# CURRICULUM VITAE

# Rachel Katz-Brull, PhD

ORCID: 0000-0003-4850-1616

## EXECUTIVE SUMMARY

Prof. Rachel Katz-Brull, PhD, is a scientist at Hadassah Medical Organization. She is a Professor of Imaging at the Hebrew University Faculty of Medicine and the Director of the Centre for Hyperpolarized MRI Molecular Imaging at Hadassah's Ein-Kerem campus in Jerusalem, Israel. Prof. Katz-Brull is a seasoned researcher of nuclear magnetic imaging and spectroscopy biomedical resonance (NMR/MRI/MRS) and hyperpolarized MRI. Her current research focuses on the development of dissolution-dynamic nuclear polarization (dDNP) molecular imaging agents for diagnostic medical imaging. Her group developed analogs of choline, glucose, deoxyglucose, phosphate, and <sup>15</sup>N containing molecular imaging probes for <sup>13</sup>C, <sup>31</sup>P, and <sup>15</sup>N hyperpolarized MRI with <sup>31</sup>P dDNP magnetic resonance



in solution pioneered by this group. The use of molecular imaging agents with directly bound deuterons to hyperpolarized sites as dDNP imaging agents *per se* was pioneered by this group as well and led to the first glucose and choline imaging without ionizing radiation. In the last few years her research also revolved around novel pre-clinical biological systems and investigations of in-cell metabolism using hyperpolarized magnetic resonance with specific focus on breast cancer, hepatocellular carcinoma and chronic liver disease, brain metabolism and stroke, and cardiac metabolism.

Prof. Katz-Brull graduated from the Weizmann Institute (PhD 2002) and performed her post-doctoral research at Harvard Medical School and Beth Israel Deaconess Medical Centre. During her post-doctoral research, Prof. Katz-Brull was the first to demonstrate clinical breath-hold body spectroscopy at 3T, a method that evolved to become a standard for quantification of liver fat, which had changed medical reality in the diagnosis of liver disease. Contributions of her research had also impact on HIV and cancer patients and provided new mechanisms underlying progressive multifocal leukoencephalopathy survival, human breast and renal cancer metabolism and understanding of basic human brain physiology related to blood flow. During her MSc and PhD studies, Prof. Katz-Brull focused on choline metabolism in breast cancer and in the brain. Her studies on breast cancer served as a basis for other groups in subsequent PET studies on <sup>11</sup>C- and <sup>18</sup>F labeled choline, now clinically used biomarkers, as well as targeted treatment for cancer based on choline kinase antibodies.

## HIGHER EDUCATION

1989 - 1993	Bachelor of Science (BSc) 1993 Magna Cum Laude		
	School of Chemistry, Faculty of Exact Sciences, Tel Aviv University, Israel		
1994 - 1995	Master of Science (MSc) 1995		
	Department of Chemical Physics, Weizmann Institute of Science, Israel		
1996 - 2002	Doctor of Philosophy (PhD) 2002		
	Department of Biological Regulation, Weizmann Institute of Science, Israel		

## OCCUPATION

1-Apr-2001 - 31-Jun-2004	Postdoctoral Research Fellow	
	Center for Advanced MRI, Harvard Medical School & Beth Israel Deaconess Medical Center, Boston MA, USA	
	Host: Professor Robert E. Lenkinski	
1-Jul-2004 - 31-Mar-2005	Postdoctoral Research Fellow	
	Optical Imaging, Department of Neurobiology, Weizmann Institute of Science, Israel	
	Host: Professor Amiram Grinvald	
1-Apr-2005 - 31-Aug-2006	Entrepreneur, Private (independent) inventor and business development, Rehovot, Israel	
1-Sep-2006 - ongoing	Principal Investigator and Director, Center for Hyperpolarized MRI Molecular Imaging, Department of Radiology, Hadassah-Hebrew University Medical Center, Ein-Kerem, Jerusalem, Israel	
1-Apr-2009 - 31-Oct-2011	Founder and Director of Research and Development, BrainWatch Ltd., Tel-Aviv, Israel	
1-Mar-2015 - ongoing	Tenured Scientist, Hadassah-Hebrew University Medical Center	

APPOINTMENTS AT THE HEBREW UNIVERSITY			
15-Jul-2007	Member of the Physiology Teaching Track		
1-Oct-2011	Senior Lecturer of Imaging, Faculty of Medicine		
25-Jan-2018	Academic Tenure		
25-Jan-2018	Associate Professor of Imaging, Faculty of Medicine		
09-Aug-2023	Full Professor of Imaging, Faculty of Medicine		

## SELECTED ADDITIONAL FUNCTIONS/TASKS AT THE HEBREW UNIVERSITY

2012 - 2022 Member of the MSc Theses Examination Boards for the following students: Zohar Milman (2012), Sami Abood (2013), Mor Ozeri (2021, Chair of the Examination Board), Aviel Iluz (2022), Adi Shtir (2023)

11/2013 – 11/2016 Chair, Physiology Teaching Division.

In charge of physiology teaching for undergraduate students at the Faculty of Medicine. The Physiology Division is composed of 9 frontal-instruction courses and 2 laboratory courses. The courses are given to students of Medicine, Military Medicine, Dental Medicine, Pharmaceutical Sciences, Nursing, Occupational Therapy, and Biomedical sciences. Every year the courses are taken by *ca.* 600 students in the 1<sup>st</sup> semester and *ca.* 700 students in the 2<sup>nd</sup> semester. Altogether, more than 550 academic hours per year given by a group of 20 teachers. The Chair is responsible for all lecturers' assignments. During these years of service, the physiology curriculum of four of the five associated schools (Medicine, Nursing, Pharmacy, and Biomedical sciences) had been reviewed, revised, and restructured. While the changes in the Medical and Nursing schools were in response to the schools' requests, the changes in the pharmacy and biomedical sciences schools were bottom-up changes. All the curriculum changes that were managed and implemented by Prof. Katz-Brull remained in effect till today.

11/2013 - 11/2016 Member, Teaching Committee, Medicine (as part of the role of Chair of Physiology).
11/2013 - 11/2016 Member, Biomedical Sciences Teaching Committee (as part of the role of Chair of Physiology).
11/2013 - 11/2016 Member, The Memorial Fund for Prof. Jonathan Magnes (as part of the role of Chair of Physiology).
10/2013 - 10/2014 Member of the Interdepartmental Equipment Unit Committee.
2016 - 2019 Member of the PhD follow-up committee: Oded Rosolio, a student of Prof. Alex Retzker, Racah Institute of Physics

2023 – on Member in committees for academic promotion at the Faculty of Medicine (Associate Professor level)

## SELECTED SERVICE IN OTHER ACADEMIC AND RESEARCH INSTITUTIONS

2016 Johns Hopkins University School of Medicine, USA

Expert referee for the promotion committee (Full Professor). Russell H. Morgan Department of Radiology and Radiological Science.

## 2018 Denmark Technical University, Denmark

Member of the committee for the selection of candidates for the Position of a Researcher or Senior Researcher in NMR at HYPERMAG Centre, DTU Electrical Engineering.

2019 - 2023 European Commission, Horizon 2020, FET-Open Challenging Current Thinking, FETOPEN-01-2018-2019-2020, RIA Research and Innovation action

Coordinator, Award Number 858149, AlternativesToGd, Hyperpolarised MR technologies and molecular probes as alternatives for conventional metal-containing contrast agents for MRI examinations.

# 2021 Ecole Normale Supérieure, Paris, France

Member of the thesis defense committee of David Guarin, PhD student of Prof. Daniel Abergel, MD, PhD, Laboratory of Biomolecules, Department of Chemistry.

2023 Aarhus University, Denmark

Expert referee for the promotion committee (Associate Professor). MR research centre.

# 2024 Aarhus University, Denmark

Member of the thesis defense committee of Nichlas Vous Christensen, PhD student of Prof. Lotte Bonde Bertelsen, PhD, MR research centre.

## SELECTED OTHER ACTIVITIES

## Selected extracurricular activities

Ad Hoc Reviewer for Scientific Journals such as (2007 – ongoing)

- Chemical Society Reviews
- Nature Communications
- Angewandte Chemie International Edition
- Journal of the American Chemical Society
- Chemical Communications
- Proceedings of the National Academy of Sciences USA
- Cancers
- Chemistry A European Journal
- ChemPhysChem
- Radiology
- Endocrinology, Diabetes & MetabolismNeoplasia
- Magnetic Resonance in Medicine
- NMR in Biomedicine
- Chemical Physics
- Biochemistry
- Analytical and Bioanalytical Chemistry
- Analytical Biochemistry
- Magnetic Resonance in Chemistry
- Communications Chemistry
- Magnetic Resonance
- Journal of Magnetic Resonance Open
- Biocybernetics and Biomedical Engineering

A partial list of reviews validated by Publons can be found at:

https://www.webofscience.com/wos/author/record/404247

Ad Hoc Reviewer of National and International Competitive Grant Applications (partial list)

- Natural Sciences and Engineering Research Council of Canada (NSERC)
- COST Association, European Cooperation in Science and Technology
- French National Research Agency (ANR), 1<sup>st</sup> stage selection review
- French National Research Agency (ANR), 2<sup>nd</sup> stage full review
- Agency for Science, Technology and Research (A\*STAR) Singapore
- Israel Science Foundation (ISF) Individual Research Program
- Israel Science Foundation (ISF) F.I.R.S.T program

- US-Israel Binational Science Foundation (BSF)
- Weizmann Institute of Science Technology Transfer Office
- Israel Cancer Association

# Ad Hoc Reviewer for PhD thesis

# Weizmann Institute of Science

# Ad Hoc Reviewer for International Scholarship Programs

2018 - 2020 Ontario Graduate Scholarship Program, University of Western Ontario, Ontario, Canada

# Committee member for grant funding

Member of committees in Israel's national funding bodies and authorities.

# Session chair / moderator in scientific conferences

June 4th, 2018 - Session chair, The 5th Israel Pre-ISMRM Symposium, Weizmann Institute, Rehovot

June 19th, 2018 – Moderator, Power Pitch Session, Hot Topics in MRS, Spectroscopy & Non-Proton MR, Joint Annual Meeting ISMRM-ESMRMB, Paris, France.

February 19th, 2019 – Session chair, Minerva Gentner Symposium on MR spectroscopy & molecular imaging. Weizmann Institute, Rehovot, Israel

March 14<sup>th</sup>, 2023 – Session Organizer and Chair, European Society for Molecular Imaging EMIM, Salzburg, Austria. "Hyperpolarised MR technologies and molecular probes as alternatives for conventional metal-containing contrast agents for MRI examinations – The AlternativesToGd Project".

March 16<sup>th</sup>, 2023 – Chair, European Society for Molecular Imaging EMIM, Salzburg, Austria. "MRI and MPI – Probe Chemistry".

March 12<sup>th</sup>, 2024 – Sub-chair, European Society for Molecular Imaging EMIM, Porto, Portugal. Category "Physics, Engineering & Technologies". Expert for the abstract category on "MRS Technologies (Hyperpolarization & Multinuclear)".

