

WP 1: Characterisation of glycolytic and ketogenic metabolic pathways following diets of industrial refined proteins

Background: The use of whey protein as a source of amino acids and its effect on reducing risks of diseases such as heart disease, cancer and diabetes [6,7] is the focus of ongoing research [8]. Whey is an abundant source of branched-chain amino acids that stimulates protein synthesis. In particular, leucine plays a key role in initiating the transcription of protein synthesis. When leucine is ingested in high amounts, there is greater stimulation of protein synthesis, which can speed recovery and adaptation to increased exercise [9].

Objectives: ☐To acquire data on possible changes in metabolic fluxes in liver and muscles following a dietary shift to proteins with varying amino acid composition obtained from industrial refined whey; ☐To compare effects of whey, hydrolyzed whey, sugars, casein and hydrolyzed casein on the postprandial diabetic glucose response. ☐ To study the effect of varying amino acid load (e.g. low glycine) in nutrients on growth processes in experimental tumor tissue and secondly the effect in patient cancers.

Method: Based on the [1-13C]pyruvate (animals and humans) metabolic flux will be examined in liver, kidneys and muscle. Additionally, an array of [1-13C]amino acids bio-probes to transaminase activities will be applied in animals (pigs). Full authorization to include humans is expected early 2014. The first patients will include prostatic cancers [10]. However, initially we will emphasize animal based studies as high metabolic similarity between the two species has been established [11].

Outcome: Data on metabolic effects of modified protein content in the most important organs; evidence on whether dietary adjustments can change tumour metabolism.

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