilter Capturing Viable Circulating Tumor Cells via Altered Biophysical Properties as Measured by Atomic Force Microscopy," Small; 9(18):3103-10. Link Kim MS, Jo S, Park JT, Km SS, Kang HT, **Gurel O**, Park SC, (2015), "A New Method to Purify and Analyze Heterogeneous Senescent Cell Populations Using a Novel Microfluidic Filter with Uniform Fluidic Profile," *Anal. Chem*; **87**(19):9584–9588. Link

Park KJP, Lee K, Lee JH, Kang B, Shin C-W, Woo J, Kim J-S, Suh Y, Kim S, **Gurel O**, Ryu H, (2015) "Computationally Efficient, Real-time Motion Recognition Based on Bio-Inspired Visual and Cognitive Processing," *ICIP*, 932-935. Link

Yeo W-G, **Gurel O**, Srinivasan N, King PD, Nahar NK, Park S, Lehman N, Sertel K, (2017), "Terahertz Imaging and Electromagnetic Model of Axon Demyelination in Alzheimer's Disease," *IEEE Transactions on Terahertz Science and Technology*, **7**(6), August 30. Link **RECENT PRESENTATIONS, WORKSHOPS & SEMINARS (2011 – PRESENT)**

"Protein Electrodynamics and the Terahertz gap," Korea Atomic Energy Research Institute (KAERI) Seminar, Daejeon, South Korea, 24 Oct 2012.

"Perspectives on the Future of Healthcare," Gananan Forum, Seoul, 5 Nov 2012.

"Unique Challenges in Healthcare Innovation," SAIT MOT Forum, Giheung, South Korea, 9 Nov 2012.

"THz Medicine: A New Frontier?" 3rd WCI Symposium, WCI-2012, Seoul, 15 Nov 2012. Link

"Global Perspectives on the Future of Healthcare," KAIST College of Business, Seoul, 20 Nov 2012.

"Protein Electrodynamics & Terahertz Medicine: A New Frontier?" University of Southampton, Optoelectronics Research Centre Seminar, Southampton, 3 Dec 2012. Link

Gurel O, Park J, Ryu SE, (2013) "Terahertz spectroscopy of methemoglobin: implications for novel medical imaging and therapeutics," **SPIE Photonics West** "Terahertz and Ultrashort Electromagnetic Pulses for Biomedical Applications", San Francisco, 7 Feb 2013. Link

"Protein Electrodynamics: Possibilities for Next-generation THz-based Medical Diagnosis and Treatment," **Ohio State University, ElectroScience Laboratory, IEEE AP-MTT Chapter Seminar**, Columbus, Ohio, 11 Feb 2013. Link

"Protein Electrodynamics & Terahertz Radiation: The Future of Medicine?" 4th THz-Bio Workshop, Seoul National University, Seoul, 15 Feb 2013. Link

"Protein Electrodynamics: A Revolution Medical Diagnosis & Therapy" **Samsung R&D America**, Dallas, 31 Jul 2013.

"Protein Electrodynamics: Possibilities and Challenges in Terahertz Medicine," **Electronics and Telecommunications Research Institute (ETRI)**, Daejeon, South Korea, 3 Apr 2013.

Yeo WG, Nahar NK, Hitchcock CL, Park SC, Gurel O, Sertel K, "Real-time THz Imaging of Human Tissue Characteristics and Cancer Margins," IRMMW-THz 2013, Mainz, Germany, 5 Sep 2013. Link

Lewis RJ, Lim EL, Rowe DJ, Alam S, Nilsson J, Baik CW, **Gurel O**, Wilkinson JS, Richardson DS, "High-Resolution Broadly-Tunable MOPA-Based Terahertz Spectrometer to Non-Destructively Probe and Modulate Protein Electrodynamics," **IRMMW-THz 2013**, Mainz, Germany, 5 Sep 2013. Link

Gurel O and Pastreich E, "Seoul as a Mecca for the Creative Class in the 21st Century," 10 Magazine Book Club and The Asia Institute, Lecture & Panel, Seoul, 14 Sep 2013. Link & <u>BusinessKorea</u>

