

Stanford



Johannes Reiter

Assistant Professor of Radiology (Canary Center) and, by courtesy, of Biomedical Data Science

Bio

ACADEMIC APPOINTMENTS

- Assistant Professor, Radiology
- Assistant Professor (By courtesy), Biomedical Data Science
- Member, Bio-X
- Member, Stanford Cancer Institute

HONORS AND AWARDS

- ASciNA Young Scientist Award, Austrian Federal Ministry of Education, Science and Research (2019)
- Wissen schaff[f]t Zukunft Award, Lower Austria (2018)
- Pathway to Independence Award (K99/R00), NIH/NCI (2018-2023)
- Johannes Ritschl Dissertation Prize, Lower Austrian Cancer Society (2017)
- Erwin Schrödinger Fellowship, Austrian Science Fund (2017-2018)

PROFESSIONAL EDUCATION

- Postdoctoral Fellow, Harvard University , Program for Evolutionary Dynamics (2017)
- PhD, Institute of Science and Technology Austria , Computational and Mathematical Biology (2015)
- BSc, Vienna University of Technology , Computer Science (2009)

LINKS

- Lab website: <https://reiterlab.stanford.edu>
- Google Scholar Profile: <https://scholar.google.com/citations?user=CdY4zVMAAA&hl=en>
- ORCID: <http://orcid.org/0000-0002-0170-7353>
- Canary Center: <http://canarycenter.stanford.edu/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Cancer is an evolutionary process that typically spans multiple decades before it causes symptoms. The survival probability of patients with a tumor diagnosed early is five to ten times higher than when diagnosed at an advanced stage. The last stage of cancer progression, metastasis, is responsible for 90% of cancer-related deaths. In a tumor with billions of cells virtually any point mutation is expected to be present in a few cells. Hence, at a genetic level, not only is every cancer type different, but

also every tumor of the same type and every cell of the same tumor are different. This enormous heterogeneity poses a major barrier to drug development and long-term disease control but also represents a unique opportunity to study the evolutionary principles that govern cancer initiation and progression.

My research focuses on the stochastic biological processes underlying cancer evolution, in particular those related to the initiation, progression, spread, and treatment of cancer. The goal of this research is to accurately diagnose aggressive cancers as well as to provide new insights about metastatic spread and the development of resistance against therapies. I develop computational methods and design mathematical models to generate novel hypotheses and explain observations on a mechanistic level in close collaboration with many physician#scientists.

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Stefano Avanzini

Publications

PUBLICATIONS

- **An analysis of genetic heterogeneity in untreated cancers.** *Nature reviews. Cancer*
Reiter, J. G., Baretta, M., Gerold, J. M., Makohon-Moore, A. P., Daud, A., Iacobuzio-Donahue, C. A., Azad, N. S., Kinzler, K. W., Nowak, M. A., Vogelstein, B.
2019
- **Precancerous neoplastic cells can move through the pancreatic ductal system** *NATURE*
Makohon-Moore, A. P., Matsukuma, K., Zhang, M., Reiter, J. G., Gerold, J. M., Jiao, Y., Sikkema, L., Attiyeh, M. A., Yachida, S., Sandone, C., Hruban, R. H., Klimstra, D. S., Papadopoulos, et al
2018; 561 (7722): 201+
- **Minimal functional driver gene heterogeneity among untreated metastases.** *Science (New York, N.Y.)*
Reiter, J. G., Makohon-Moore, A. P., Gerold, J. M., Heyde, A., Attiyeh, M. A., Kohutek, Z. A., Tokheim, C. J., Brown, A., DeBlasio, R. M., Niyazov, J., Zucker, A., Karchin, R., Kinzler, et al
2018; 361 (6406): 1033–37
- **Limited heterogeneity of known driver gene mutations among the metastases of individual patients with pancreatic cancer** *NATURE GENETICS*
Makohon-Moore, A. P., Zhang, M., Reiter, J. G., Bozic, I., Allen, B., Kundu, D., Chatterjee, K., Wong, F., Jiao, Y., Kohutek, Z. A., Hong, J., Attiyeh, M., Javiet, et al
2017; 49 (3): 358-366
- **Reconstructing metastatic seeding patterns of human cancers** *NATURE COMMUNICATIONS*
Reiter, J. G., Makohon-Moore, A. P., Gerold, J. M., Bozic, I., Chatterjee, K., Iacobuzio-Donahue, C. A., Vogelstein, B., Nowak, M. A.
2017; 8
- **Origins of lymphatic and distant metastases in human colorectal cancer.** *Science (New York, N.Y.)*
Naxerova, K., Reiter, J. G., Brachtel, E., Lennerz, J. K., van de Wetering, M., Rowan, A., Cai, T., Clevers, H., Swanton, C., Nowak, M. A., Elledge, S. J., Jain, R. K.
2017; 357 (6346): 55–60
- **Evolutionary dynamics of cancer in response to targeted combination therapy** *ELIFE*
Bozic, I., Reiter, J. G., Allen, B., Antal, T., Chatterjee, K., Shah, P., Moon, Y. S., Yaqubie, A., Kelly, N., Le, D. T., Lipson, E. J., Chapman, P. B., Diaz, et al
2013; 2
- **Consecutive seeding and transfer of genetic diversity in metastasis.** *Proceedings of the National Academy of Sciences of the United States of America*
Heyde, A., Reiter, J. G., Naxerova, K., Nowak, M. A.
2019
- **Growth dynamics in naturally progressing chronic lymphocytic leukaemia.** *Nature*