# Professional Memberships (1995 – on)

International Society for Magnetic Resonance in Medicine, World Molecular Imaging Society, European Society for Molecular Imaging, European Congress of Radiology

### SELECTED PRIZES AND AWARDS

1993	Bachelor of Science in Chemistry, Magna Cum Laude, Tel Aviv University.	
1995	Selected Abstract Award, Experimental Nuclear Magnetic Resonance Conference (ENC), Boston, MA, USA.	
1997	Magna Cum Laude Award, Annual Meeting of the European Society for Magnetic Resonance in Medicine and Biology (ESMRMB), Brussels, Belgium.	
1997 - 2001	Recipient of the Carol and Allan Gordon Scholarship Fund in Women's Health Research for PhD studies, Feinberg Graduate School, Weizmann Institute of Science.	
1999 - 2006	Travel stipends awarded by the International Society for Magnetic Resonance in Medicine - for participation in the Society's annual meetings in Philadelphia, PA, USA (1999); Honolulu, HA, USA (2002); Toronto, Canada (2003); Kyoto, Japan (2004); Miami Beach, FL, USA (2005); and Seattle, WA, USA (2006).	
2006	<b>Brain Research Young Investigator Award</b> for the study of "Direct detection of brain acetylcholine synthesis by magnetic resonance spectroscopy" (Paper # 11 in the list of publications). This award was given by the journal Brain Research of Elsevier B.V. Award criteria: young scientists who have done outstanding research, which is demonstrated by their articles accepted for publication in Brain Research 2005.	
2009	Outstanding Project of the Year Award to BrainWatch Ltd, awarded by RAD-BioMed at the Annual Meeting of the ILSI-BioMed, Tel Aviv, Israel.	
2013	ERC starting grant – The first and only ERC starting grant to have been awarded to an Israeli scientist working in an Israeli hospital.	
2019	Future Emerging Technologies - FET-OPEN grant - Coordinator of the AlternativesToGd consortium.	
	The only coordinator from an Israeli medical center in Horizon 2020 (all programs, 7 Years). Only 2 Israeli coordinators were selected in the FET-OPEN program of Horizon 2020 (7 Years). The consortium encompasses 10 partners from Europe and Israel.	
2023	<b>Selected Project Session</b> of the European Society for Molecular Imaging (EMIM). EMIM provided the facility to present the AlternativesToGd project, a European Comission funded project, initiated and coordinated by Rachel Katz-Brull, at the annual meeting in Salzburg, Austria.	
Awards to stu	dents under Rachel Katz-Brull's supervision and collaboration	
2012	<b>ISMRM Merit Award Magna Cum Laude</b> for the study on "In vivo imaging of hyperpolarized <sup>13</sup> C labeled choline and monitoring of metabolism" presented at the ISMRM annual meeting. Awarded to Trevor Wade.	

2020 **ECR Student Abstract Award** for the study on "Direct detection of metabolic changes in rat brain slices during perfusion arrest – implications for imaging of cerebral ischemia with hyperpolarized MR" presented at the European Congress of Radiology (ECR), Vienna, Austria. The award to David Shaul (PhD student of Rachel Katz-Brull) granted him a registration fee waiver and reimbursement on all flight and accommodation expenses.

#### SELECTED RESEARCH GRANTS

2005 Tnufa - Office of the Chief Scientist of the Ministry of Economy and Industry (Israel) 100,000 NIS to PI Rachel Katz-Brull The Abisch-Frenkel Foundation 30,000 USD to PI Rachel Katz-Brull 2007 2007 The Tchorz fund, 70,000 NIS to PI Rachel Katz-Brull (Co-PI Miri Sklair-Levy) 2007 - 2008United States - Israel Binational Science Foundation. Start-up research grant (BSF, 2006118) 64,580 USD to PI Rachel Katz-Brull. US partner: Prof. Robert Lenkinski, Harvard Medical School, Boston, USA 2007 - 2008 Dana Foundation 100,000 USD to PI Rachel Katz-Brull, New-York, New-York, USA 2008 - 2009 The German Israel Foundation. Young Scientists program (GIF, 2131-1586.5/2006) 38,250 Euro to PI Rachel Katz-Brull. 2008-2010 The Center for Complexity Science 67,000 USD/100,000 USD (CCS, GR2007-053) to PI Rachel Katz-Brull. Co-Pi: Lucio Frydman, Weizmann Institute. 2009 - 2011 Office of the Chief Scientist, Incubator Program, Rad-Biomed and BrainWatch initiative 2,200,000 NIS to PI Rachel Katz-Brull. 2010 - 2014 Israel Science Foundation (ISF, 284/10). Hyperpolarized metabolic contrast media for diagnosis of neurodegenerative diseases by MRI and the para hydrogen-induced polarization approach. 624,000 NIS to PI Rachel Katz-Brull. 2014 - 2018 European Research Council (ERC), ERC-2013-StG, 338040, Citicoline and deoxyglucose as new molecular imaging probes of DNP hyperpolarized MRI for cancer and neuroimaging. 1,650,000 Euro to PI Rachel Katz-Brull. 2016-2019 European Commission, Horizon 2020 - Research and Innovation Framework Program, H2020-PHC-2015-two-stage, and Innovation 667192-2, Research action. HYPERDIAMOND. The diamond revolution in hyperpolarized MR imaging - novel platform and nanoparticle targeted probe. 427,750/4,866,050 Euro to PI Rachel Katz-Brull. Coordinator - Martin Plenio, Ulm University, Germany 2016-2018 Co-participant in a grant submitted by Omer Bonne and partners, NATO Emerging Security Challenges Division, Multidisciplinary metrics for soldier resilience prediction and training. 39,000/399,462 Euro to PI Rachel Katz-Brull for the purpose of MRS studies. 2017 The Joint Research Fund of the Hebrew University of Jerusalem and Hadassah Medical Organization, Novel diagnosis & prediction of liver diseases using hyperpolarized <sup>[13</sup>C]pyruvic acid. 10,000 USD for the project. PI Naama Lev-Cohain, Co-PI Rachel Katz-Brull and Yuval Dor. 2018-2023 Co-participant, The Trustees of the Wohl Foundations (Institutional Equipment). Establishing the Wohl National Center for Translational Medicine (WNCTM) at Hadassah Medical Organization Ein Kerem Campus, Jerusalem. 6,500,000 USD for the National Center. 2018-2019 KAMIN Promoting Applied Research in Academia, Israel Innovation Authority, Diagnosis of cancer using glucose imaging with magnetic resonance. 290,000/660,000 NIS to PI Rachel Katz-Brull. Co-PIs: Aharon Blank, Technion, Haifa, Israel and Daniella Goldfarb and Akiva Feintuch, Weizmann Institute of Science, Rehovot, Israel. Israel Science Foundation (ISF, 1379/18), Hyperpolarized <sup>15</sup>N-labeled MRI contrast 2018-2023

agents. 1,600,000 NIS to PI Rachel Katz-Brull.

- 2019-2023 European Commission, Horizon 2020, FET-Open Challenging Current Thinking, FETOPEN-01-2018-2019-2020, RIA Research and Innovation action, Award Number 858149, AlternativesToGd, Hyperpolarised MR technologies and molecular probes as alternatives for conventional metal-containing contrast agents for MRI examinations. 440,870/3,065,957 Euro to PI Rachel Katz-Brull. Coordinator - Rachel Katz-Brull, Hadassah Medical Organization, Jerusalem, Israel. Partners: Jan Henrik Ardenkjaer-Larsen, Denmark Technical University, Denmark Damian Tyler, Oxford University, United Kingdom Kevin Brindle, University of Cambridge, United Kingdom Katharina Landfester, Max Planck Institute for Polymer Research, Germany Tanja Weil, Max Planck Institute for Polymer Research, Germany Volker Rasche, University of Ulm, Germany Francesca Reineri and Prof. Silvio Aime, University of Torino, Italy Angelo Bifone, Italian Institute of Technology, Italy European Institute for Biomedical Imaging Research (EIBIR), Austria RS2D, Mundolsheim, France & Nanalysis, Calgary, Alberta, Canada 2023 Keren Gishur 2022, Hadassah Medical Organization, Internal Competitive Fund, 60,000 NIS to PI Rachel Katz-Brull.
- 2024 2026 Ministry of Innovation, Science & Technology, Binational collaboration with Italy, , Award Number 0006244, Precision and Personalized Medicine by nanodiamonds and MRI, 379,891NIS to PI Rachel Katz-Brull. Collaborator: Angelo Bifone, University of Turin, Italy
- 2024 2026 Ministry of Health, Improving the treatment of triple negative breast cancer by monitoring treatment response *via* non-invasive, non-ionizing, metabolic imaging. 150,000 NIS PI Rachel Katz-Brull.

# Selected competitive grant support and prizes awarded to students under the supervision of Rachel Katz-Brull

2016-2019 Magna cum laude scholarship, The Faculty of Medicine, The Hebrew University, Awarded to Gal Sapir, 124,800 NIS, 4-Years, for MD/MSc and MD/PhD studies. 2017-2019 Magna cum laude scholarship, The Faculty of Medicine, The Hebrew University, Awarded to David Shaul, 62,400 NIS, 2-Years, for MD/MSc studies. 2018-2019 Lady Davis Post-Doctoral Fellowship at the Hebrew University. Awarded to Dr. Talia Harris 83,652 NIS, One Year. 2018-2022 Cum laude scholarship, The Faculty of Medicine, The Hebrew University, Awarded to Atara Nardi-Schreiber 102,600 NIS, 5-Years, for PhD studies. 2019-2023 Ze'ev Jabotinsky Scholarship - The Ministry of Science and Technology. Awarded to David Shaul, 460,000 NIS, 4-Years, for Direct PhD studies in Applied and Engineering Science. 2018-2019 Golda Meir Scholarship - The Ministry of Science and Technology. Awarded to Atara Nardi-Schreiber 80,000 NIS, One Year. Academia and industry scholarship for advancing women in science and technology. 2019-2020 Bester Scholarship for Cancer Research, Faculty of Medicine, Hebrew University.

	Awarded to Gal Sapir, 4,125 USD, One Year, for PhD studies.
2020	Sam Lazarus Prize for Excellent Study in Physiology, The Faculty of Medicine, The Hebrew University. Awarded to Gal Sapir, 800 GBP.
2020	European Congress of Radiology (ECR) Student Abstract Award to David Shaul, <i>ca.</i> 2,000 Euro.
2021	Excellence scholarship for PhD studies, Hadassah Medical Center, Research and Development Division. Awarded to Gal Sapir, 5,000 NIS.
2022	European Molecular Imaging Meeting (EMIM, Thessaloniki, Greece) 2022 Registration Grant to David Shaul, 480 Euro.
2022	Short Term Travel Scholarship, Hebrew University, Awarded to David Shaul, 3,300 NIS.