Lewis RJ, Lim EL, Rowe DJ, Alam S, Nilsson J, Baik CW, **Gurel O**, Wilkinson JS, Richardson DS, "Terahertz Spectroscopy to Non-Destructively Probe and Modulate Protein Electrodynamics: Fundamental Basis for THz Medicine," **Bioelectrics 2013**, Karlsruhe, 19 Sep 2013. <u>Link</u>

"eHealth Trends," Seoul Tech Society, Seoul, 16 Mar 2014. Link

"mHealth and Sensors," 4th Mobile & Wearable Technology Healthcare 2014, Singapore, 4 April 2014. Link

Samsung-Telstra "Create & Innovate" Digital Healthcare Workshop, Melbourne, 16 May 2014.

"E-Health & the Revolution in Healthcare," International Federation of Health Plans, Biennial Conference, Madrid, 20 May 2014. Link

Yeo WG, Nahar NK, Hitchcock CL, Park SC, **Gurel O**, Sertel K, "THz Spectroscopy and Imaging of Major Human Organ Tissues for Cancer Margin Assessment," **2014 IEEE International Symposium on Antennas and Propagation**, Memphis, Tennessee, 8 Jul 2014. <u>Link</u>

"Art & Culture in the U.S. and Korea," 3rd U.S. Studies Seminar, Dinner speech and Talk Concert, Seoul, 26 Aug 2014. Link

Yeo WG, Nahar NK, Hitchcock CL, Lehman NL, Park SC, **Gurel O**, Sertel K, "THz Imaging of Alzheimer's Disease: Spectroscopic Differentiation Between Normal and Diseased Tissues," Tucson, Arizona, **IRMMW-THz 2014**, 16 Sep 2014. <u>Link</u>

"Nursing in the Mobile Health Era," HIMSS APAC14: Singapore, 16 Sep 2014. Link

"mHealth and Paradigm Shifts in Healthcare," HIMSS APAC14, Singapore, 17 Sep 2014. Link

"Protein Electrodynamics & Terahertz Medicine: A New Frontier?" Okinawa Institute of Science & Technology, Okinawa, Japan, 11 Aug 2014.

"Protein Electrodynamics & Terahertz Medicine," Martin Karplus Celebration Symposium, San Francisco, 30 Sep 2014. <u>Link</u>

"Protein Electrodynamics and Terahertz Medicine," French-Singaporean workshop on Technologies and Applications of ultra-high frequency nano-systems, Nanyang Technological University, Singapore, 16 Oct 2014. Link

"The Role of Universities in Korea for the Prospective Global Leaders," **Panel Discussion**, U.S. **Embassy – Kyunghee University**, 5 Nov 2014.

"The Digital Health Revolution and Paradigm Shifts in Medicine," **Bringing State-of-the-Art Innovation to the Treatment of Allergies**, Bali, Indonesia, 14 Nov 2014.

"The Digital Health Revolution and Paradigm Shifts in Medicine," **National Health IT Summit 2015**, **Singapore Ministry of Health Holdings**, Singapore, 7 Jan 2015.

"Protein Electrodynamics and Terahertz Medicine," University of Oxford, Department of Engineering Science, Oxford, 9 Feb 2015.

"Digital Healthcare and Paradigm Shifts in Medicine," **Digital Health Assembly Open Innovation Conference**, Cardiff, 10 Feb 2015. <u>Link</u>

"Protein Electrodynamics and Terahertz Medicine," University of Bristol, School of Chemistry, Bristol, 12 Feb 2015. Link 1 and Link 2 Victorian State Government Digital Healthcare workshop, Melbourne, 26 Feb 2015.

"KBLA What's Next Seminar: The Digital Healthcare Revolution and Paradigm Shifts in Medicine," Korea Business Leaders Alliance, Seoul, 17 Mar 2015. <u>Link & *BusinessKorea*</u>

"Innovation and Marketing," (Marketing Management – GPT 5007 Guest Lecture) Sungkyunkwan University GSB, Seoul, 21 April 2015.

