2025 Winner of the Eppendorf Award for Young European Investigators
Dr. Varun Venkataramani

»I am deeply honored and grateful to receive the 2025 Eppendorf Award for Young European Investigators. This recognition reflects the dedication and innovative spirit of my entire research team, whose tireless efforts have made our discoveries possible. I extend my sincere thanks to my mentors, collaborators, and family for their unwavering support throughout this journey. The award acknowledges our contributions to understanding the complex interplay between neurons and cancer cells in brain tumors. Our work has revealed how cancer cells form synapses with neurons and exploit neuronal mechanisms for tumor growth and invasion. These findings are establishing cancer neuroscience as a new field at the intersection of neuroscience and oncology. Looking forward, we remain committed to developing innovative approaches to map brain cancer connectomes and translate our findings into effective therapies. We hope that our research will ultimately lead to neuroscience-instructed treatment strategies that improve outcomes for patients with brain tumors, for whom current therapeutic options remain limited.«

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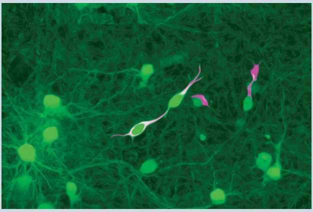

Stylized depiction of glioblastoma cells (purple and green) with their tumor-connected (neurons)

Discovery and Characterization of Synaptic Neuron-Tumor Networks Driving Brain Tumor Progression

The brain's delicate network of neurons communicates through specialized junctions called synapses, enabling complex functions from memory formation to conscious thought. Our research has uncovered a startling phenomenon: brain cancer cells can integrate into this neural network by forming functional synapses with neurons. These neuron-to-cancer cell synapses represent a previously unknown mechanism by which brain tumors interact with their surrounding environment.

We could demonstrate that glioblastoma, an aggressive brain cancer, receives direct synaptic input from neurons. These connections are not mere physical contacts but functional glutamatergic synapses that transmit electrical signals. Most surprisingly, this synaptic communication drives tumor growth and facilitates cancer cell invasion throughout the brain.

We pioneered methodologies to investigate neuron-tumor networks and multicellular cancer networks in general. By developing advanced imaging approaches we created new ways to visualize these interactions in living tissue with unprecedented resolution. Our lab has also established novel tracing methods to map the connectivity between neurons and cancer cells across the entire brain.

By mapping the molecular architecture of these connections, we discovered that cancer cells express neurotransmitter receptors similar to those found in neurons and we identified cellular states within tumors that are particularly prone to connect with neurons. Our recent work further revealed that glioblastoma cells adopt neuron-like characteristics to navigate the brain, hijacking neuronal mechanisms to facilitate their spread.

Looking forward, we remain committed to further developing technologies to visualize and map neuron-tumor connections across the entire brain, creating a comprehensive "cancer connectome." Understanding these networks may lead to novel therapeutic strategies that disrupt neuron-tumor communication, potentially overcoming the treatment resistance that characterizes brain tumors.

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