

Ramon C. Sun

UNIVERSITY OF KENTUCKY
DEPARTMENT OF NEUROSCIENCE
COLLEGE OF MEDICINE
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EDUCATION

- 2010 **The Australian National University, Canberra, Australia**
Ph.D. Cancer Biology and Biochemistry Thesis advisor: Dr. Anneke Blackburn
Targeting Pyruvate Dehydrogenase Kinase in Triple Negative Breast Cancer.
- 2006 **University of Auckland, Auckland, New Zealand**
Bachelor of Biotechnology, First Class Honors. Advisor: Dr. Kathy Mountjoy

PROFESSIONAL EXPERIENCE

- 2019-present **University of Kentucky, Lexington, KY**
Assistant Professor, Department of Neuroscience
- 2018-2019 **University of Kentucky, Lexington, KY**
Research Assistant Professor, Department of Biochemistry, College of Medicine
- 2016-2018 **University of Kentucky, Lexington, KY**
T32 Postdoctoral Fellow of Metabolomics, Department of Toxicology, College of Medicine
- 2011-2015 **Stanford University, Palo Alto, CA**
Postdoctoral Scholar, Department of Radiation Oncology, School of Medicine

ENTREPRENEURIAL ACTIVITIES

- 2018-2019 **Fluxomics LLC, Lexington, KY**
Founder -Metabolomics Solution from Basic Science to Biomarker Discovery
- 2018-present **Maze Therapeutics, San Francisco, CA**
Scientific Consultant for Metabolomics and Mass Spectrometry-Assay Development
- 2018-present **TEC Biosciences, Lexington, KY**
Scientific Consultant for Flux Assay Development and Pathway Analysis

PATENTS AND IP DISCLOSURES

1. Method for Heavy Isotope Incorporation into Living Systems. *US provisional 504629418*
2. Method of Treating Cancer with an Elevated Glycogen Content *US provisional 62782958*

PUBLICATIONS (27 TOTAL, 12 CORRESPONDING AUTHOR)

Selected Publications. *Corresponding Author; #Co-Corresponding Author

- Sun, R. C.#**, Dukhande, V. V., Zhou, Z., Young, L. E., Emanuelle, S., Brainson, C. F., and Gentry, M. S. (2019) Nuclear glycogenolysis modulates histone acetylation in human non-small cell lung cancers. *Cell Metabolism* 30, 903-916. e907 #Co-corresponding Author
 - Highlighted in a commentary:** *BMC Cancer Communications - Nuclear glycogenolysis modulates histone acetylation: a novel mechanism of epigenetic regulation in cancer*
 - Highlighted in a commentary:** *Annals of Translational Medicine - The many metabolic sources of acetyl-CoA to support histone acetylation and influence cancer progression*
- Andres, D. A., Young, L. E. A., Veeranki, S., Hawkinson, T. R., Levitan, B. M., He, D., Wang, C., Satin, J., and **Sun, R. C***. (2020) Improved workflow for mass spectrometry-based metabolomics analysis of the heart. *Journal of Biological Chemistry*
 - Highlighted in a special issue: Method in Biological Chemistry Collection: JBC Methods Madness**
- Sun, R. C.**, Fan, T. W.-M., Deng, P., Higashi, R. M., Lane, A. N., Le, A.-T., Scott, T. L., Sun, Q., Warmoes, M. O., and Yang, Y. (2017) Noninvasive liquid diet delivery of stable isotopes into mouse models for deep metabolic network tracing. *Nature Communications* 8, 1646
- Sun, R. C.**, and Denko, N. C. (2014) Hypoxic regulation of glutamine metabolism through HIF1 and SIAH2 supports lipid synthesis that is necessary for tumor growth. *Cell Metabolism* 19, 285-292