"eHealth and Innovation – The Future of Medicine," **Seoul Tech Society [STREAM]**, Seoul, 9 May 2015. Link

"The Future of Medicine: Protein Electrodynamics," 2015 Electrical and Computer Engineering Graduate Student Symposium, National University of Singapore (NUS), Singapore, 13 May 2015. Link

"Protein Electrodynamics & Terahertz Medicine," Nanyang Institute of Technology in Health and Medicine (NITHM) Tissue Engineering Program Seminar, Nanyang Technological University (NTU), Singapore, 15 May 2015.

"The Structure and Function of Innovation," KBLA Breakfast Business School: Innovation, Korean Business Leaders Alliance, Seoul, 4 Jun 2015. Link

"The Future of Medical Imaging: Protein Electrodynamics & Terahertz Medicine," Iljin Holdings & Alpinion Medical Systems Executive Briefing, Seoul, 30 Jun 2015.

Gurel O, Yeo W-G, Nahar NK, Lehman NL, Kim MS, Park S, Sertel K, "THz Spectroscopic Response of Brain Tissue Exhibiting Alzheimer's Disease," 2015 IEEE International Symposium on Antennas and Propagation, Vancouver, 24 Jul 2015. Link

"NUS Mini-MD: Understanding Medical Science," **National University of Singapore (NUS)**, **NUS Institute for Engineering Leadership**, Singapore, 20 Aug 2015. <u>Link</u>

"Singapore-Stanford Biodesign Mini-Medical School," **Singapore-Stanford Biodesign (SSB)**, SSB Innovation Class, Singapore, 22 Aug 2015. <u>Link</u>

"Biophysics of Musculoskeletal Function: Implications for Next-Generation Robotic Technologies," DRB – Campus D Workshop, Seoul, 2 Sep 2015.

"On Innovation," Power Lecture Autumn Series, Suwon, South Korea, 12 Sep 2015. Link

"On Innovation," Campus D (Kent Foreign School), Seoul, 23 Sep 2015. Link

"The Future of Medicine: Protein Electrodynamics & Terahertz Medicine," Intellectual Ventures & Intellectual Ventures Lab, Seattle, 28 Sep 2015.

Park KJP, Lee K, Lee JH, Kang B, Shin C-W, Woo J, Kim J-S, Suh Y, Kim S, **Gurel O**, Ryu H, "Computationally Efficient, Real-time Motion Recognition Based on Bio-Inspired Visual and Cognitive Processing," **IEEE International Conference on Image Processing**, Montreal, 30 Sep 2015. <u>Link</u> Cross, G, Gautam A, Grant D, Palte B, Lu V, **Gurel O**, "Panel Discussion: Developments in China's rapidly evolving healthcare investment landscape," **Australia Biotech Invest 2015**, Melbourne, 7 Oct 2015. <u>Link</u>

"Protein Electrodynamics & Terahertz Medicine," University of Melbourne, Centre for Neural Engineering, Melbourne, 8 Oct 2015.

"The Melbourne Mini-MD Program," Startup HealthTech & Peak15, Melbourne, 10 Oct 2015. Link

"Digital Healthcare and Paradigm Shifts in Medicine," HIMSS-APAC Webinar, Singapore, 29 Oct 2015. Link

"Protein Electrodynamics & Terahertz Medicine," KAIST, Daejeon, South Korea, 3 Nov 2015.

"Protein Electrodynamics & Terahertz Medicine," Konyang University, Daejeon, South Korea, 3 Nov 2015.

"On Innovation," Kent Foreign School Annual Dinner, Seoul, 6 Nov 2015.

"On Innovation," Seoul Scholars International, Seoul, 26 Nov 2015.

"On Innovation," Association of IIT Alumni in South Korea (Dinner Address), Seoul, 6 Dec 2015.