## PHARMA SUPPORTED GRANTS

## Grant support and prizes awarded to students under the supervision of Rachel Katz-Brull

- 2013 2014TEVA National Network of Excellence Awards to fund two post-doctoral positions for<br/>Dr. Lital Magid and Dr. Abed L. Azab. 70,000 USD to PI Rachel Katz-Brull.
- 2019-2020 Israeli Bioinnovators Fellowship & Mentorship by TEVA. Award to Gal Sapir in the field of Brain Disorders, 10,000 USD, One Year, for PhD studies.

## **TEACHING at HUJI**

# Supervisor or co-supervisor of master and doctoral degree students

Years	Name of	Subject	Academic
(period)	Student		Institute
01/2008 -	Hyla Allouche-	Faculty of Medicine Excellence Prize for Ph.D. Thesis	Hebrew
02/2013	Arnon	Co-supervisor: Prof. Hagai Bergman	University
		Topic: Non- invasive imaging of new MRI molecular	-
		probes	
05/2011 -	Valentina N.	Ph.D. Thesis (partial, stopped due to immigration outside	Hebrew
02/2012	Miller	Israel)	University
		Topic: Multinuclei Spectroscopy	-
01/2016 -	Atara Nardi-	Ph.D. Awarded May 10, 2021.	Hebrew
11/2020	Schreiber	Topic: Uses of nuclear magnetic resonance (NMR) at	University
		thermal equilibrium and in a hyperpolarized state for	-
		biomedical diagnostics.	
12/2017 -	Gal Sapir	Ph.D. Awarded October 6, 2021	Hebrew
05/2021		<b>Topic:</b> Development of metabolic probes for	University
		hyperpolarized MR-imaging.	-
		(Ph.D. performed during M.D. studies)	
04/2018 -	Lauren Smith	Visiting Ph.D. student from the group of Prof. Charles	University
10/2018		McKenzie, University of Western Ontario, Canada	of Western
		Topic: Hyperpolarized MRI	Ontario,
			Canada
02/2019 -	David Shaul	M.D./Ph.D. program	Hebrew
09/2023		Co-supervisor: Prof. Leo Joskowicz	University

# Doctoral (PhD) degree students:

<b>Topic:</b> Characterization of metabolic activity in the heart	
and in the brain under ischemia with hyperpolarized	
magnetic resonance biomarkers and investigation of the	
mechanism underlying their utility.	

# Master's degree students:

Years	Name of	Subject	Academic
(period)	Student		Institute
01/2008 -	Ruppen	Topic: Multinuclei Magnetic Resonance Spectroscopy -	Hebrew
04/2010	Nalbandian	Topics in Methodology Development and Clinical University	
		Applications.	
10/2015 -	Gal Sapir	M.D./M.Sc. (Tzameret M.D. studies)	Hebrew
11/2017		<b>Topic:</b> Observing cardiac metabolism with	University
		hyperpolarized nuclear magnetic resonance (NMR).	
10/2015 -	Assad Azar	<b>Topic:</b> Development of methods for determining	Hebrew
10/2018		metabolism by nuclear magnetic resonance in a	University
		hyperpolarized state and at thermal equilibrium in <i>ex</i> -	
		<i>vivo</i> viable tissues – emphasizing studies on the brain.	
10/2017 -	David Shaul	M.D./M.Sc. (for direct Ph.D.)	Hebrew
01/2019		<b>Topic:</b> Characterization of metabolic activity in the heart	University
		and in the brain under ischemia with hyperpolarized	
		magnetic resonance biomarkers and investigation of the	
		mechanism underlying their utility.	
03/2022 -	Sarah Aben-	MSc, Biomedical Sciences, Biochemistry, Metabolism &	Hebrew
ongoing	Danan	Endocrinology	University
10 / 2022	Shira Rachlin	MSc (Partial), Biomedical Sciences, Neurobiology	Hebrew
- 10/2023			University
3/2023 -	Bat-Hen	Supplemental studies for MSc, Biomedical Sciences,	Hebrew
ongoing	Avraham	Biochemistry, Metabolism & Endocrinology	University

# Supervised undergraduate students

03/2011 - 09/2014	Dr. Netanel Chendler, M.D.	M.D. Tzameret, Undergraduate research
05/2014 - 09/2015	Dr. Gal Sapir, M.D.	M.D. Tzameret, Undergraduate research
03/2015 - 09/2015	Assad Azar, M.Sc.	Engineer project, Department of Pharmaceutical engineering, The Jerusalem College of Engineering (JCE)
07/2016 - 09/2016	Dalya Pevzner, M.Sc.	Summer project, Biomedical Sciences, HUJI
07/2016 - 10/2016	Mr. Moshe Yehoshua	Summer project, Biomedical Sciences, HUJI
09 / 2022 - 06/2023	Ms. Sandra Morvay	Hadassah Academic College, Biotechnology, 3 <sup>rd</sup> year project
09 / 2022 - 06/2023	Ms. Tamar Malik	Hadassah Academic College, Biotechnology, 3 <sup>rd</sup> year project
11/2022 - 11/2023	Ms. Raghad Nees	Biomedical Sciences, HUJI, 3rd year project
10/2023 - ongoing	Ms. Hallel Azulai	Biomedical Sciences, HUJI, 3rd year project

## Mentorship and supervised basic research for clinical faculty

06/2015 - 12/2020	Dr. Naama Lev-Cohain, M.D.
12/2015 - 12-2020	Dr. Yael Adler-Levy, M.D.

# **Post-doctoral Students**

01/2008 - 01/2010	Dr. Ayelet Gamliel, PhD	Post-doctoral studies
10/2012 - 08/2014	Dr. Lital Magid, PhD	Post-doctoral studies
10/2012 - 11/2013	Dr. Abed Azab, PhD	Post-doctoral studies
09/2014 - 08/2016	Dr. Marc Jupin, PhD	Post-doctoral studies (International, France)
09/2016 - 03/2019	Dr. Talia Harris, PhD	Post-doctoral studies
11/2016 - 10/2018	Dr. SivaRanjan Uppala, PhD	Post-doctoral studies (International, India)
10/2017 - 10/2018	Dr. Benjamin Grieb, MD	Post-doctoral studies (International, Germany)
07/2018 - 06/2019	Dr. Itai Katz, PhD	Post-doctoral studies

## <u>Courses</u>

## **Undergraduate courses**

03/2009 – 03/2017. Medical Physiology I, Undergraduate core course (2<sup>nd</sup> year), Course #75205, Medicine, Dental Medicine, Military Medicine and Courses #94103 and #98124, MSc courses in Biomedical Sciences. Membrane transport and membrane potential.

03/2009 – 03/2011. Medical Physiology I, Undergraduate core course (2<sup>nd</sup> year), Course #94669, Biomedical Sciences. Membrane transport and membrane potential.

03/2013 – 06/2016. Human Physiology Part A, Undergraduate core course (1<sup>st</sup> year), Course #64308, Pharmacy. Membrane transport and membrane potential.

06/2015 – 06/2016. Workshop in Biomedical Physiology I for Biomedical Sciences, Undergraduate core course (2<sup>nd</sup> year), Course #94605 – Imaging of neurodegenerative diseases.

11/2016 – 10/2018. Human Physiology, Undergraduate core course (1<sup>st</sup> year), Course# 64310, Pharmacy, Membrane transport and membrane potential.

01/2017 – 03/2019. Cell Biology, Undergraduate core course (1<sup>st</sup> year), Course #96114, Medicine, Dental Medicine, Military Medicine. Topic: Membrane transport and membrane potential.

03/2017 - ongoing. Introduction to the Healthy Human Body, Undergraduate core course (1<sup>st</sup> year), Course #96116, Medicine, Dental Medicine, Military Medicine. Topic: Introduction to Medical Imaging.

03/2018 – 06/2018. Physiology, Undergraduate core course (1<sup>st</sup> year), Course #91108, Nursing, Membrane transport and membrane potential.

10/2018 – ongoing. Advanced Medical Imaging and Research, Elective graduate and undergraduate course, Course # 94846, Faculty of Medicine. Open to undergraduate students of medicine and pharmacy, and graduate students of biomedical sciences. Prof. Katz-Brull is the founder and the main teacher of this course.

10/2019 – ongoing. Chemistry and Physics of Advanced Medical Imaging and Research Imaging, Elective graduate and undergraduate course, Course # 69920, Faculty of Natural Sciences, Chemistry; Faculty of Medicine, Pharmacological Sciences; School of Computer Science and Engineering, Computational Biology and Computer Sciences. Prof. Katz-Brull is the founder and the sole teacher of this course.

## Graduate courses

10/2018 – ongoing. Advanced Medical Imaging and Research, Elective graduate and undergraduate course, Course # 94846, Faculty of Medicine. Open to undergraduate students of medicine and pharmacy, and graduate students of biomedical sciences. Prof. Katz-Brull is the founder and the main teacher of this course. This course is also listed in the undergraduate section above.

10/2019 - ongoing. Chemistry and Physics of Advanced Medical Imaging and Research Imaging, Elective graduate and undergraduate course, Course # 69920, Faculty of Natural Sciences, Chemistry; Faculty of Medicine, Pharmacological Sciences; School of Computer Science and Engineering, Computational Biology and Computer Sciences. Prof. Katz-Brull is the founder and the sole teacher of this course. This course is also listed in the undergraduate section above.

## **Other – Clinical courses**

10/2010 – 12/2016 Medical Imaging, Graduate core course (5<sup>th</sup> year), Course #96825, Medicine, clinical course, Basics principles of MRI contrast and contrast agents.

## SELECTED TEACHING IN OTHER INSTITUTIONS

# Israel Radiological Association (ISRA)

05/2014 – 05/2015. Annual course of 1-2 days - MRI physics for radiology residents. The course is attended by radiology residents from all of the hospitals in Israel, about 40 residents each year.

4/2023 – ongoing. Annual 6-day course in medical imaging physics to Residents in Radiology from all Israeli Hospitals. The course covers all clinical medical imaging technologies.

## School for Roentgen Technology and Medical Imaging, Bar-Ilan University and Hadassah Medical Center

4/2023. Annual 9-day course in medical imaging physics for undergraduate students of Roentgen Technology and Medical Imaging. The course covers all clinical medical imaging technologies.

12/2023 – ongoing. Medical imaging, photography course for second- and third-year students. All medical imaging technologies

03/2024 – on. Medical imaging, photography course for first year students. Basic X-ray technologies, X-ray imaging, mammography, fluoroscopy.

## Weizmann Institute of Science, Feinberg Graduate School

7/2023 – ongoing Course name: Translational Cancer Research. A 1-hour lecture on the physics of medical imaging related to cancer detection and treatment monitoring.

## LIST OF PUBLICATIONS

## **DOCTORAL DISSERTATION**

Master's Dissertation. Choline metabolism in human breast cancer cells and tumors: in vivo NMR studies. The dissertation is published in the Library Catalog of the Weizmann Institute of Science.) Advisor: Professor Hadassa Degani. MSc awarded by the Weizmann Institute of Science in 1995.