Other Publications

5. Stanback A.E., Conroy L.R., Young E.A., Hawkinson T.R., Markussen K.H., Clarke H.A., Allison D.B., Sun R.C* (2021) Regional N-glycan and lipid analysis from tissue using MALDI-mass spectrometry imaging. *In Press, Star Protocols*.
6. Hawkinson T.R., Sun R.C*, (2021) Mass spectrometry imaging of glycogen in situ. *In Press, Methods in Molecular Biology*.
7. Sun R.C.#, Young L.E., Zhou Z.Q., Macedo J.K.A., Sanders W.C., Bruntz R.C., Hurley T.D., Brainson C.F., Taylor R.E., Roach P.J., Roach A.A.D., Drake R., Gentry M.S. Cerebral glycan metabolic dependency through glycogenolysis of hexosamine. *Revision at Cell Metabolism*. #Co-Corresponding Author.
8. Duran J., Hervera A., Markussen H. K., Varea O., Sun R.C., Rio J.A., Gentry M.S., Guinovart J.J. (2021) Astrocytic glycogen accumulation drives the pathophysiology of neurodegeneration in lafora disease. *Accepted. Brain*
9. Farmer B.C., Williams H.C., Devanney N.A., Gentry M.S., Morganti J.M., Sun R.C., Johnson L.A. (2020) APOE lowers energy expenditure and impairs glucose oxidation by increased flux through aerobic glycolysis. *Under Review* BioRxiv reprint doi: <https://doi.org/10.1101/2020.10.19.345991>
10. Williams H., Piron M.A., Nation G.G., Walsh A.E., Young L.E.A., Sun R.C.#, Johnson L.A. (2020) Oral gavage delivery of stable isotope tracer for in vivo metabolomics. *Metabolites*. 10(12), 501 #Co-corresponding Author.
11. Conroy L.R., Young L.E., Stanback A., Austin G.L., Allison B.D., Sun R.C*. Mass Spectrometry Imaging of N-glycans reveals racial discrepancies in low grade prostate tumors. *Revision at Molecular Cancer Research*. *Corresponding Author. BioRxiv reprint doi: <https://doi.org/10.1101/2020.08.20.260026>
12. Hepowitz, N.L., Macedo, J.K., Young, L.E., Liu, K., Sun, R.C., MacGurn, J. and Dickson, R.C., 2021. Enhancing lifespan of budding yeast by pharmacological lowering of amino acid pools. *In Press Aging*. bioRxiv. <https://doi.org/10.1101/2020.10.30.362459>
13. Kinslow C., Chaudhary K, Upadhyayula P., Sun R.C., Cheng S. (2020) Serine and one-carbon metabolism in breast cancer metastasis. *Molecular Cancer Research*. 18.11,1755-1755
14. Andres, D. A., Young, L. E. A., Gentry, M.S., Sun R. C*. Spatial profiling of gangliosides in mouse brain by mass spectrometry imaging (2020). *Journal of Lipid Research*. 61(12):1537
 - **-Highlighted in a commentary in ASBMB TODAY - LJR's new article format puts images at the forefront**
 - **Top 20 most read in JLR from June 2020-july 2020**
15. Donohue, K. J., Gentry, M. S. & Sun, R. C*. (2020) The E3 ligase malin plays a pivotal role in promoting nuclear glycogenolysis and histone acetylation. *Annals of Translational Medicine*. 8.(5).
16. Zhou, Z., Kinslow, C. J., Wang, P., Huang, B., Cheng, S. K., Deutsch, I., Gentry, M. S., and Sun, R. C*. (2020) Clear Cell Adenocarcinoma of the Urinary Bladder Is a Glycogen-Rich Tumor with Poorer Prognosis. *Journal of Clinical Medicine* 9, 138
17. Williams, H. C., Farmer, B. C., Piron, M. A., Walsh, A. E., Bruntz, R., Gentry, M., Sun, R. C., and Johnson, L. A. (2020) APOE alters glucose flux through central carbon pathways in astrocytes. *Neurobiology of Disease*, 10474
18. Conroy, R. L., Dougherty, S., Kruer, T., Metcalf, S., Lorkiewicz, P., He, L., Yin, X., Zhang, X., Arumugam, S., Young, E. A. L., Sun, R. C., and Clem, F. B. (2020) Loss of Rb1 Enhances Glycolytic Metabolism in Kras-Driven Lung Tumors In Vivo. *Cancers* 12
19. Young, L. E., Brizzee, C. O., Macedo, J. K., Murphy, R. D., Contreras, C. J., DePaoli-Roach, A. A., Roach, P. J., Gentry, M. S., and Sun, R. C*. (2020) Accurate and sensitive quantitation of glucose and glucose phosphates derived from storage carbohydrates by mass spectrometry. *Carbohydrate Polymers* 230, 11565.
20. Brewer, M. K., Uittenbogaard, A., Austin, G. L., Segvich, D. M., DePaoli-Roach, A., Roach, P. J., McCarthy, J. J., Simmons, Z. R., Brandon, J. A., Zhou, Z., Zeller, J., Young, L. E. A., Sun, R. C., Pauly, J. R., Aziz, N. M., Hodges, B. L., McKnight, T. R., Armstrong, D. D., and Gentry, M. S. (2019) Targeting Pathogenic Lafora Bodies in Lafora Disease Using an Antibody-Enzyme Fusion. *Cell Metabolism* 30, 689-705.e686
21. Zhou, Z., Kinslow, C. J., Hibshoosh, H., Guo, H., Cheng, S. K., He, C., Gentry, M. S., and Sun, R. C*. (2019) Clinical features, survival and prognostic factors of glycogen-rich clear cell carcinoma (GRCC) of the breast in the US population. *Journal of Clinical Medicine* 8, 246.
22. Zhou, Z., Austin, G., Young, L., Johnson, L., and Sun, R. C*. (2018) Mitochondrial Metabolism in Major Neurological Diseases. *Cells* 7, 229.