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Quality of Care and Quantity of Payment: The New Link Between Performance and Reimbursement Michael Millenson, President of Health Quality Advisors
Physician Quality & Performance Measurement Joseph V. Messe, MD, FACP, MACC, FCCP, Professor of Medicine at Rush Medical College
Issues in Gastroenterology: C. Diff Colitis; Nutrition and other topics Dr. Carol Semrad., Associate Professor of Medicine at the University of Chicago
Update on MRSA Dr. Bala Hota MD MPH, Assistant Professor of Medicine (Infectious Diseases) at Rush University Medical Center
Advances in Targeted Therapies for Cancer Ezra Cohen MD - Assistant Professor of Medicine (Oncology) at the University of Chicago
Gastroenterology for the Family Practitioner Dr. Carol Semrad MD., Associate Professor of Medicine at the University of Chicago
Issues in Male Reproductive Health for the General Practitioner Craig Niederberger MD - Chairman of Urology, University of Illinois - Chicago
Update on Bariatric Surgery Vivek Prachand MD - Assistant Professor of Surgery at the University of Chicago
Insights in Gastroenterology for the Primary Care Physician Arvydas D. Vanagunas MD, Associate Chief for Clinical Gastroenterology at Northwestern University School of Medicine
Online Communities for Doctors: The What, the Why and the How Tobin Arthur – Founder and CEO of iMedExchange, Inc.
Nephrolithiasis for the General Practitioner Stewart Lipson MD - Associate Professor of Urology at the University of Illinois – Chicago
Integrating Physical Health Care for Individuals with Serious Mental Illness Peter Weiden MD, Professor of Psychiatry and Director of the Psychosis Program at the University of Illinois – Chicago
Women's Heart Health Annabelle Volgman MD FACC, Director of the Rush Heart Center for Women
Advances in the Management of Cerebral Aneurysm Disease and Stroke Bernard Bendok MD, Assistant Professor of Neurological Surgery and Radiology- Northwestern University School of Medicine
The Present & Future of Primary Care Medicine C. Anderson Hedberg MD, MACP, former President of the American College of Physicians
Unmet Needs in Primary Care Vedat Obuz MD, Medical Director at the Lotus Medical Clinic

INTERNET TELEVISION PRESENTATIONS (<i>NANOTECH TODAY</i> HOST) —, (28 Mar 2008) "Nanotechnology internet TV talk show debuts," <i>nanowerk</i> . <u>Link</u>
Bioinspired Nanomaterials Link Chad Mirkin PhD - Professor of Chemistry and Director of the Institute for Nanotechnology at Northwestern University
Biologically inspired strategies for new biomaterials Link Phillip Messersmith PhD - Professor of Biomedical Engineering - Northwestern University
<i>Emerging Technologies for Nano-Engineered Medicine</i> Link Dean Ho PhD - Professor of Biomedical Engineering - Northwestern University
 Nano-Engineered Medicine - Dean Ho - Pt. 1 - <u>Link</u> Nano-Engineered Medicine - Dean Ho - Pt. 2 - <u>Link</u>
Bio-Inspired Sensors Hooman Mohseni PhD - Assistant Professor of Electrical Engineering & Computer Sciences - Northwestern University
Linking structure and function at the molecular level Neville Freeman PhD – President, Farfield Scientific
The role of complex dissipative systems, non-equilibrium self-organization and self-assembly in nanotechnology Bartosz A. Grzybowski PhD - Associate Professor of Chemical and Biological Engineering - Northwestern University
Self-Assembling Molecules for Cell Signaling Daniel Harrington PhD - Research Assistant Professor - Northwestern University
Nanoparticle-based sensors Sandra Bishnoi PhD - Assistant Professor - Illinois Institute of Technology
Making "Sense" of DNA Franz Geiger PhD - Dow Chemical Company Professor at Northwestern University
Making "Sense" of DNA - Prof. Franz Geiger - Link
The Nanostructure of Portland Cement - New Approaches to Studying an Old Material Hamlin M. Jennings PhD - Professor of Civil and Environmental Engineering - Northwestern University
Nanostructure of Portland Cement - Hamlin Jennings - Link
Fostering Innovation in Nanotech Ogan Gurel, MD

