Title: Metabolic Processing By The mTORC1 Pathway In The Zebrafish Yolk Cell

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Abstract: Regulation of the *mechanistic target of rapamycin complex 1* (mTORC1) pathway is essential to regulate cellular metabolism and has important implications in human health. mTORC1 receives and integrates multiple signals including growth factors, amino acids, stress, oxygen, and energy status to control anabolic and catabolic processes in the cell. As this pathway is the key metabolic sensor in the cell, it is required to strike a balance between energy intake and energy demands. Disregulation of mTOR-associated pathways has been observed in patients afflicted with type-2 diabetes, obesity, and certain cancers. Our laboratory has identified a potential role for mTORC1 signaling in regulating embryonic yolk absorption in the freshwater teleost, zebrafish (*Danio rerio)* and based on our preliminary findings, **we hypothesize that mTORC1 signaling is essential for yolk absorption in the zebrafish yolk cell.** Here, we used the macrolide Rapamycin to specifically inhibit the mTORC1 signaling pathway and assessed yolk absorption over 6 days of development. We found that inhibiting the mTORC1 pathway prevents complete yolk absorption and results in a smaller, but still viable zebrafish larvae. Numerous signaling pathways are known to measure nutrient levels and regulate the mTORC1 complex to promote cell growth and inhibit autophagy, however, the pathways regulating yolk absorption are unknown. Currently, we are using CRISPR-mediated inhibition to autonomously knockdown various regulators of the mTORC1 signaling complex expressed in the yolk cell. Using this method, we hope to identify the molecular pathways that regulate yolk absorption and further our understanding of the mTORC1 signaling complex.