23. Deng, P., Higashi, R. M., Lane, A. N., Bruntz, R. C., **Sun, R. C.**, Raju, M. V. R., Nantz, M. H., Qi, Z., and Fan, T. W.-M. (2017) Quantitative profiling of carbonyl metabolites directly in crude biological extracts using chemoselective tagging and nanoESI-FTMS. *Analyst* 143, 311-322
24. Golias, T., Papandreou, I., **Sun, R. C.**, Kumar, B., Brown, N. V., Swanson, B. J., Pai, R., Jaitin, D., Le, Q.-T., and Teknos, T. N. (2016) Hypoxic repression of pyruvate dehydrogenase activity is necessary for metabolic reprogramming and growth of model tumours. *Scientific Reports* 6, 31146
25. **Sun, R. C.**, Koong, A., Giaccia, A., and Denko, N. C. (2016) Measuring the impact of microenvironmental conditions on mitochondrial dehydrogenase activity in cultured cells. *Tumor Microenvironment*, Springer. pp 113-120
26. Cerniglia, G. J., Dey, S., Gallagher-Colombo, S. M., Daurio, N. A., Tuttle, S., Busch, T. M., Lin, A., **Sun, R. C.**, Esipova, T. V., and Vinogradov, S. A. (2015) The PI3K/Akt pathway regulates oxygen metabolism via pyruvate dehydrogenase (PDH)-E1 α phosphorylation. *Molecular Cancer Therapeutics* 14, 1928-1938
27. **Sun, R. C.**, Board, P. G., and Blackburn, A. C. (2011) Targeting metabolism with arsenic trioxide and dichloroacetate in breast cancer cells. *Molecular Cancer* 10, 142
28. **Sun, R. C.**, Fadia, M., Dahlstrom, J. E., Parish, C. R., Board, P. G., and Blackburn, A. C. (2010) Reversal of the glycolytic phenotype by dichloroacetate inhibits metastatic breast cancer cell growth in vitro and in vivo. *Breast Cancer Research and Treatment* 120, 253-260

CURRENT GRANTS

Current Grants

R01AG066653 (NIA) (R01)

06/1/2020 – 05/31/2025

“Aberrant Glycogen Modulates Cerebral Glucose Metabolism in Aging and Alzheimer’s Disease”

The goal of this project is to evaluate the biological origin of polyglucosan bodies (PGBs) in late onset Alzheimer’s disease and interrogate PGBs’ contribute to AD progression and pathology.

Role: PI

V2020-002 V-Scholar Grant

12.1.2020-11.31.2022

“Enzyme -antibody fusion against glycogen in Ewing’s sarcoma”

The goal of this project is to evaluate enzyme-antibody agent that targets glycogen metabolism in Ewing’s sarcoma and evaluate their efficacy in preclinical models.

Role: PI

St. Baldrick’s Scholar Career Development Award

8.1.2019-7.31.2022

“Aberrant Glycogen Is A Metabolic Vulnerability of Ewing’s Sarcoma”

The overall focus of this grant is to define the biology behind a key clinical feature of Ewing’s sarcoma, glycogen accumulation, and to explore its role in tumor progression.

Role: PI

Rally Foundation Independent Investigator Grant

6.1.2020-5.31.2021

“Targeting Ewing’s sarcoma metabolic vulnerabilities”

The goal of this project is to evaluate enzyme-antibody agent that targets glycogen metabolism in Ewing’s sarcoma and evaluate their efficacy in preclinical models.

Role: PI

Sponsored Project: NO ID

07/01/2016-06/30/2021

Maze Therapeutics

“Maze-Directed Analysis of Glycogen Metabolism ”

Goals: To develop GCMS methods to monitor glucose incorporation into glycogen via gavage and IM.

