Research profile for applicants

Name of DKFZ research division/group:	***Division of Regulatory Genomics and Cancer Evolution (B270)***
Contact person:	***Duncan Odom*** ***d.odom@dkfz-heidelberg.de***
Group homepage: *Visit this website for further information on current research and recent publications.*	***https://www.dkfz.de/en/regulatory-genomics-and-cancer-evolution***

RESEARCH PROFILE AND PROJECT TOPICS

The Odom laboratory is an experimental genomics laboratory that investigates the basic genomic mechanisms underlying sex-biased organismal and cancer development. Our current scientific frontiers use powerful model systems to unravel the contributions of sex chromosomes and sex hormones to cancer, including the four-core genotype model that generates XX males and XY female individuals (Panten 2024). In parallel, we have developed in mice a highly controlled cancer induction system using chemical carcinogenesis, which complements and deeply enriches the large-scale patient cohorts characterized over the past decade. This approach has resulted in the discovery of how unrepaired DNA lesions persist after chemical insults, resulting in large-scale polarization of mutations in cancer genomes (Aitken 2020), as well as how genetic background shapes the trajectory of cancer evolution (Aitken 2026). We also repurpose technologies like microfluidics to better understand the molecular landscape of the earliest mitoses after mutagenesis (Ginno 2024).

Our current research programs intersect large-scale genetic analysis utilizing experimental models, spatial biology, single-cell sequencing, tumorigenesis and mutagenesis. We have several projects that delve into fundamental forces driving sex-specificity in tumourigenesis, organismal development, and spatial biology of liver. We are investigating the principles of lesion segregation (Aitken 2026), which is a mechanism underlying the acquisition and passage of somatic lesions throughout tumor progression. We also study sex-specific molecular differences within the acquisition and maintenance of malignancies, the identification and classification of cellular populations and niches and the development of both classical and AI/ML-based computational approaches to condense and interpret the full breadth of genetic and molecular changes associated with cancer inception.

We are seeking an ambitious postdoctoral researcher to lead a team of technicians, masters, and graduate students to pioneer our next generation of discoveries. Experimental expertise in molecular and genome biology, a basic level of computational fluency, and proven collaborative leadership are all absolutely required for this post. We have strong and long-standing alliances with the laboratories of Edith Heard, Dana Pe'er, Oliver Stegle, and Angela Goncalves, with whom joint appointments are possible. We prioritize hiring the right person – and after that, together we shape a cutting-edge project to bridge the candidate's interest and expertises with our active research directions.

CITATIONS

Aitken SJ, Anderson CJ, Connor F, Pich O, Sundaram V, Feig C, Rayner TF, Lukk M, Aitken S, Luft J, Kentepozidou E, Arnedo-Pac C, Beentjes SV, Davies SE, Drews RM, Ewing A, Kaiser VB, Khamseh A, Lopez-Arribillaga E, Redmond AM, Santoyo-Lopez J, Sentis I, Talmane L, Yates AD, Liver Cancer Evolution C, Semple CA, Lopez-Bigas N, Flicek P, Odom DT, Taylor MS. Pervasive lesion segregation shapes cancer genome evolution. **Nature**. 2020;583(7815):265-70. https://doi.org/10.1038/s41586-020-2435-1

Aitken SJ, Connor F, Feig C, Rayner TF, Lukk M, Luft J, Aitken S, Arnedo-Pac C, Hayes JF, Nicholson MD, Ewing A, Sundaram V, Verburg JC, Connelly J, Anderson CJ, Behm M, Campbell S, Daunesse M, Kaiser VB, Kentepozidou E, Pich O, Redmond AM, Santoyo-Lopez J, Sentis I, Talmane L, Liver Cancer Evolution C, Flicek P, Lopez-Bigas N, Semple CA, Taylor MS, Odom DT. Genetic background sets the trajectory of experimental cancer evolution. **Nature**. 2026. https://doi.org/10.1038/s41586-026-10821-z

Ginno PA, Borgers H, Ernst C, Schneider A, Behm M, Aitken SJ, Taylor MS, Odom DT. Single-mitosis dissection of acute and chronic DNA mutagenesis and repair. **Nature Genetics**. 2024;56(5):913-24. https://doi.org/10.1038/s41588-024-01712-y

Panten J, Del Prete S, Cleland JP, Saunders LM, van Riet J, Schneider A, Ginno P, Schneider N, Koch ML, Chen X, Gerstung M, Stegle O, Arnold AP, Turner JMA, Heard E, Odom DT. Four Core Genotypes mice harbour a 3.2MB X-Y translocation that perturbs Tlr7 dosage. **Nature Communications**. 2024;15(1):8814. https://doi.org/10.1038/s41467-024-52640-8