



# Jiří Hejnar

jiri.hejnar@img.cas.cz

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[www.img.cas.cz/research/jiri-hejnar](http://www.img.cas.cz/research/jiri-hejnar)



LABORATORY OF

## VIRAL AND CELLULAR GENETICS

receptors for retroviruses, retroviral vectors, endogenous retroviruses, latency of retroviruses, epigenetics

### In the picture:

**1. Jiří Hejnar** | **2.** Volodymyr Stepanets | **3.** Kryštof Štafl | **4.** Lenka Mikušová | **5.** David Příkryl | **6.** Josef Geryk | **7.** Filip Šeniql | **8.** Albert Font-Haro | **9.** Vít Karafiát | **10.** Helena Farkašová | **11.** Anna Lounková | **12.** Vladimír Pečenka | **13.** Dalibor Miklík | **14.** Tomáš Hron | **15.** Martina Slavková | **16.** Dana Kučerová | **17.** Lubomíra Pecnová | **18.** Kateřina Trejbalová | **19.** Mária Gašpareková

Retroviruses enter host cells after specific binding of retroviral envelope proteins to host cell receptors. The specificity of envelope-receptor interaction dictates the host susceptibility or resistance to certain retrovirus. Retroviruses can broaden their host range by mutations of the env gene, and vice versa, host cells develop resistance to retroviruses by mutations of genes encoding the specific receptors. Avian leukosis virus subgroup J [ALV-J], an important pathogen of domestic poultry, infects chickens and turkeys, whereas other galliform species are resistant thanks to a single amino-acid substitution in cell surface Na<sup>+</sup>/H<sup>+</sup> exchanger [NHE1], the receptor for ALV-J. We screened the NHE1 receptor in wild bird species in order to predict the spread of ALV-J in its natural reservoirs. We identified four species of New World quails susceptible to ALV-J.

Another defence mechanism used by the host cells is inactivation of the integrated invaders at the level of transcription via DNA methylation and modifications of adjacent histones. This epigenetic regulation governs the latency of HIV, which is the major obstacle in the HIV cure. We studied the development of DNA methylation of the latent HIV-1 provirus in cell line models and in long-term-infected individuals.

Last but not least, our laboratory deals with endogenous retroviruses. When screening the newly released whole genome sequences of mammalian species using a new two-step computational procedure, we discovered a new endogenous retrovirus in the genome of Malayan colugo. These proviral sequences turned out to be the first endogenous lentivirus identified in the Euarchonta lineage, which includes primates, and represents the oldest member of the lentivirus genus.

### Selected recent papers:

Plachý J, Reinišová M, Kučerová D, Šeniql F, Stepanets V, Hron T, Trejbalová K, Elleder D, Hejnar J: Identification of New World Quails Susceptible to ALV-J Infection. **J. Virol.**, in press, 2017.

Trejbalová K, Kovářová D, Blažková J, Machala L, Jilich D, Weber J, Kučerová D, Vencálek O, Hirsch I, Hejnar J: Development of 5' LTR DNA methylation of latent HIV-1 provirus in cell line models and in long-term-infected individuals. **Clin. Epigenetics**, 8: e19, 2016.

Hron T, Farkašová H, Padhi A, Pačes J, Elleder D: Life history of the oldest lentivirus: characterization of ELVgv integrations in the dermopteran genome. **Mol. Biol. Evol.** 33: 2659-2669, 2016.