Role: MPI

5R01AG062550-02 (PI: L. Johnson)

4/1/19-3/31/24

“Changing the energy substrate balance: Does APOE2 promote glucose usage to protect from Alzheimer’s Disease?”

The overall focus of this grant is to define metabolic flux of glucose associated with APOE2 that potentially play a protective role against the development of late onset Alzheimer’s Disease.

Role: Co-I

R01 AG060056 (PI: L. Johnson)

9/1/18-8/31/23

“APOE and the PPP: Glucose Metabolism and Oxidative Stress in Alzheimer's Disease”

The goal of this project is to evaluate APOE genotypes on glucose metabolism and how this contributes to oxidative stress in late onset Alzheimer's Disease.

Role: Co-I

P01 NS097197-01 (PI: M. Gentry)

NIH/NINDS

07/01/16-06/30/2021

“Lafora Epilepsy - Basic mechanisms to therapy”

The overall focus of this Program Project Grant is to: Diagnose, Treat, and eventually Cure LD. Four complimentary projects and three integrated core facilities form the basis of this proposal.

Role: Co-I

R35 1R35NS116824-01. (PI: M. Gentry)

NIH/NIND

“Brain Glycogen-Metabolism, Mechanisms, and Therapeutic Potential”

05/15/20-03/31/2028

“Characterization and function of polyglucosan bodies in Alzheimer's disease”

Goals: Define glycogen structure in human and mouse models of Alzheimer's disease, and determine its impact on cellular metabolism and energy homeostasis of the brain.

Role: Co-I

AZ190017 (PI: Adam Bachstetter)

DOD

3/01/2020-2/28/2023

“AD and TBI: converging on brain energy metabolism”

Goal: To test the hypothesis that a TBI causes chronic metabolic dysfunction that worsens the hypometabolism seen in physiologically relevant models of AD genetic- risk.

Role: Co-I

1R21NS114771-01A1 (PI: Saatman)

07/01/2020-06/30/2025

“Implementing A Novel, Multimodal Technique for Monitoring Cerebrovascular Hemodynamics in Mice as A Diagnostic and Prognostic Tool for Single and Repeated Mild TBI”

Role: OSC

COMPLETED GRANTS

ACS-IRG 16-182-28

2.1.19-1.31.20

“Targeting metabolic vulnerabilities in Ewing's sarcoma”

The goal of this project is to understand the biological role of abnormal glycogen in Ewing's sarcoma and evaluate whether it is viable drug target.

Role: PI

P20 GM121327 COBRE for the Center for Cancer and metabolism Pilot Grant (PI: St. Clair, Zhou.)

1/1/18-12/31/18

“Defining the contribution of glycogen phosphorylase in NSCLC tumorigenesis”

Role: Co-I

NIH/NIGMS T32 5T32ES007266-25 Postdoctoral Fellowship

7.1.15-6.30.17

“Glycogen Phosphorylases is Necessary for Non-Small Cell Lung Cancer Growth”

Role: Trainee

Ohio State University Pelotonia Research Foundation

1.1.13-12.31.15

Characterizing Phosphorylation of PDH in Tumorigenesis of Head and Neck Cancer

Role: Trainee

AWARDS AND HONORS

2021

V-Scholar

2020

University of Kentucky Vice President of Research Equipment Award (\$80K)

2019

St Baldrick's Scholar

2018

Selected Participant for The ASBMB Junior Faculty Grant Writing Workshop

2018

College of Medicine Poster Session 1st Place Poster Prize, Lexington, KY

2018	College of Medicine Post-Doc Poster Competition First Place
2016	MCC Research Day Poster Prize First Place
2015	NRSA-T32 Postdoctoral Training Fellowship
2014	Ohio State University Top Publication Award
2014	Pelotonia Research Award
2013	International Tumor Microenvironment Workshop Junior Investigator Award
2009	AACR AstraZeneca International Scholar-In-Training Award
2009	Scientist In School Special Scholarship
2009	International Academy Of Pathology New Investigator Award
2009	ANU Vice Chancellor Scholar Award
2008	Queenstown Molecular Biology Conference Top Student Award
2008	Lorne Cancer Conference Top Student Award
2008	ASBMB Annual Meeting Top Poster Award
2007	John Curtin School Of Medical Research Ph.D Scholarship
2007	Australian National University Graduate Research Scholarship
2006	University Of Auckland Summer Scholar Research Award
2005	University of Auckland Biological Science Senior Award
2004	University of Auckland Undergraduate Scholar Research Award