**Doctoral Dissertation.** Choline in breast cancer and in the aging brain: multinuclear magnetic resonance spectroscopy studies. The dissertation is published in the Library Catalog of the Weizmann Institute of Science.) Advisor: Professor Hadassa Degani. PhD awarded by the Weizmann Institute of Science in 2002.

### **BOOKS EDITED**

Katz-Brull R. Member of the Editorial Board, Supplementary Issue: New concepts in magnetic resonance as applied to cellular and in vivo applications, Magnetic Resonance Insights, Sendhil Velan, Editor in Chief, Open Access, (2015)

## **CHAPTERS IN COLLECTIONS**

Lenkinski RE and Katz-Brull R. Breast MR Spectroscopy. In: Morris E and Liberman L Eds, Breast 1. MRI: Diagnosis and Intervention. ISBN: 0387219978, Springer-Verlag, New York (2004)

2. Allouche-Arnon H, Arazi-Kleinman T, Fraifeld S, Uziely B, Katz-Brull R. In Comprehensive Biomedical Physics. Belkic D and Belkic K Eds. Magnetic Resonance Imaging and Spectroscopy Imaging, Chapter 3.19 MRS of the breast. Pages 299-314, http://dx.doi.org/10.1016/B978-0-444-53632-7.00320-8 (2014)

## ARTICLES AND SELECTED PRIMARY DATA ARCHIVES

Katz-Brull R and Degani H. (1996) Kinetics of choline transport and phosphorylation in human breast cancer cells; NMR application of the zero trans method. Anticancer Res. 16: 1375-1380. PMID: 8694504 (FREE ACCESS)

Katz-Brull R, Margalit R, Bendel P, Degani H. (1998) Choline metabolism in breast cancer; <sup>2</sup>H, <sup>13</sup>C & <sup>31</sup>P NMR studies of cells and tumors. Magn. Reson. Mater. Phys. 6: 44-52. DOI: 10.1007/BF02662511 (FREE ACCESS)

Katz-Brull R, Margalit R, Degani H. (2001) Differential routing of choline in implanted breast cancer and normal organs. Magn. Reson. Med. 46: 31-38. DOI: 10.1007/BF02662511 (OPEN ACCESS)

Katz-Brull R, Koudinov A, and Degani H. (2002) Choline in the aging brain. Brain Res. 951(2):158-165. DOI: 10.1016/s0006-8993(02)03155-4

Katz-Brull R, Seger D, Rivenson-Segal D, Rushkin E, and Degani H. (2002) Metabolic markers of breast cancer: enhanced choline metabolism and reduced choline-ether-phospholipid synthesis. Cancer Res. 62(7):1966-1970.

PMID: 11929812 (OPEN ACCESS)

Katz-Brull R, Rofsky NM, and Lenkinski RE. (2003) Breathhold abdominal and thoracic proton magnetic resonance spectroscopy at 3T. Magn. Reson. Med. 50:461-467. DOI: 10.1002/mrm.10560 (OPEN ACCESS)

Katz-Brull R and Lenkinski RE. (2004) Frame-by-frame PRESS 1H-MRS of the brain at 3T: The effects of physiological motion. Magn. Reson. Med. 51:184-187. DOI: 10.1002/mrm.10670 (OPEN ACCESS)

Katz-Brull R, Lenkinski RE, Du Pasquier RA, and Koralnik IJ. (2004) Elevation of myo-Inositol is associated with disease containment in progressive multifocal leukoencephalopathy. Neurology 63(5):897-900. DOI: 10.1212/01.wnl.0000137420.58346.9f

Katz-Brull R, Rofsky NM, Morrin M, Pedrosa I, George DJ, Michaelson MD, Marquis RP, Maril M, Noguera C, and Lenkinski RE. (2005) Decrease in free cholesterol and fatty acids unsaturation in renal cell carcinoma, demonstrated by breath hold magnetic resonance spectroscopy. Am. J. Physiol.-Renal Physiol. 288(4):F637-641.

DOI: 10.1152/ajprenal.00140.2004 (OPEN ACCESS)

Katz-Brull R, Koudinov AR, and Degani H. (2005) Direct detection of brain acetylcholine synthesis by magnetic resonance spectroscopy. Brain Res. 1048(1-2):202-210. DOI: <u>10.1016/j.brainre</u>s.2005.04.080

Katz-Brull R, Alsop DC, Marquis RP, and Lenkinski RE (2006) Limits on activation induced temperature and metabolic changes in the human primary visual cortex. Magn. Reson. Med. 56(2):348-355. DOI: 10.1002/mrm.20972 (OPEN ACCESS)

Lima MA, Katz-Brull R, Lenkinski RE, Nunez R, Feinrider D, and Koralnik IJ. (2007) Remission of progressive multifocal leukoencephalopathy and primary central nervous system lymphoma in an HIVinfected patient. Eur. J. Neurol. 14(6):598-602. DOI: 10.1111/j.1468-1331.2007.01820.x

Edvardson S, Korman SH, Livne A, Shaag A, Saada A, Nalbandian R, Allouche-Arnon H, Gomori JM, and Katz-Brull R. (2010) L-arginine: glycine amidinotransferase (AGAT) deficiency: clinical presentation and response to treatment in two patients with a novel mutation. Mol. Genet. Metab. 101(2-3):228-32. DOI: 10.1016/j.ymgme.2010.06.021

Gamliel A, Allouche-Arnon H, Nalbandian R, Barzilay CM, Gomori JM, Katz-Brull R. (2010) An apparatus for production of isotopically and spin enriched hydrogen for induced polarization studies. Appl. Magn. Reson. 39:329-345. DOI: 10.1007/s00723-010-0161-9

Allouche-Arnon H, Gamliel A, Barzilay CM, Nalbandian R, Gomori JM, Karlsson M, Lerche MH, and Katz-Brull R. (2011) A hyperpolarized choline molecular probe for monitoring acetylcholine synthesis. Contrast Media Mol. Imaging 6(3):139-147. DOI: 10.1002/cmmi.418 (OPEN ACCESS)

Allouche-Arnon H, Lerche MH, Karlsson M, Lenkinski RE, and Katz-Brull R. (2011) Deuteration of a molecular probe for DNP hyperpolarization - a new approach and validation for choline chloride. Contrast Media Mol. Imaging 6 (6): 499-506. DOI: 10.1002/cmmi.452 (OPEN ACCESS)

Allouche-Arnon H, Wade T, Friesen-Waldner L, Miller VN, Gomori JM, Katz-Brull R, McKenzie CA. (2013) In vivo magnetic resonance imaging of glucose – initial experience. <u>Contrast Media Mol. Imaging</u> 8(1):72-82.

DOI: <u>10.1002/cmmi.1497 (OPEN ACCESS)</u>

Allouche-Arnon H, Gamliel A, Sosna J, Gomori JM, Katz-Brull R. (2013) In vitro visualization of betaine aldehyde synthesis and oxidation using hyperpolarized magnetic resonance spectroscopy. <u>Chem.</u> <u>Commun</u>. 49 (63), 7076-7078. DOI: <u>10.1039/c3cc42542h</u>

Allouche-Arnon H, Hovav Y, Friesen-Waldner L, Sosna J, Gomori JM, Vega S, and Katz-Brull R. (2014) Quantification of rate constants for successive enzymatic reactions with DNP hyperpolarized MR. <u>NMR</u> <u>Biomed.</u> 27 (6), 656-662. DOI: 10.1002/nbm.3102

Friesen–Waldner LJ, Wiens CN, Wade TP, Thind K, Sinclair KP, Hovav Y, Gomori JM, Sosna J, McKenzie CA<sup>#</sup>, and Katz-Brull R<sup>#</sup>. (2014) Direct enzyme-substrate affinity determination by real-time hyperpolarized <sup>13</sup>C-MRS. <u>Chem. Commun</u>. 50 (89), 13801-13804. <sup>#</sup> - Equal contribution. DOI: <u>10.1039/c4cc05418k</u>

Friesen-Waldner L, Wade T, Thind K, Chen AP, Gomori JM, Sosna J, McKenzie CA, and Katz-Brull R. (2015) Hyperpolarized choline as an MR imaging molecular probe: feasibility of *in vivo* imaging in a rat model. J. Magn. Reson. Imaging 41(4):917-23. DOI: <u>10.1002/jmri.24659 (OPEN ACCESS)</u>

Jupin M, Gamliel A, Hovav Y, Sosna J, Gomori JM, and Katz-Brull R. (2015) Application of the steady-state variable nutation angle method for faster determinations of long  $T_1s$  – an approach useful for the design of hyperpolarized MR molecular probes. <u>Magn. Reson. Insights</u> 8(Suppl 1):41-47.

Gamliel A, Chendler N, Gomori JM, Sosna J, and Katz-Brull R. (2015) The sensitivity of phosphocholine <sup>13</sup>C chemical shifts to pH. <u>Appl. Magn. Reson</u>. 47(1): 111-120. DOI:10.1007/s00723-015-0734-8

Banne E, Meiner V, Shaag A, Katz-Brull R, Gamliel A, Korman S, Horowitz S, Plesser M, Frumkin A, Zilkha A, Kapuller V, Arbell D, Cohen E, Eventov-Friedman S. (2016) Transaldolase deficiency: A new case expands the phenotypic spectrum. J. Inherit. Metab. Dis. Rep. 26: 31–36.

Grigoletto J, Puka K, Gamliel A, Komisarov D, Katz-Brull R, Richter-Landsberg C, Sharon R. (2017) Higher levels of myelin phospholipids in brains of neuronal α-Synuclein transgenic mice precede myelin loss. <u>Acta Neuropathol. Commun.</u> 5(1):37.

DOI: <u>10.1186/s40478-017-0439-3</u> (OPEN ACCESS)

Nardi-Schreiber A, Gamliel A, Harris T, Sapir G, Sosna J, Gomori JM, and Katz-Brull R. (2017) Biochemical phosphates observed using hyperpolarized <sup>31</sup>P in physiological aqueous solutions. <u>Nat. Commun.</u> 8(1): 341.

