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Metabolic and Neural Regulation of Immunity and Cancer

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Abstract

It has become clear that not only multiple molecular mechanisms, both intrinsic and extrinsic, but also numerous metabolites converge to alter core cellular metabolism during tumorigenesis. This state of affairs has made it difficult to analyse precisely the roles that key metabolites play in immune cell functions and/or cancer. Fortuitously, the finding that certain mutations in particular metabolic enzymes, such as isocitrate dehydrogenase, can give rise to malignancies such as gliomas, acute myeloblastic leukemia (AML) and angioimmunoblastic T cell lymphoma (AITL) give us avenues to comprehending metabolic and epigenetic pathways that are important in both in tumorigenesis and immune responses. Another metabolite that plays an important linking role between a seemingly unconnected biological process and immunity is acetylcholine. Although choline has been known for decades to be involved in neurotransmission, its deficiency has been shown to cause liver cancer. Our laboratory has reported several findings supporting the intriguing proposition that neurotransmitters like norepinephrine and acetylcholine may be key components that tie the neuronal system to the regulation of immune responses. In this presentation, I will discuss our findings dissecting the roles of important metabolic elements and neurotransmitters in immune cell regulation and diseases such as infections, autoimmune diseases and cancer development.