INTERNET TELEVISION PRESENTATIONS (FUTURE MD)
Joshua M. Rosenow MD – Director, Functional Neurosurgery - Northwestern University - Link
Saul Weiner MD - Section Chief, General Pediatrics - University of Illinois at Chicago - Link
Lawrence S. Ross MD - Professor of Urology at the University of Illinois - Chicago - Link
Richard Prinz MD - Helen Shedd Keith Professor and Chairman of Surgery - Rush University Medical Center - Link
Giuliano Testa MD FACS - Director, Liver Transplantation and Hepato-Biliary Surgery - University of Chicago - Link
Emil F. Coccaro MD - Professor & Chairman of Psychiatry at the University of Chicago - Link
Issam Awad MD MSc FACS MA (hon) - Professor and Vice-Chairman of Neurosurgery at Northwestern University - Link

INTERNET TELEVISION PRESE	NTATIONS (Eye on Harvard Host)
—, (Jan–Feb 2008) "Alumni: Eye	on Harvard," Harvard Magazine. <u>Link</u>
	nd Biotechnology: Bringing it All Together <u>Link</u> tific Officer - Baxter International
The World of Politics David Wilhelm MPP'90 – Presid	ent & Founder of Woodland Venture Management
	ry Clinton compared - Link
	dent George W. Bush - <u>Link</u> nedy School at Harvard University - <u>Link</u>
	n. Barack Obama - Link
	enges facing DNC Chair Howard Dean - Link
	atic Nominating Process: Good or Bad? - Link
 Why I decided to supp What Makes Barack C 	ort Barack Obama - <u>Link</u> Jhama "Tick" - Link
 On Choosing a Presid 	
 Comparing politics in 1 	1992 with the present time - <u>Link</u>
 On negativity in the CI 	inton campaign - <u>Link</u>
	Current Trends in Small Cap Investing
Brendan Carroll MBA '04 - Victo	ry Park Capital Advisors, LLC
<i>Terra Firma - A Journey from Migrar</i> Alfredo Quinones Hinojosa, MD	
The World of Nanotechnology: Self- Bartosz A. Grzybowski PhD '00	Assembly of Complex Systems - Associate Professor of Chemical and Biological Engineering - Northwestern University
Sam Dyson - MEd'00 - Walter P Kevin McCarron - MEd'94 - Scie	hievement Gap in Secondary School Science & Math Education ayton College Prep ence Teacher - Oak Park & River Forest High School y Educator, University of Chicago - Yerkes Observatory
Topics in the History of Ethnic Clean Prof. Benjamin Frommer - PhD'9	using, Nationalism and the Use of Courts for Political Ends 29 - Associate Professor of History - Northwestern University
Healthcare Reform, Challenges in H James Doyle - HSPH - Senior V	ospital Finance P & CFO, Elmhurst Memorial Healthcare
An Introduction to String Theory Savdeep S. Sethi PhD '99 - Ass	ociate Professor of Physics - University of Chicago
From Shakespeare to South Park Judith Kegan Gardiner, AB '62 -	Professor of English and Gender and Women's Studies - University of Illinois at Chicago
	prising or not so surprising conclusions n Chief, General Pediatrics - University of Illinois at Chicago
Geopolitical Trends – the Middle Eas Frederick C. Broda AMP'88 – Ad	
New Paradigms in Treating Psychial Chip Fisher AB'78 – President F	ric Disorders ïsher-Wallace Laboratories
Turkey's Foreign Policy Ambassador Altay Cengizer – F	ellow, Harvard Weatherhead Center for International Affairs
<i>Medical Diplomacy</i> Gov. Tommy Thompson (former	Governor of Wisconsin and previously Secretary of U.S. Department of HHS)