DOI: <u>10.1038/s41467-017-00364-3</u> (OPEN ACCESS)

Nardi-Schreiber A, Sapir G, Gamliel A, Kakhlon O, Sosna J, Gomori JM, Meiner V, Lossos A, and Katz-Brull R. (2017) Defective ATP breakdown activity related to an ENTPD1 gene mutation demonstrated using <sup>31</sup>P NMR. <u>Chem. Commun.</u> 53: 9121 – 9124. DOI: <u>10.1039/c7cc00426e</u> Harris T, Gamliel A, Uppala S, Nardi-Schreiber A, Sosna J, Gomori JM, and Katz-Brull R. (2018) Longlived <sup>15</sup>N hyperpolarization and rapid relaxation as a potential basis for repeated first pass perfusion imaging – marked effects of deuteration and temperature. <u>ChemPhysChem</u> 19: 2148–2152. DOI: <u>10.1002/cphc.201800261</u>

Harris T, Azar A, Sapir G, Gamliel A, Nardi-Schreiber A, Sosna J, Gomori JM, and Katz-Brull R. (2018) Realtime *ex-vivo* measurement of brain metabolism using hyperpolarized [1-<sup>13</sup>C]pyruvate. <u>Sci. Rep.</u> 8:9564; 8 DOI: <u>10.1038/s41598-018-27747-w (OPEN ACCESS)</u>

Harris T, Gamliel A, Sosna J, Gomori JM, and Katz-Brull R. (2018) Impurities of [1-<sup>13</sup>C]pyruvic acid and a method to minimize their signals for hyperpolarized pyruvate metabolism studies. <u>Appl. Magn. Reson.</u> 49(10):1085–1098. DOI: 10.1007/s00723-018-1030-1

Gamliel A, Uppala S, Sapir G, Harris T, Nardi-Schreiber A, Shaul D, Sosna J, Gomori JM, and Katz-Brull R. (2018) Hyperpolarized [<sup>15</sup>N]nitrate as a potential long lived hyperpolarized contrast agent for MRI. J. <u>Magn. Reson.</u> 299: 188–195. DOI: <u>10.1016/j.jmr.2019.01.001</u> Primary data for this publication are available at: https://zenodo.org/record/7711616#.ZAmpWnZBw2w

Lev-Cohain N, Sapir G, Harris T, Azar A, Gamliel A, Nardi-Schreiber A, Uppala S, Sosna J, Gomori JM, and Katz-Brull R. (2019) Real-time ALT and LDH activities determined in viable precision-cut mouse liver slices using hyperpolarized [1-<sup>13</sup>C]pyruvate – implications for studies on biopsied liver tissues. <u>NMR Biomed</u>. 32:e4043. DOI: 10.1002/nbm.4043

Uppala S, Gamliel A, Harris T, Sosna J, Gomori JM, Jerschow A, and Katz-Brull R. (2019) <sup>1</sup>H-decoupling and isotopic labeling for the measurement of the longitudinal relaxation time of hyperpolarized <sup>13</sup>C-methylenes in choline analogs. <u>Isr. J. Chem.</u> 59: 1–7. DOI: <u>10.1002/ijch.201900016</u>

Adler-Levy Y, Nardi-Schreiber A, Harris T, Shaul D, Uppala S, Sapir G, Lev-Cohain N, Sosna J, Goldberg SN, Gomori JM, and Katz-Brull R. (2019) In-cell determination of lactate dehydrogenase activity in a luminal breast cancer model – *ex vivo* investigation of excised xenograft tumor slices using dDNP hyperpolarized [1-<sup>13</sup>C]pyruvate. <u>Sensors</u>, 19(9): 2089. DOI: 10.3390/s19092089 (OPEN ACCESS)

Sapir G, Harris T, Uppala S, Nardi-Schreiber A, Sosna J, Gomori JM, and Katz-Brull R. (2019) [ ${}^{13}C_6,D_8$ ]2-deoxyglucose phosphorylation by hexokinase shows selectivity for the  $\beta$ -anomer. <u>Sci. Rep.</u> 9:19683. DOI: <u>10.1038/s41598-019-56063-0</u> (OPEN ACCESS)

Harris T, Gamliel A, Nardi-Schreiber A, Sosna J, Gomori JM, and Katz-Brull R. (2020) The effect of Gadolinium doping in [<sup>13</sup>C<sub>6</sub>,<sup>2</sup>H<sub>7</sub>]glucose formulations on <sup>13</sup>C dynamic nuclear polarization at 3.35T. <u>ChemPhysChem</u> 21:1–7 DOI: 10.1002/cphc.201900946

Harris T, Uppala S, Lev-Cohain N, Adler-Levy Y, Shaul D, Nardi-Schreiber A, Sapir G, Azar A, Gamliel A, Sosna J, Gomori JM, and Katz-Brull R. (2020) Hyperpolarized product selective saturating-excitations for determination of changes in metabolic reaction rates in real-time. <u>NMR Biomed</u>. e4189.

# DOI: <u>10.1002/n</u>bm.4189

Kreis F, Wright AJ, Somai V, Katz-Brull R, Brindle KM. (2020) Increasing the sensitivity of hyperpolarized [<sup>15</sup>N<sub>2</sub>]urea detection by serial transfer of polarization to spin-coupled protons. Magn. Reson. Med. 84:1844– 1856

DOI: 10.1002/mrm.28241 (OPEN ACCESS)

Uppala S, Gamliel A, Sapir G, Sosna J, Gomori JM, and Katz-Brull R. (2020) Observation of glucose-6phosphate anomeric exchange in real-time using dDNP hyperpolarised NMR. RSC Adv., 10:41197-41120 DOI: 10.1039/d0ra08022e (OPEN ACCESS)

Shaul D, Azar A, Sapir G, Uppala S, Nardi-Schreiber A, Gamliel A, Sosna J, Gomori JM, and Katz-Brull R. (2021) Correlation between LDH/PDH activities ratio and tissue pH in the perfused mouse heart - a potential non-invasive indicator of cardiac pH provided by hyperpolarized magnetic resonance. NMR Biomed. 34:e4444

DOI: 10.1002/nbm.4444

Primary data for this publication are available at: https://zenodo.org/record/8200397

Lev-Cohain N, Sapir G, Uppala S, Nardi-Schreiber A, Goldberg SN, Adler-Levy Y, Sosna J, Gomori JM, and Katz-Brull R. (2021) Differentiation of heterogeneous mouse liver from HCC by hyperpolarized <sup>13</sup>C magnetic resonance. Sci. 3(1):8 DOI: 10.3390/sci3010008 (OPEN ACCESS)

Shaul D, Grieb B, Sapir G, Uppala S, Sosna J, Gomori JM, and Katz-Brull R. (2021) The metabolic representation of ischemia in rat brain slices - a hyperpolarized <sup>13</sup>C magnetic resonance study. <u>NMR</u> Biomed. e4509. DOI: 10.1002/nbm.4509

Primary data for this publication are available at: https://doi.org/10.5281/zenodo.10252973

Sapir G, Shaul D, Lev-Cohain N, Sosna J, Gomori JM, and Katz-Brull R. (2021) LDH and PDH activities in the ischemic brain and the effect of reperfusion - An ex vivo MR study in rat brain slices using hyperpolarized [1-13C]pyruvate. Metabolites 11, 210. DOI: 10.3390/metabo11040210 (OPEN ACCESS)

Grieb B, Uppala S, Sapir G, Shaul D, Gomori JM, and Katz-Brull R. (2021). Curbing action potential generation or ATP-synthase leads to a decrease in in-cell pyruvate dehydrogenase activity in rat cerebrum slices. Sci. Rep. 11:10211.

DOI: 10.1038/s41598-021-89534-4 (OPEN ACCESS)

Sapir G, Steinberg DJ, Aqeilan RI, and Katz-Brull R. (2021) Real-time non-invasive and direct determination of lactate dehydrogenase activity in cerebral organoids - a new method to characterize the metabolism of brain organoids? Pharmaceuticals 14: 878. DOI: 10.3390/ph14090878 (OPEN ACCESS)

Shaul D, Grieb B, Lev-Cohain N, Sosna J, Gomori JM, and Katz-Brull R. (2022) Accumulation of 3-APP in the ex vivo brain - observed by <sup>31</sup>P NMR. NMR Biomed. e4721 DOI: 10.1002/nbm.4721 (OPEN ACCESS)

Primary data for this publication are available at: https://doi.org/10.5281/zenodo.10252352

Katz-Brull R. (2022) Tolerance of rodents to an intravenous bolus injection of sodium nitrate in a highconcentration. Biology 11(5): 794.

DOI: 10.3390/biology11050794 (OPEN ACCESS)

Gamliel A, Shaul D, Gomori JM, and Katz-Brull R. (2022) Signal enhancement of hyperpolarized <sup>15</sup>N sites in solution - Increase in solid-state polarization at 3.35T and prolongation of relaxation in deuterated water mixtures. <u>NMR Biomed.</u> e4787 DOI: 10.1002/nbm.4787 (OPEN ACCESS)

Primary data for this publication are available at: https://zenodo.org/record/7551320#.Y8INEXZByUl

Shaul D, Sapir G, Lev-Cohain N, Sosna J, Gomori JM, and Katz-Brull R. (2023) Investigating cardiac metabolism in the isolated perfused mouse heart with hyperpolarized [1-<sup>13</sup>C]pyruvate and <sup>13</sup>C/<sup>31</sup>P NMR spectroscopy. J. Vis. Exp. e63188. DOI: 10.3791/63188

Shaul D, Lev-Cohain N, Sapir G, Sosna J, Gomori JM, Joskowicz L, and Katz-Brull R. (2023) Real-time influence of intracellular acidification and NHE1 inhibition on in-cell pyruvate metabolism in the perfused mouse heart – A <sup>31</sup>P- and hyperpolarized <sup>13</sup>C-NMR study. <u>NMR Biomed.</u> e4993. DOI:10.1002/nbm.4993

Primary data for this publication are available at: https://doi.org/10.5281/zenodo.10004563

Rooney CHE, Gamliel A, Shaul D, Tyler DJ, Grist JT, and Katz-Brull R. (2023) Directly bound deuterons increase X-nuclei hyperpolarization using dynamic nuclear polarization. ChemPhysChem 24(18): e202300144.

DOI: 10.1002/cphc.202300144

Primary data for this publication are available at: <u>https://zenodo.org/record/7625142#.Y-Tr13ZBxPY</u>

## **REVIEWS AND EDITORIALS**

Katz-Brull R, Lavin PT, and Lenkinski RE. (2002) The clinical utility of proton MRS in characterizing breast lesions. <u>INCI-J. Natl. Cancer I.</u> (16):1197-1203. (Review and Meta-Analysis). DOI: <u>10.1093/jnci/94.16.1197</u> (OPEN ACCESS)

Martin M, Albensi B, Cross A, Katz-Brull R, Thiessen J, King S, Lin A (2015) New concepts in magnetic resonance as applied to cellular and in vivo applications. <u>Magn. Reson. Insights.</u> 8(Suppl 1):49-52 (Editorial).

DOI: 10.4137/MRI.S37997 (OPEN ACCESS)

Hövener Jan-Bernd, Pravdivtsev AN, Kidd B, Bowers CR, Glöggler S, Kovtunov KV, Plaumann M, Katz-Brull R, Buckenmaier K, Jerschow A, Reineri F, Theis T, Shchepin RV, Wagner S, Bhattacharya P, Zacharias NM, and Chekmenev EY (2018) Parahydrogen-based Hyperpolarization for Biomedicine. <u>Angew. Chem.</u> <u>Int. Ed.</u> 57: 11140–11162. (Review) DOI: <u>10.1002/anie.201711842</u>

### PATENTS

1. Katz-Brull R (2005) Magnetic resonance imaging and spectroscopy means and methods thereof. US2008287774 AA, WO07052274 A2, Patent granted: AU2006310100.

