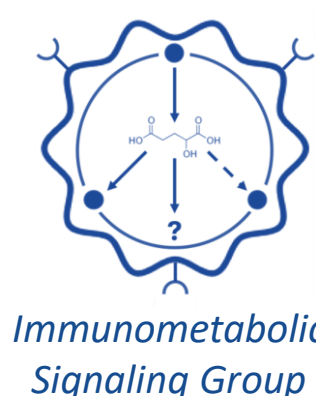


How cellular metabolism regulates the function and differentiation of immune cells?

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Immunometabolism is a new and rapidly expanding interdisciplinary field of research, which integrates immunological concepts-at both the cellular and organismal levels-with cell and molecular biology, biochemistry, and analytical chemistry. The fundamental research question that immunometabolism seeks to answer is how metabolism-both within individual immune cells and throughout the entire organism-regulates the function and differentiation of immune cells. Our group investigates how metabolic signals shape immune responses in inflammation, obesity and cancer. We combine immune-cell phenotyping by flow cytometry, techniques, such as RNAseq, ¹³C Metabolic tracing (GC-MS), qRT-PCR, Western-blotting, lipidomics, Seahorse respirometry, confocal microscopy and murine *in vivo* genetic models. This multidisciplinary approach allows us to study immunometabolic regulation across multiple biological scenarios, from intracellular signaling pathways to organismal level responses particularly in inflammation and obesity.

Mitochondria as signaling organelles

Traditionally viewed as cellular powerhouses, mitochondria are now recognized as critical signaling platforms. Our previous research has significantly contributed to the understanding of how mitochondrial reactive oxygen species (ROS) regulate T cell activation and intracellular signaling pathways. Thus, we investigate how mitochondrial metabolism communicates with transcriptional and signaling networks that determine immune-cell function and fate.

Glycerol metabolism in immunity

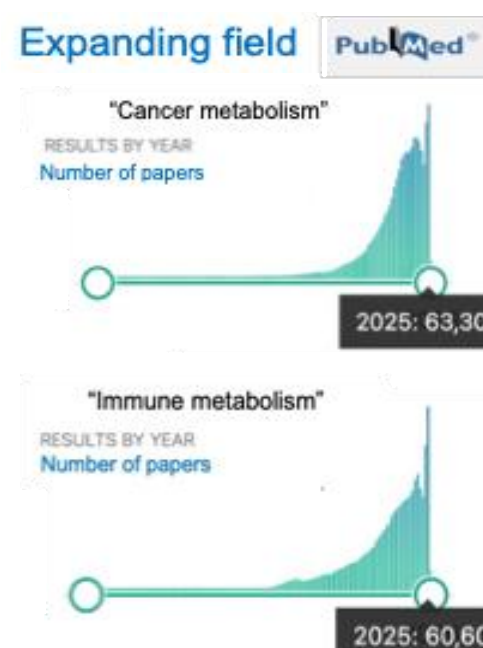
A major focus of our current work is the role of glycerol metabolism in immune regulation. We study how activated T cells utilize glycerol, how mitochondrial glycerol metabolism contributes to immune-cell activation, and how the enzyme glycerol-3-phosphate dehydrogenase (**GPD2**) integrates metabolic and signaling functions within the cell. These mechanisms may be particularly important in obesity, where elevated glycerol concentrations are present within adipose tissue.

Lipid Metabolism and Immune Function

In particular, our research explores how lipid metabolism controls T cell activation, differentiation, and inflammatory responses, particularly in obesity-associated chronic inflammation.