	rtistry of John Himmelfarb B '68 MAT '70 - Artist
The World of Commerc Michael Alter AB'83	ial Real Estate 8 - President, The Alter Group
Explorations in Entrepre Steven Kaplan, AB	eneurship 81 AM'82 PhD'88 - Professor of Entrepreneurship at the University of Chicago
	- Writer, Producer, Director 7 – Managing Director , VII Photo LLC
The World of Healthcar Scott Becker JD'98	<i>e Law</i> - Healthcare Co-Chair at McGuireWoods, LLP
Fetal Medicine – how th Dr. Jason Birnholz,	ne field began at Harvard and where it is going MGH/HMS '70 – '79
	yment: Past, Present and Future , AB'77- CEO of Challenger, Gray & Christmas, Inc.
Physician Quality Meas Dr. Joseph Messer	ures - The Good and the Bad , AB '53 MD '56
Encyclopedia of Life John McCarter MB	A '63 - President & CEO of the Field Museum of Natural History
Next-generation investr Jan Hummel MBA	<i>nent paradigms</i> 86, CEO of Paradigm Capital Management
The Harvard-Munich M Prof. Chris Frank M LMU-Harvard Medi	ID, Chief of Cardiac Anesthesiology, Ludwig Maximilians University (Munich) and Executive Director of the
	orism, The Center for Global Initiatives and more unding Director - Center for Global Initiatives
	udying fish fossils and worm DNA tells us something about ourselves PhD '87 - Professor and Chair, Dept. of Organismal Biology and Anatomy at the University of Chicago
	Do With My Baby's Cord Blood? –The Politics, Economics, Business & Ethics of Stem Cells and Cord Blood 6 – Assistant Professor of Pediatric Hematology/Oncology at Rush University Medical Center
	aterfalls: An I-Banker Turned Adventure Travel Entrepreneur '99, CEO of Global Adrenaline, Inc.
	ve Inside of North Korea 7 President of Asia Pacific Travel

BLOG ARTICLES (MULTIPLY SYNDICATED)
Global and Historical Perspectives on Invention & Innovation
On Innovation Part II: Fostering Innovation
Expanding Health Coverage to the Uninsured: How to Pay for it - the Health Impact Tax
On Innovation, Fostering Innovation and Accelerating Development: New Webcast
On Innovation Part I: Innovation is Not the Same as Invention
A Pharmaceutical Addiction
Medical Diplomacy: A Brief Outline
Diabetes: Looking Past Blood Sugar
FDA issues a "black box" warning for Avandia - A Balancing Act Between Safety and
The Deconstruction of Amgen
Is Healthcare too Personalized for Personalized Medicine?
Accelerating Medical Technology Innovation, Drug/Device Safety and FDA Reform: InTimeTV broadcast
FDA panel votes to retain Avandia on the market: DrugWonks celebrate; Prince Hal rails against Falstaff
"Nothing but Momentum" Life Sciences on a roll in Illinois
Life Sciences Accelerator, Drug Safety, FDA reform and other topics
FDA Report on Avandia: Implications and a "critique" of the critique
"Conversations in Biotechnology and other topics": InTimeTV interview
Has the private equity boom peaked?
Private equity boom (and bust?): Implications for the Life Sciences
Boston Scientific, Medtronic settle some defibrillator suits; is the device safety storm over?
Avandia, the Drug Safety Debate and How to Get a Nobel Prize
Patent Reform Act of 2007: Innovation, Implications and the American Inventor
Bleeding stents Is the drug-eluting stent era over?
Convergent Medical Technology: Part II - Why is it important?
Financial Incentives Can Drive New Pharmaceutical & Medical Technology Adoption: What are the Implications?
GE Healthcare acquisition of Abbott Diagnostics deal scrapped: Who could be the next buyer in line?
Biologue Chicago - Life Sciences at the Columbia Yacht Club
How Doctors Think: Implications for Life Science Business & Finance
Convergent Medical Technology: Part I - What is it?
Chief Partnership Officer: An Idea Whose Time Has Come?
The Many Surprising Implications of Hip Resurfacing Implants
FDA Reform Redux: On Business Models, Regulatory Reform and Safety
Too Few Biotech Firms in Chicago?
New Blog Launch: Independent Life Sciences Business & Investment Blog Debuts on Independence Day
Zangani Audio Webcast: Technology convergence, Personalized Medicine and Patient Safety