2. Katz-Brull R (2009) Isotopically labeled neurochemical agents and uses thereof for diagnosing conditions and disorders. US2012156139, WO11024156

3. Katz-Brull R, Barzilay CM, Gomori JM, Gamliel A. (2010) Production of isotopically and spin enriched hydrogen for induced polarization studies. US2011262346

4. Gomori JM, Allouche-Arnon H, and Katz-Brull R (2010) Isotopically labeled deoxy-glucose and derivatives thereof, compositions comprising them and used thereof. US2013230468, WO12056447, Patents granted: IL225948, US US10814018.

5. Katz-Brull R, and Gomori JM (2011) Isotopically labeled CDP-choline and uses thereof US2014099262, WO12164563

6. Gamliel A, Harris T, Uppala S, Sapir G, Sosna J, Gomori JM, Katz-Brull R. (2019) Non-metallic magnetic resonance contrast agent. US2020345868, WO19145955, Patent granted: US11771779.

7. Katz-Brull R, Sosna J, Gomori MJ (2023) Diagnostic agents and uses thereof. Provisional US patent application.

## SELECTED CONFERENCES

## Selected invited lectures

\* = speaker

\*Katz-Brull R. (2002) *Clinical MRS at a high magnetic field*. Department of Radiology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2006) *Current and future role of MRS in brain studies*. Department of Applied Medical Physics, Tel Aviv University, Tel Aviv, Israel

\*Katz-Brull R. (2006) *Current and future role of MRS in brain studies*. Department of Neurobiology and Ethology, Faculty of Science and Science Education, Haifa University, Haifa, Israel

\*Katz-Brull R. (2006, November 5<sup>th</sup>) *Monitoring of acetylcholine synthesis in brain slices by NMR*, BRAINS unit, Lund University, Lund, Sweden

\*Katz-Brull R. (2007) *Hyperpolarized MRI and MRS biomarkers*. Department of Gene Therapy, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2007) *Hyperpolarized MRI and MRS biomarkers*. Departments of Physiology and Pharmacology, Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

\*Katz-Brull R. (2008) *Hyperpolarized MRI / MRS biomarkers – A new platform for non-invasive biochemical monitoring*. Pediatric Neurology Unit, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2008, January 30<sup>th</sup>) *Hyperpolarized MRI / MRS biomarkers – a new platform for noninvasive biochemical monitoring*. MRI Business and Development, Siemens Medical Systems, Erlangen, Germany

\*Katz-Brull R. (2008, May 8<sup>th</sup>) *Hyperpolarized MRI / MRS biomarkers.* Siemens Workshop on Hyperpolarization at the Annual Meeting of the International Society for Magnetic Resonance in Medicine, Toronto, Canada

\*Katz-Brull R. (2009, June 15th) *BrainWatch*. Rad Biomed 1st place award for promising start-up company, Tel-Aviv, Israel

\*Katz-Brull R. (2009, June 25th) *Hyperpolarized Contrast Agents,* Medical Physics, Department of Radiology, University Medical Center Freiburg, Freiburg, Germany

\*Katz-Brull R. (2009, December 27th) Hyperpolarized choline. Albeda Research Laboratories, Copenhagen, Denmark

\*Katz-Brull R. (2010, April 7th) *The Center for Hyperpolarized Molecular Imaging*. Clinical Conference, Presentation of the Department of Radiology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2010, May 9th) *Deuterated hyperpolarized molecular probes*. Albeda Research Laboratories, Copenhagen, Denmark

\*Katz-Brull R. (2010, June 1st) *Metabolic molecular probes for MRI*. Magnetic Resonance Club, Departments of Chemistry and Biomedical Engineering, Tel Aviv University, Tel Aviv, Israel

\*Katz-Brull R. (2010, June 9<sup>th</sup>) *Metabolic molecular probes for MRI*. Annual Meeting of the Israeli Magnetic Resonance Society, Bar Ilan University, Ramat Gan, Israel

\*Katz-Brull R. (2010, December 19th) Non Invasive Visualization of Enzymatic Reactions – Neurotransmitter Synthesis and Oxidative Metabolism. Department of Medical Neurobiology, Faculty of Medicine, Hebrew University, Jerusalem, Israel

\*Katz-Brull R. (2011, February 2<sup>nd</sup>) *Hyperpolarized Molecular Imaging*. Diagnostic Imaging Research night, Departments of Radiology and Nuclear Medicine, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2011, March 10<sup>th</sup>) *Non invasive visualization of enzymatic reactions – neurotransmitter synthesis and oxidative metabolism,* Department of Chemical Physics, Weizmann Institute, Rehovot, Israel

\*Allouche-Arnon H and Katz-Brull R. (2011, March 30th) *Non Invasive Visualization of Enzymatic Reactions – Neurotransmitter Synthesis and Oxidative Metabolism.* Clinical Conference, Presentation of the Department of Radiology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2011, March 11<sup>th</sup>) *Hyperpolarized metabolic imaging*. Department of Medical Biophysics, The University of Western Ontario, London, Ontario, Canada

\*Katz-Brull R. (2011, July 20th) *Hyperpolarized choline and betaine*. Department of Medical Biophysics, The University of Western Ontario, London, Ontario, Canada

\*Katz-Brull R. (2012, February 21st) *In vivo spectroscopy using hyperpolarized choline*. Centro Ricerche Bracco, Bracco Imaging SpA, Colleretto Giacosa, Italy

Allouche-Arnon H, \*Wade T, Katz-Brull R, Friesen Waldner L, Miller VN, Gomori JM, McKenzie CA. (2012, May 10<sup>th</sup>) *In vivo magnetic resonance imaging of glucose*. Flash talk invited by the Dynamic NMR / Hyperpolarized Media Study Group. A full presentation was given as well and is listed in the Oral Presentations section. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia.

\*Katz-Brull R. (2012, July 16<sup>th</sup>) *Hyperpolarized choline and hyperpolarized glucose*. Department of Medical Biophysics, The University of Western Ontario, London, Ontario, Canada

\*Katz-Brull R. (2012, October 12<sup>th</sup>) *Choline and glucose molecular probes for DNP hyperpolarized MRI and spectroscopy,* Seminar on DNP Hyperpolarization, Mossakowski Medical Research Centre, Warsaw, Poland

\*Katz-Brull R. (2015, June 29<sup>th</sup>) *Hyperpolarized MRI – A pathway to metabolic imaging.* The Semiannual Conference of the Israel Radiological Association, Ramat Gan, Israel

\*Katz-Brull R. (2015, October 22<sup>nd</sup>) *Direct enzyme-substrate affinity determination by real-time hyperpolarized* <sup>13</sup>*C-MRS*, 13<sup>th</sup> Annual Congress of International Drug Discovery Science & Technology, Therapy and EXPO-2015, Beijing, China

\*Katz-Brull R. (2016, March 10<sup>th</sup>) *Hyperpolarized MRI as means for metabolic imaging*. Department of Chemical Physics, Weizmann Institute, Rehovot, Israel

\*Katz-Brull R. (2016, March 27<sup>th</sup>) *Molecular Imaging Probes for Hyperpolarized MRI and MRS*. PreISMRM symposium, Israeli Chapter of the ISMRM, Weizmann Institute, Rehovot, Israel

\*Katz-Brull R. (2016, June 22<sup>th</sup>) *Hyperpolarized MRI – a pathway to metabolic imaging.* Annual Meeting of the Israeli Magnetic Resonance Community, Weizmann Institute, Rehovot, Israel

\*Katz-Brull R. (2017, March 2<sup>nd</sup>) *Available and potential hyperpolarised molecular targets.* European Congress of Radiology (ECR), New Horizons Sessions, Session NH 5, Hyperpolarised MRI: imaging tissue metabolism in real time. Vienna, Austria

\*Harris T, Azar A, Sapir G, Gamliel G, Nardi-Schreiber A, Sosna J, Gomori JM, and Katz-Brull R. (2018, August 30<sup>th</sup>) *Real-time ex vivo measurement of brain metabolism using hyperpolarized* [1-<sup>13</sup>C]*pyruvate.* International Society for Magnetic Resonance in Medicine (ISMRM) Virtual Meeting Series of the Hyperpolarized Media Study Group, Topic of the Meeting: Emerging Applications of Hyperpolarization.

\*Katz-Brull R. (2019, January 31st) *Metabolic imaging of the brain*, The Division of Brain Medicine, Hadassah Medical Center, Jerusalem, Israel

\*Katz-Brull R. (2019, January 22<sup>nd</sup>) *New indicators of liver disease offered by monitoring the metabolism of hyperpolarized substrates*. French-Israel Symposium on Magnetic Resonance, Weizmann Institute, Rehovot, Israel

\*Katz-Brull R. (2019, February 19<sup>th</sup>) *What can we learn from studies of hyperpolarized substrate metabolism in rodent brain slices.* Minerva Gentner Symposia on MR spectroscopy & molecular imaging. Weizmann Institute, Rehovot, Israel

\*Katz-Brull R. (2019, August 14<sup>th</sup>) *Novel probes and methodologies for hyperpolarized MR.* Department of Physiology, Anatomy & Genetics, Oxford University, Oxford, UK

\*Sapir G, Shaul D, Lev-Cohain N, Sosna J, Gomori JM, and Katz-Brull R. (2022, April 19<sup>th</sup>) *LDH and PDH activities in the ischemic brain and the effect of reperfusion – An ex vivo MR study in rat brain slices using hyperpolarized* [1-<sup>13</sup>C]*pyruvate*. Department of Radiology and Biomedical Imaging, University of California in San Francisco (UCSF), San Francisco, CA, USA (online meeting)

\*Katz-Brull R. (2022, July 16<sup>th</sup>) *Alternatives to gadolinium: developing an alternative to gadolinium-based contrast agents (GBCAs).* European Congress of Radiology (ECR), Session OF 18b – Safety in radiology: advancing medical imaging to the next level with EIBIR support. Vienna, Austria

\*Katz-Brull R. (2022, September 13<sup>th</sup>) *Introduction to the AlternativesToGd project and hyperpolarized MR studies in perfused tissues.* Organized by Prof. Kevin M. Brindle, Cancer Research UK Cambridge Institute, Li Ka Shing Centre, and Department of Biochemistry, University of Cambridge, Cambridge, UK

\*Katz-Brull R. (2023, January 8<sup>th</sup>) *Hyperpolarized metabolic compounds for use as molecular imaging agents on MRI*, Department of Biotechnology, Hadassah Academic College, Jerusalem, Israel

\*Katz-Brull R. (2023, March 2<sup>nd</sup>) *European efforts to improve quality and safety in imaging and therapy – The AlternativesToGd Project.* European Congress of Radiology (ECR), Vienna, Austria

\*Katz-Brull R. (2023, March 14<sup>th</sup>) Introduction to the AlternativesToGd project and optimization of hyperpolarized MRI agents. European Society for Molecular Imaging (EMIM), Salzburg, Austria

\*Katz-Brull R. (2024, January 30th) *Real-time in-cell metabolism in perfused heart and brain and responses to stress.* HMTRC International HP C-13 MRI Seminar, University of California San-Francisco, USA (online)

# Selected oral presentations

\*= speaker

\*Katz-Brull R. (1994) Choline transport in breast cancer cells. Annual Meeting of the Israeli Magnetic Resonance Society, Weizmann Institute, Rehovot, Israel

