DÁVID SZÜTS

HUN-REN Research Centre for Natural Sciences
Institute of Molecular Life Sciences

Address: Magyar Tudósok körútja 2.,
H-1117 Budapest, Hungary

RESEARCH AREA

Studies of my group are aimed at molecular details and interactions of the processes that generate mutations in the genome, particularly via the bypass of DNA damage during replication. The accumulation of mutations in somatic cells is essential for tumorigenesis. Often, cells acquire a mutator phenotype through the inactivation or modification of DNA damage tolerance pathways that enables them to accumulate further mutations in key cancer genes.

Several distinct cellular mechanisms exist that enable the bypass of DNA damage during replication. We are studying each of these distinct mechanisms, using a range of biochemical, genetic and genomic approaches. We pioneered the use of whole genome sequencing in cell lines to measure the mutagenic effect of the loss of various DNA repair capabilities. We use cell culture experiments to model the mutagenic processes that take place in tumours, to help treatment selection based on the cancer mutation patterns. We also work with clinicians on the analysis of tumour genomic data to better understand the aetiology, the effect of mutagenic treatments and the evolution of resistance.

TECHNIQUES AVAILABLE IN THE LAB

Both experimental and bioinformatics methods are employed in our research. Experimental methods: standard molecular biological techniques, cell culture, cell viability assays, gene knockouts. Bioinformatical methods: analysis of genomic and transcriptomic datasets from next generation sequencing, mutation detection, data display.

SELECTED PUBLICATIONS

Martinek, R., Lózsa, R., Póti, Á., Németh, E., Várady, G., Szabó, P., & **Szüts, D.** (2024). Comprehensive investigation of the mutagenic potential of six pesticides classified by IARC as probably carcinogenic to humans. **Chemosphere 362**: 142700.

Lózsa, R., Németh, E., Gervai, J. Z., Márkus, B. G., Kollarics, S., Gyüre, Z., Tóth, J., Simon, F., & **Szüts, D.** (2023). DNA mismatch repair protects the genome from oxygen-induced replicative mutagenesis. **Nucleic Acids Res 51**(20): 11040–11055.

Gyüre, Z., Póti, Á., Németh, E., Szikriszt, B., Lózsa, R., Krawczyk, M., Richardson, A. L., & **Szüts, D.** (2023). Spontaneous mutagenesis in human cells is controlled by REV1-Polymerase ζ and PRIMPOL. **Cell Rep 42**(8): 112887.

Szüts D. (2022). A fresh look at somatic mutations in cancer. **Science 376**(6591): 351–352.

Chen, D., Gervai, J. Z., Póti, Á., Németh, E., Szeltner, Z., Szikriszt, B., Gyüre, Z., Zámborszky, J., Ceccon, M., d'Adda di Fagagna, F., Szallasi, Z., Richardson, A. L., & **Szüts, D.** (2022). BRCA1 deficiency specific base substitution mutagenesis is dependent on translesion synthesis and regulated by 53BP1. **Nat Commun 13**(1): 226.