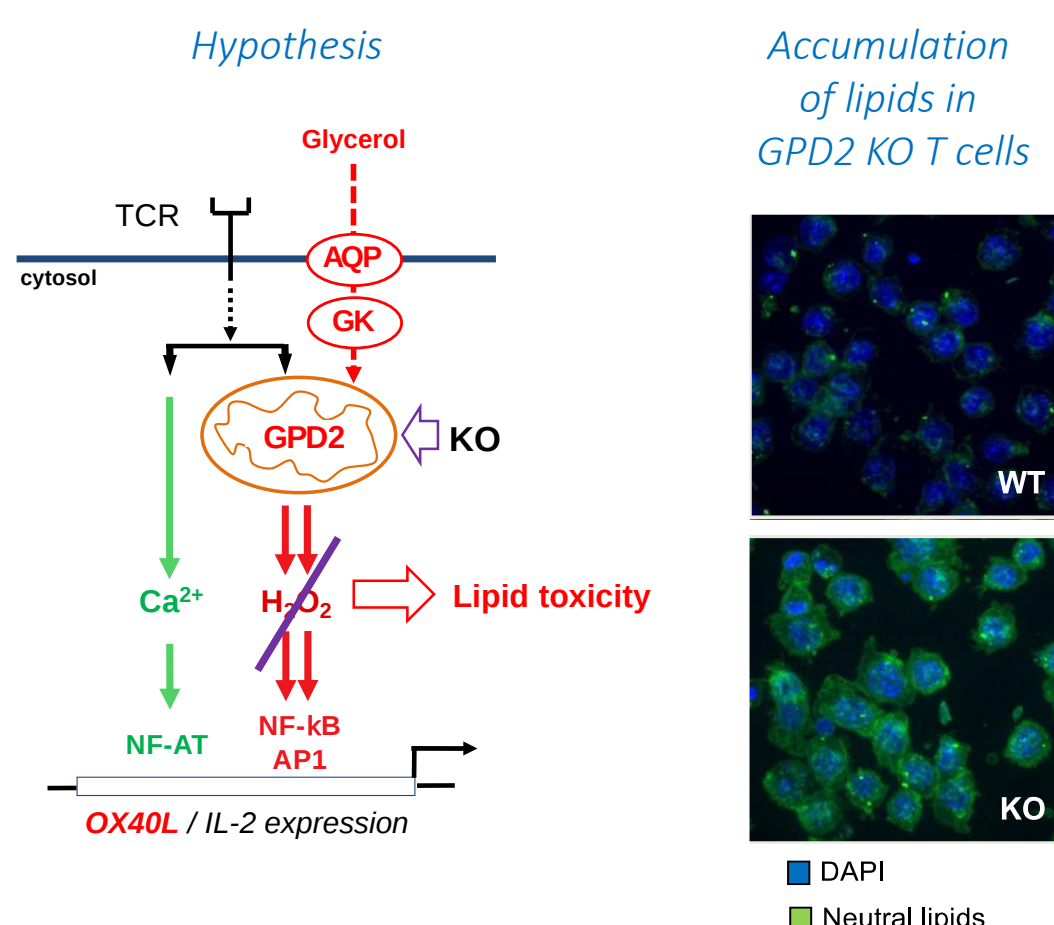
Hanahan D and Weinberg R.A. Cell 2011



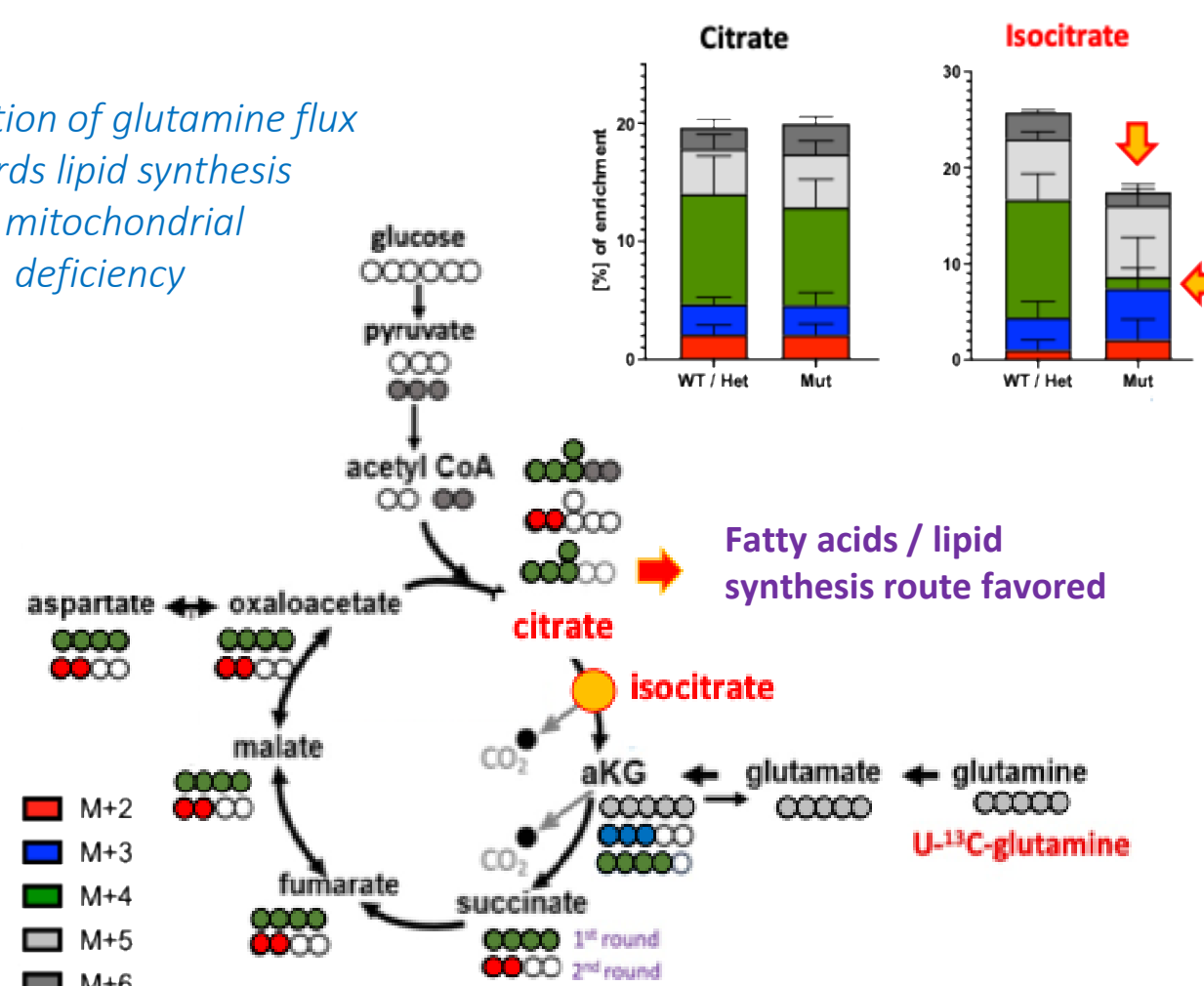
To answer the question:

How metabolism controls the function of immune and cancer cells?

Does glycerol influx and GPD2 regulate obesity-induced T cell hyper-activation and fat infiltration ?



Re-direction of glutamine flux towards lipid synthesis by mitochondrial deficiency



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