Katz-Brull R, Margalit R, Rushkin E, \*Degani H. (2000) MR Spectroscopy of breast cancer. SecondInternational Congress on MR-Mammography, Jena, Germany[2: 27]

\*Katz-Brull R, Lavin PT, Lenkinski RE. (2002) The clinical utility of proton MRS in characterizing breast lesions. Annual Meeting of the Radiological Society of North America (RSNA), Chicago IL, USA [Radiology 225: 1615 suppl. S]

\*Katz-Brull R, Rofsky NM, Lenkinski RE. (2003) Breath-hold abdominal and thoracic proton magnetic resonance spectroscopy at 3T. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Ontario, Canada [Proc Int Soc Magn Res Med 11:171]

Katz-Brull R, Lenkinski RE, Du Pasquier RA, Baptista J, \*Koralnik IJ. (2003) Elevation of myo-inositol levels in progressive multifocal leukoencephalopathy: implication of an early inflammatory response in disease containment. International Symposium on Neurovirology, Baltimore, Maryland, USA [] Neurovirol; 9 (supplement 3):54, I.80]

\*Morrin MM, Katz-Brull R, Noquera C, Marquis RP, Pedrosa I, Lenkinski RE. (2003) Breath-hold proton magnetic resonance spectroscopy of normal kidneys. Annual Meeting of the Radiological Society of North America (RSNA), Chicago IL, USA [Radiology A05-41] \*Katz-Brull R, Alsop DC, Marquis RP, Lenkinski RE. (2004) Limits on activation-induced temperaturerelated frequency changes in primary visual cortex. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Kyoto, Japan [Proc Int Soc Magn Res Med 12: 2426]

\*Katz-Brull R, Alsop DC, Marquis RP, Lenkinski RE. (2004) Functional proton magnetic resonance spectroscopy of the human primary visual cortex: metabolite and neurotransmitter concentrations. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Kyoto, Japan [Proc Int Soc Magn Res Med 12: 2540]

\*Katz-Brull R. (2005) Magnetic resonance spectroscopy of the brain. Annual Meeting of the Israeli Magnetic Resonance Society, Ben-Gurion University, Beer-Sheva, Israel

\*Degani H, Eliyahu G, Katz-Brull R. (2005) Choline metabolism: meaning and significance. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Miami Beach, FL, USA [Proc Int Soc Magn Res Med 13:Educational Weekend]

\*Katz-Brull R, Alsop DC, Marquis RP, Lenkinski RE. (2005) Limits on activation induced temperature and metabolic changes in the human primary visual cortex. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Miami Beach, FL, USA [Proc Int Soc Magn Res Med 13:187]

\*Katz-Brull R, Koralnik IJ, Lenkinski RE. (2005) Proton MRS identifies early indicators of brain inflammation and PML-induced regional metabolic differences. The Minerva-Gentner Symposium, Eilat, Israel [25]

\*Katz-Brull R, Koralnik IJ, MD, and Lenkinski RE. (2006) MRS identifies early indicators of brain inflammation in PML. Second Annual Update Symposium Series on Clinical Neurology and Neurophysiology, Tel Aviv, Israel

\*Katz-Brull R. (2006) Current and future role of MRS in psychiatric investigations. Annual Meeting of the Israeli Society for Biological Psychiatry, Hagoshrim, Israel

\*Katz-Brull R. Direct detection of neuromodulation. (2006) Annual Meeting of the International Society for Magnetic Resonance in Medicine, (ISMRM), Seattle, WA, USA [Proc Int Soc Magn Res Med 14: Unsolved Problems and Unmet Needs in MR]

\*Allouche-Arnon H, Gamliel A, Nalbandian R, Lenkinski RE, Gomori JM, Barzilay CM, Katz-Brull R. (2008) Effects of deuteration on <sup>13</sup>C relaxation times in neuro-metabolic compounds: implications for hyperpolarized spectroscopic imaging. Frontiers of Magnetic Resonance, Safed, Israel

\*Nalbandian R, Allouche-Arnon H, Gomori JM, Edvardson S, Elpeleg O, Katz-Brull R. (2009) MRS characteristics of creatine deficiency syndrome. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu, HA, USA [Proc Int Soc Magn Res Med 17: 4002]

Gamliel A, Allouche-Arnon H, Nalbandian R, Vinogradov E, Grant AK, Lenkinski RE, Barzilay CM, Gomori JM, \*Katz-Brull R. (2009) PHIP studies on ethyl propiolate using an effective para-hydrogen generator. The Second International Workshop on Polarized Carbon-13, Philadelphia, PA, USA

Allouche-Arnon H, Grant AK, Vinogradov E, Wang X, Lenkinski RE, Gamliel A, Nalbandian R, Mishkovsky M, Frydman L, J. Gomori JM, Barzilay CM, \*Katz-Brull R. (2010, May 6<sup>th</sup>) *In vivo* studies on a hyperpolarized choline contrast agent: design and implementation of a new biomarker. Annual Meeting

of the International Society for Magnetic Resonance in Medicine (ISMRM), Stockholm, Sweden [Proc Int Soc Magn Res Med 18: 4524]

\*Wade T, Allouche-Arnon H, Friesen Waldner L, McKenzie CA, Thind T, Ouriadov AV, Chen A, Gomori JM, and Katz-Brull R. (2012, May) In vivo imaging of hyperpolarized C13 labelled choline and monitoring of metabolism. <u>ISMRM Magna Cum Laude Award</u>, Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia [*Proc Int Soc Magn Res Med 20*]

Allouche-Arnon H, \*Trevor Wade T, Katz-Brull R, Friesen Waldner L, Miller VN, Gomori JM, McKenzie CA. (2012, May) In vivo magnetic resonance imaging of glucose. A short presentation of this work was invited and is listed under the Invited Lectures section above. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia *[Proc Int Soc Magn Res Med* 20:2548]

Wade T, Allouche-Arnon H, Friesen Waldner L, Thind K, Ouriadov AV, Chen A, Gomori JM, McKenzie CA, \*Katz-Brull R. (2012, July) In vivo magnetic resonance imaging of hyperpolarized choline and monitoring of metabolism. World Molecular Imaging Congress, Dublin, Ireland

Allouche-Arnon H, Wade T, Friesen Waldner L, Miller VN, Gomori JM, \*Katz-Brull R, McKenzie CA. (2012, July) In vivo magnetic resonance imaging of glucose. World Molecular Imaging Congress, Dublin, Ireland

Wade T, Allouche-Arnon H, Friesen Waldner L, Thind K, Ouriadov AV, Chen A, \*Gomori JM, McKenzie CA, Katz-Brull R. (2012, November 27<sup>th</sup>) In vivo magnetic resonance imaging of hyperpolarized choline and monitoring of metabolism. Radiological Society of North America, Chicago, USA

[RSNA ID: 12028393]

\*Lev-Cohain N, Jupin M, Gamliel A, Sosna J, Gomori MJ, Katz-Brull R. (2015, October) Gadoterate meglumine effect on pyruvic acid signals in hyperpolarized magnetic resonance. Annual Meeting of the Israel Radiological Association, Eilat, Israel

\*Lev Cohain N, Sapir G, Harris T, Azar A, Gamliel A, Nardi-Schreiber A, Sosna J, Gomori JM, Katz-Brull R. (2017, November 28<sup>th</sup>) Hyperpolarized [<sup>13</sup>C<sub>1</sub>]pyruvate metabolism in precision-cut mouse liver slices. Radiological Society of North America, Chicago, USA, *[RSNA ID: 17007754]* 

\*Adler-Levy Y, Nardi-Schreiber A, Harris T, Uppala SR, Sapir G, Gamliel A, Azar A, Sosna J, Gomori JM, Katz-Brull R. (2017, November 2<sup>nd</sup>) Monitoring pyruvate metabolism in excised xenograft human breast cancer. Annual Meeting of the Israel Radiological Association, Eilat, Israel

\*Lev Cohain N, Sapir G, Harris T, Azar A, Gamliel A, Nardi-Schreiber A, Sosna J, Gomori JM, Katz-Brull R. (2017, November 2<sup>nd</sup>) Hyperpolarized [<sup>13</sup>C<sub>1</sub>]pyruvate metabolism in precision-cut mouse liver slices. Annual Meeting of the Israel Radiological Association, Eilat, Israel

Uppala S, Gamliel G, Nardi Schreiber A, Harris T, Sosna J, Gomori JM, \*Katz-Brull R. (2018, June) The effect of <sup>1</sup>H-decoupling on hyperpolarized <sup>13</sup>C signal decay – a study on choline chloride analogs and comparison to the effect of deuterium substitution of directly bonded protons. E-Poster. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France

[Proc Int Soc Magn Res Med]

\*Sapir G, Harris T, Azar A, Nardi-Schreiber A, Gamliel A, Sosna J, Gomori JM, Katz-Brull R. (2018, June 18<sup>th</sup>) A perfused heart system to simulate first pass observation of rat cardiac metabolism with hyperpolarized [1-<sup>13</sup>C]pyruvate and determination of LDH flux using selective excitation. E-Poster.

Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France [Proc Int Soc Magn Res Med]

\*Sapir G, Harris T, Azar A, Nardi-Schreiber A, Gamliel A, Sosna J, Gomori JM, Katz-Brull R. (2018, June 4<sup>th</sup>) A perfused heart system to simulate first pass observation of rat cardiac metabolism with hyperpolarized [1-<sup>13</sup>C]pyruvate and determination of LDH flux using selective excitation. Pre - Annual Meeting of the International Society for Magnetic Resonance in Medicine, Rehovot, Israel

Adler Levy Y, Nardi-Schreiber A, Harris T, Uppala S, Sapir G, Gamliel A, Azar A, Goldberg SN, Sosna J, Gourevich S, \*Gomori JM, Katz-Brull R. Ex vivo monitoring of hyperpolarized [1-<sup>13</sup>C]pyruvate metabolism in human breast cancer xenograft tumor slices. (2018, November) Scientific Assembly and Annual Meeting of the Radiological Society of North America. Chicago, USA, E-Poster.

[RSNA ID: 18002968, Public ID: MI205-SD-SUB2]

\*Kreis F, Wright A, Katz-Brull R, Brindle K. (2019, May 15<sup>th</sup>) Partial hyperpolarization transfer to protons in [<sup>15</sup>N<sub>2</sub>]urea. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, QC, Canada [Proc Int Soc Magn Res Med]

\*Shaul D, Grieb B, Sapir G, Uppala S, Sosna J, Gomori JM, Katz-Brull R. (2020, July 15<sup>th</sup>) Direct detection of metabolic changes in rat brain slices during perfusion arrest – implications for imaging of cerebral ischemia with hyperpolarized MR. European Congress of Radiology (ECR), Vienna, Austria. This abstract won the ECR's **Student Abstract Award**, which granted David Shaul a registration fee waiver and reimbursement on all flight and accommodation expenses.