SAMSUNG P	RESENTATIONS (NOT INCLUDING CONFIDENTIAL INTERNAL PRESENTATIONS)
2012/11/9	"Unique Challenges in Healthcare Innovation" - Samsung Tech Conference 2012 - MOT Forum
2013/4/12	"Pride in Samsung" - Samsung Group HR Global Experienced Employee Course - GEEC
2013/5/6	"History & Vision of SAIT" - SAIT HR International Employees Training
2013/5/9	"Samsung R&D Strategy & Innovation" - SEC HRDC Global Directors Course
2013/5/21	"Samsung R&D Strategy & Innovation" - SEC HRDC Core Talent Program
2013/5/29	"Building high-performance teams" - SEC HRDC - Global Leadership Academy at HRDC
2013/6/4	"Samsung R&D Strategy & Innovation" - SEC HRDC Core Talent Program
2013/6/7	"Samsung R&D Strategy & Innovation" - SEC HRDC Global Managers Course
2013/6/11	"Samsung R&D Strategy & Innovation" - 2013 R&D Leaders Forum
2013/6/17	"Pride in Samsung" - Global HR New Global Hire Orientation (HRDC)
2013/7/2	"Samsung R&D Strategy & Innovation" - 2013 R&D Leaders Forum
2013/7/15	"Pride in Samsung" - Global HR New Global Hire Orientation
2013/8/20	"Samsung R&D Strategy & Innovation" - 2013 New Global Manager Hires
2013/8/20	"Pride in Samsung" - Global HR New Global Hire Orientation
2013/9/3	"Trends in Innovation & Technology" - Samsung Managers Academy
2013/9/4	"Samsung R&D Strategy & Innovation" - 2013 New Global Manager Hires
2013/10/21	"Pride in Samsung" - Global HR New Global Hire Orientation
2013/10/22	"Samsung R&D Strategy & Innovation" - Samsung New Graduate - New Hire Orientation
2013/11/1	"Pride in Samsung" - SHRDC Global Experienced Employee Course - New Global Hire Orientation
2013/11/5	Technical Chair Samsung Tech Conference 2013 - Future IT Forum - Convergence in Mobile Health
2013/11/18	"Pride in Samsung" - 2013 New Global Manager Hires
2013/11/25	"Samsung R&D Strategy & Innovation" - Core Talent Program
2014/03/18	"Samsung R&D Strategy & Innovation" - SELC New Hires Orientation
2014/04/1	"Bio-inspired concepts for computer vision & imaging processing" - SAIT Imaging Device Lab seminar
2014/04/15	"Samsung R&D Strategy & Innovation" - SELC New Hires Orientation
2014/10/21	"Samsung R&D Strategy & Innovation" - SELC New Hires Orientation
2014/11/4	Panel Moderator - Samsung Tech Forum, Mobile Health Panel
2015/03/6	"Protein Electrodynamics & Terahertz Medicine", Mobile Healthcare Lab Research Seminar

	S Advanced Institute of Technology (SAIT) T Journal Club (Internal)
2011/03/15	On Innovation: "Global Innovation 1000: How the Top Innovators Keep Winning" and "The 5 Myths of Innovation"
2011/03/29	Crafting R&D Project Portfolios
2011/04/12	Strategy: Steps to Developing Scenarios
2011/04/26	Building Your Company's Vision, Harvard Business Review
2011/08/23	Medical Devices: Managing the Mismatch – WHO Priority Medical Devices Project
2011/09/06	Disruptive Innovation & Healthcare
2011/10/25	Neuromorphic Systems Workshop: Conference Debrief
2011/12/13	Lean Knowledge Work
2012/07/03	Roadmapping for Technology Strategy
2012/10/23	EMBC 2012 Highlights: Conference Report
2012/12/18	The Future of Medical Imaging (RSNA'12 Conference Report)
2013/02/28	SPIE Photonics West - BiOS & SNU THz-Bio Workshop Conference Report
2013/03/20	The Laws of Technological Progress: Overview, Recent Results, Implications
2013/04/11	Megatrends: Definitions, Implications, Framework
2014/07/31	Best Practices in Industry-University Collaboration