

CEIPEX MU TOPIC 5

Položka / Field	Obsah / Content
NAME	Petr Těšina, PhD
CEIPEX RESEARCH TOPIC LEVEL2	Structural Biology: coupled transcription & translation, translational control
NAME OF THE RESEARCH GROUP	Translation Control
TOPIC	Translation Control
ABSTRACT	Age-related neurodegenerative diseases present a major global health challenge. A fundamental unresolved question is how translational stress disrupts protein synthesis in neurons, causing ribosomes to stall and collide, creating molecular “traffic jams” that threaten cellular proteostasis. Neurons respond through collision-sensitive surveillance pathways, including an early translational repression mechanism that acts as a brake by limiting further ribosome loading onto affected mRNAs. The project will define this protective response from the atomic mechanism to its organization inside intact neurons using two complementary structural approaches. First, single-particle cryo-EM will determine the high-resolution structure of the translational repression complex on collided ribosomes, revealing the interfaces that couple collision recognition to translational repression. Second, cryo-electron tomography will visualize the native three-dimensional translational landscape of stressed neurons and map ribosome states and collision-associated assemblies across the soma, dendrites and axons. Together, these approaches will provide a multi-scale structural framework for understanding how neurons reorganize translation during acute translational stress and how failures in collision-responsive surveillance may contribute to neuronal vulnerability in ageing and neurodegenerative disease.
WEBPAGE OF THE RESEARCH GROUP	https://www.ceitec.eu/translation-control/rg396