\*Shaul D, Lev-Cohain N, Sosna J, Gomori JM, Katz-Brull R. (2022, May 9<sup>th</sup>) The influence of intracellular acidification and Na<sup>+</sup>/H<sup>+</sup> exchanger inhibition on LDH and PDH activity in the mouse heart – A hyperpolarized <sup>13</sup>C magnetic resonance study. Israel Radiological Association Annual Meeting, Kfar Blum, Israel.

# Selected posters

Shinkarenko L, Katz-Brull R, Kaye AM, Degani H. (1994) Kinetics and mechanism of transport of metabolites determined by MRS. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM) [Proc Int Soc Magn Res Med 2: 1151]

Sherr D, Katz-Brull R, Degani H. (1995) Phospholipid metabolism in normal and cancerous breast cells; multinuclear MRS studies. 5th International Conference of Anticancer Research, Corfu, Greece

[Anticancer Research 15 (5A): 1685]

Katz-Brull R, Bendel P, Maretzek AF, Degani H. (1995) Multinuclear magnetic resonance measurements of choline metabolism in human breast cancer cells and tumors. Experimental Nuclear Magnetic Resonance Conference (ENC), Boston MA, USA

[Selected Abstract Award 36: 119]

Bogin L, Katz-Brull R, Polak-Charcon S, Papa MZ, Degani H. (1996) Modulations in phospholipid metabolism induced by TNF-alpha in human breast cancer cells; NMR studies. Annual Meeting of the American Association for Cancer Research [37 (0): 498]

Katz-Brull R, Bendel P, Margalit R, Degani H. (1997) Quantitative *in vivo* kinetics of choline metabolism in breast cancer – a localized deuterium MRS study. Annual Meeting of the European Society for Magnetic Resonance in Medicine and Biology (ESMRB), Brussels, Belgium

[Magna cum laude Prize MAGMA, 5 (supp 2): 459]

Katz-Brull R, Margalit R, Bendel P, Degani H. (1999) Accumulation of phosphocholine in MCF7 human breast cancer; the role of choline transport and phosphorylation. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Philadelphia, PA, USA

[Proc Int Soc Magn Res Med 7: 1348]

Katz-Brull R, Koudinov AR, Segal M, Degani H. (2000) Choline metabolism and betaine synthesis in rat brain. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM) [Proc Int Soc Magn Res Med 8: 1075]

Katz-Brull R, Koudinov AR, Margalit R, Degani H. (2000) NMR spectroscopy as a tool to study brain choline metabolism. Society for Neuroscience (SFN), New Orleans, LA, USA [26 (1): 34]

Katz-Brull R, Degani H, Koudinov AR. (2000) <sup>13</sup>C NMR resolves choline metabolites and betaine synthesis in the rat brain. Society for Neuroscience (SFN), New Orleans, LA, USA [26 (2): 1734]

Katz-Brull R, Koudinov AR, Degani H. (2001) Choline transport and metabolism in the aging rat brain. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Glasgow, Scotland, UK [Proc Int Soc Magn Res Med 9: 1026]

Katz-Brull R, Degani H, Koudinov AR. (2001) Aging modulates choline homeostasis in the rat brain. Society for Neuroscience (SFN), New Orleans, LA, USA [27: 202.9]

Lenkinski RE, Katz-Brull R, Gaston SM, DeWolf WC, Reynolds HG. (2002) Multinuclear imaging of human excised prostate specimens at 3T. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu HA, USA [Proc Int Soc Magn Res Med 10: 2066]

Katz-Brull R, Lavin PT, Lenkinski RE. (2002) The emerging utility of proton MRS in characterizing breast lesions: factors influencing diagnostic performance. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu HA, USA [Proc Int Soc Magn Res Med 10: 2046]

Katz-Brull R, Koralnik IJ, Lenkinski RE. (2002) Staging of progressive multifocal leukoencephalopathy lesions using proton MR spectroscopy at 3T. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu HA, USA [Proc Int Soc Magn Res Med 10: 0981]

Anschel DJ, Katz-Brull R, Lenkinski R, Shirosky JE, and Pascual-Leone A. (2003) Magnetic resonance spectroscopy following repetitive transcranial magnetic stimulation. Annual Meeting of the American Academy of Neurology (AAN), Honolulu HA, USA [Neurology 60: 5: S1: A198]

Katz-Brull R, Lenkinski RE. (2003) Is physiological motion important in MRS of the brain at 3T: frame-toframe PRESS acquisitions, Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Ontario, Canada [Proc Int Soc Magn Res Med 11: 1990]

Katz-Brull R, Sailasuta N, Raidy T, Lenkinski RE. (2003) SESAME: an interleaved multislice chemical shift imaging method with spatial presaturation and selective excitation. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Ontario, Canada

[Proc Int Soc Magn Res Med 11: 1132]

Katz-Brull R, Morrin MM, Pedrosa I, Rofsky NM, George DG, Michaelson DM, Marquis RP, Maril M, Noguera C, Lenkinski RE. (2004) Possible decrease in free cholesterol and fatty acids unsaturation in renal cell carcinoma demonstrated by breath hold <sup>1</sup>H-MRS. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Kyoto, Japan [*Proc Int Soc Magn Res Med* 12: 925]

Katz-Brull R, Anschel DJ, Lenkinski RE, Shirosky JE, Pascual-Leone A. (2005) Transient decrease in watersoluble choline metabolites following a single session of repetitive transcranial magnetic stimulation. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Miami Beach FL, USA [Proc Int Soc Magn Res Med 13:1235]

Gamliel A, Allouche-Arnon H, Nalbandian R, Vinogradov E, Grant AK, Lenkinski RE, Barzilay CM, Gomori JM, Katz-Brull R. (2008) Validation of an efficient and compact para-hydrogen catalytic converter system for PHIP studies, Frontiers of Magnetic Resonance, Safed, Israel

Gamliel A, Allouche-Arnon H, Nalbandian R, Vinogradov E, Grant AK, Lenkinski RE, Barzilay CM, Gomori JM, Katz-Brull R. (2009) Validation of an efficient and compact para-hydrogen catalytic converter system for PHIP studies, Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu HA, USA [Proc Int Soc Magn Res Med 17: 2440]

Allouche-Arnon H, Gamliel A, Nalbandian R, Mishkovsky M, Frydman L, Gomori JM, Lenkinski RE, Barzilay CM, Katz-Brull R. (2009) Effects of deuteration on <sup>13</sup>C relaxation times in neuro-metabolic compounds: implications for hyperpolarized spectroscopic imaging, Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Honolulu HA, USA

[Proc Int Soc Magn Res Med 17: 2442]

Allouche-Arnon H, Gamliel A, Nalbandian R, Mishkovsky M, Frydman L, J. Gomori JM, Lenkinski RE, Barzilay CM, Katz-Brull R. (2009) Substitution of protons by deuterons in choline and dopamine for hyperpolarized MRSI. The Second International Workshop on Polarized Carbon-13, Philadelphia PA, USA

Allouche-Arnon H, Wade T, Friesen Waldner L, Miller VN, Gomori JM, Katz-Brull R, McKenzie CA (2012, November 29<sup>th</sup>) In vivo magnetic resonance imaging of glucose. Radiological Society of North America, Chicago, USA [RSNA ID: 12028362]

Friesen-Waldner LJ, Wiens CN, Wade TP, Thind K, Sinclair KJ, Hovav Y, Gomori JM, Sosna J, McKenzie CA, Katz-Brull R. (2014, May) Determination of diffusive and transport processes of hyperpolarized [1,1,2,2-D<sub>4</sub>, 1-<sup>13</sup>C]-choline in the rat kidney. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Milano, Italy [*Proc Int Soc Magn Res Med* 22: 5328]

Grieb B, Azar A, Harris T, Sapir G, Nardi-Schreiber A, Gamliel A, Uppala S, Sosna J, Gomori JM, Katz-Brull R. (2018, June) Ex-vivo real-time measurement of ethanol induced changes in brain metabolism of hyperpolarized [1-<sup>13</sup>C]-pyruvate. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France [Proc Int Soc Magn Res Med]

Harris T, Gamliel A, Sosna J, Gomori JM, Katz-Brull R. (2018, June) Impurities of [1-<sup>13</sup>C]pyruvic acid and their potential effects on the interpretation of hyperpolarized pyruvate metabolism studies. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France [Proc Int Soc Magn Res Med]

Harris T, Azar A, Sapir G, Gamliel G, Nardi-Schreiber A, Sosna J, Gomori JM, Katz-Brull R. (2018, June) Real-time ex-vivo measurement of brain metabolism using hyperpolarized [1-13C]pyruvate. Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France

[Proc Int Soc Magn Res Med]

Nardi-Schreiber A, Adler-Levy Y, Harris T, Shaul D, Uppala S, Sapir G, Lev-Cohain N, Sosna J, Goldberg SN, Gomori JM, Katz-Brull R. (2019, October) Selective RF excitations for in-cell determination of lactate dehydrogenase activity in excised xenograft breast tumor slices using dDNP hyperpolarized [1-<sup>13</sup>C]pyruvate. Israel Radiological Association Annual Meeting, Eilat, Israel

Shaul D, Sapir G, Azar A, Uppala S, Nardi-Schreiber A, Gamliel A, Harris T, Sosna J, Gomori JM, and Katz-Brull R. (2019, October) Correlation between LDH/PDH activities ratio and tissue pH in perfused mouse heart – a hyperpolarized MRS study. Israel Radiological Association Annual Meeting, Eilat, Israel

Sapir G, Harris T, Uppala S, Nardi-Schreiber A, Gamliel A, Sosna J, Gomori JM, Katz-Brull R. (2019, October) [<sup>13</sup>C<sub>6</sub>,D<sub>8</sub>]2-deoxyglucose as a novel probe for hyperpolarized MR and as a marker for hexokinase activity. Israel Radiological Association Annual Meeting, Eilat, Israel

Lev-Cohain N<sup>#</sup>, Sapir G<sup>#</sup>, Uppala S, Harris T, Goldberg SN, Gamliel A, Adler-Levi Y, Nardi-Schreiber A, Sosna J, Gomori JM, Katz-Brull R. (2019, October) Metabolic signature of hepatocellular carcinoma – A study of hyperpolarized [1-<sup>13</sup>C]pyruvate metabolism in precision cut liver slices. Israel Radiological Association Annual Meeting, Eilat, Israel. <sup>#</sup>- Equal contribution.

Shaul D, Sapir G, Uppala S, Nardi-Schreiber A, Gamliel A, Sosna J, Gomori JM, Katz-Brull R. (2019, November) Correlation between LDH/PDH activities and the tissue pH in perfused mouse heart – a hyperpolarized MRS study. Israel-Italy scientific workshop on Particle accelerator - development and uses in medical applications, industry, science and the environment, Tel-Aviv, Israel.

Shaul D, Lev-Cohain N, Sosna J, Gomori JM, Katz-Brull R. (2022, March) The relationship between intracellular acidification and hyperpolarized [1-<sup>13</sup>C]pyruvate metabolism in the perfused mouse heart. 17<sup>th</sup> European Molecular Imaging Meeting, Thessaloniki, Greece