- Gruber, M., Bozic, I., Leshchiner, I., Livitz, D., Stevenson, K., Rassenti, L., Rosebrock, D., Taylor-Weiner, A., Olive, O., Goyette, R., Fernandes, S. M., Sun, J., Stewart, et al
2019; 570 (7762): 474-79
- **Clonal replacement and heterogeneity in breast tumors treated with neoadjuvant HER2-targeted therapy.** *Nature communications*
Caswell-Jin, J. L., McNamara, K., Reiter, J. G., Sun, R., Hu, Z., Ma, Z., Ding, J., Suarez, C. J., Tilk, S., Raghavendra, A., Forte, V., Chin, S. F., Bardwell, et al
2019; 10 (1): 657
 - **Crosstalk in concurrent repeated games impedes direct reciprocity and requires stronger levels of forgiveness.** *Nature communications*
Reiter, J. G., Hilbe, C., Rand, D. G., Chatterjee, K., Nowak, M. A.
2018; 9 (1): 555
 - **Local recurrences at the anastomotic area are clonally related to the primary tumor in sporadic colorectal carcinoma.** *Oncotarget*
Vakiani, E., Shah, R. H., Berger, M. F., Makohon-Moore, A. P., Reiter, J. G., Ostrovnaya, I., Attiyeh, M. A., Cercek, A., Shia, J., Iacobuzio-Donahue, C. A., Solit, D. B., Weiser, M. R.
2017
 - **Pancreatic cancer: Pancreatic carcinogenesis - several small steps or one giant leap?** *Nature reviews. Gastroenterology & hepatology*
Reiter, J. G., Iacobuzio-Donahue, C. A.
2016; 14 (1): 7-8
 - **Mutations driving CLL and their evolution in progression and relapse.** *Nature*
Landau, D. A., Tausch, E., Taylor-Weiner, A. N., Stewart, C., Reiter, J. G., Bahlo, J., Kluth, S., Bozic, I., Lawrence, M., Böttcher, S., Carter, S. L., Cibulskis, K., Mertens, et al
2015; 526 (7574): 525-530
 - **Biological auctions with multiple rewards** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
Reiter, J. G., Kanodia, A., Gupta, R., Nowak, M. A., Chatterjee, K.
2015; 282 (1812): 175-182
 - **Forgiver Triumphs in Alternating Prisoner's Dilemma** *PLOS ONE*
Zagorsky, B. M., Reiter, J. G., Chatterjee, K., Nowak, M. A.
2013; 8 (12)
 - **The effect of one additional driver mutation on tumor progression** *EVOLUTIONARY APPLICATIONS*
Reiter, J. G., Bozic, I., Allen, B., Chatterjee, K., Nowak, M. A.
2013; 6 (1): 34-45
 - **The molecular evolution of acquired resistance to targeted EGFR blockade in colorectal cancers** *NATURE*
Diaz, L. A., Williams, R. T., Wu, J., Kinde, I., Hecht, J. R., Berlin, J., Allen, B., Bozic, I., Reiter, J. G., Nowak, M. A., Kinzler, K. W., Oliner, K. S., Vogelstein, et al
2012; 486 (7404): 537-540
 - **Evolutionary dynamics of biological auctions** *THEORETICAL POPULATION BIOLOGY*
Chatterjee, K., Reiter, J. G., Nowak, M. A.
2012; 81 (1): 69-80