SPEAKING ENGAGEMENTS

2020	Invited Speaker, International conference on Cell and Experimental Biology, Boston, MA
2020	Invited Speaker, International Mass Spectrometry Imaging Meeting, Imaging Mass Spec Society
2020	Invited Speaker, Ohio Mass Spectrometry and Metabolomics Symposium, Columbus, Ohio
2019	Invited Speaker, Pathology Grand Round, University of Kentucky, KY
2019	Invited Speaker, Biochemistry Seminar Series, Indian University. IN
2019	Invited Speaker, RC-SIRM Metabolomics Symposium, University of Kentucky, KY
2019	Invited Speaker, 7th Annual Breast Cancer Symposium, University of Kentucky, KY
2018	Invited Speaker, Biochemistry Seminar Series, University of Louisville, KY
2018	Invited Speaker, The Markey Cancer Research Day, University of Kentucky, KY
2018	Speaker for The Dean's Lecture Series, College of Medicine, University of Kentucky

PRESS ITEMS

2014 Cancer Cells Thrive in Oxygen-Starved Tumors

<https://www.sciencedaily.com/releases/2014/02/140204123615.htm>

https://www.eurekalert.org/pub_releases/2014-02/osuw-srh012914.php

2019 Nuclear glycogen

<https://www.genengnews.com/news/nuclear-glycogen-linked-to-non-small-cell-lung-cancer/>

http://www.healthnewsdigest.com/news/Cancer_Issues_660/Markey-Researchers-Discover-Role-of-Nuclear-Glycogen-in-Non-small-Cell-Lung-Cancers.shtml

<https://www.news-medical.net/news/20190913/Scientists-identify-a-potentially-novel-avenue-to-treat-non-small-cell-lung-cancers.aspx>

<https://www.sciencedaily.com/releases/2019/09/190912134358.htm>

<https://medicalxpress.com/news/2019-09-year-old-scientific-mystery-role-nuclear.html>

PROFESSIONAL SERVICE

Professional Memberships

American Association for Cancer Research; American Society for Biochemistry and Molecular Biology; American Society for Cell Biology, American Association for Science and Technology; The American Association for the Advancement of Science; American Chemical Society; Society for Glycobiology.

Reviewer Activities

Ad-Hoc: Molecular Cell; Science Advances; Molecular and Cellular Endocrinology; Cell Death and Diseases; Royal Society, Open Biology; JoVE; Membrane; Tumor Microenvironment; International Journal of Molecular Sciences; Nutrients; Cells; Molecular Neurobiology; Marine drugs; Journal of Leukocyte Biology; Carbohydrate Polymers; Experimental and Molecular Pathology; Journal of Translational Medicine; Experimental Lung Research; Cancer Microenvironment; Journal of Proteome Research;

Editorial board: Journal of Biological Chemistry; Annuals of Translational Medicine.

Study Section

St Baldrick's Foundation Career Development; St Baldrick's Foundation

TEACHING EXPERIENCE

2008-2010

BIOL1004-Biology 2:Molecular and Cell biology 13 Lecture Hours

Australian National University

Spring 08
Fall 06,07,08
Spring 06, 07, 08

teaching assistant
teaching assistant
teaching assistant

BIOL1003 Biology 1: Evolution, Ecology and Genetic
BIOL1009: Diversity of Life
BIOL1004: Biology 2: Molecular and Cell Biology

TRAINEES

Graduate Students:

PhD student

Ashley Stevens, University of Kentucky; Lyndsay E Young, University of Kentucky; Holden Williams University of Kentucky; Tara Hawkinson- University of Kentucky; Nick Devanney- University of Kentucky; Olivia Bodart, University of Kentucky; Alexis Smith, University of Kentucky.

MD Students :

Anh Thu le -MD/PhD, University of Kentucky ; Connor Kinslow -MD Student, Columbia Kentucky ; Zhengqiu Zhou - MD Student, University of Kentucky ; Grant Austin -MD Student, University of Kentucky ; Madi Ginn -MD Student, University of Kentucky.

Undergraduate Students:

Chase Sanders -Pre-med, University of Kentucky; Jack Klier-Pre-med, University of Kentucky; Jeremiah Wayne -Pre-med, University of Kentucky; Niraj Rama -Pre-med, University of Kentucky; Cecilia Pankau -Pre-med, University of Kentucky; Josephine Chang -Pre-med, University of Kentucky.

Post-Doctoral Fellows:

Dr. Ronald Bruntz; Dr. Jessica Macedo; Dr. Lindsey Conroy.