

P015 Prolonged stimulation of muscle protein synthesis by leucine in neonates is dependent on amino acid availability

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The rise in amino acids and insulin after a meal independently stimulate protein synthesis in skeletal muscle of neonates by activating the intracellular signalling pathways that regulate mRNA translation. Leucine, in particular, is important in mediating the response to amino acids. Previously, we showed that a 1 h infusion of leucine increased protein synthesis, but this response was not sustained for 2 h, likely because the circulating amino acids decreased as they were utilized for protein synthesis. This study aimed to determine whether leucine infusion can stimulate protein synthesis for a prolonged period when baseline fasting amino acid concentrations are maintained. Overnight fasted neonatal pigs were infused for 24 h with saline, leucine, or leucine with replacement amino acids. Muscle protein synthesis was increased by leucine, but only when circulating levels of the other amino acids were maintained at fasting levels. Leucine had no effect on upstream activators of mTOR, i.e., PKB, AMPK, and TSC2, nor eEF2. Additionally, no effect of treatment was found for the association of mTOR with raptor, GβL, or rictor. Phosphorylation of mTOR and its downstream targets, 4EBP1 and S6K1, and eIF4E-eIF4G association were increased by leucine, in the absence and presence of replacement amino acids. Thus, prolonged infusion of leucine activates mTOR and its downstream targets in skeletal muscle; however, protein synthesis stimulation is dependent upon amino acid availability.