With an AA intake identical to whey, a vegetable protein meal presents alterations in the arterial bioavailability of certain AAs in the elderly

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Background

Sarcopenia is a consequence of muscle anabolic resistance associated with a decrease of protein intake and inefficiency.

Objectives

JPI "Appetite" objectives is to develop mixtures of vegetable proteins / fibers for seniors and to compare them to whey for their effectiveness on protein metabolism, mobility, muscle functionality and the quality of life

Methods

3 mixtures were developed (PPF (Protein Fiber Product)) based on pea proteins: PPF1 (67% peas, squash), PPF2 (68% peas, oats, almonds) and PPF3 (45% peas, rice, soy). The mixtures were made up in order to be at least equivalent to the FAO protein. The amount of each PPF ingested by the 11 volunteers aged 70+, was calculated to provide the same amount of digestible leucine as 30g of whey (W). Arterialized blood was collected every 30min for 180min. Plasma amino acid (AA) were measured by Accutag (Waters) method. Postprandial "areas under the curve" (iAUC) of each AA, Insulin and glucose were calculated, means ± SE and the difference ($p<0.05$) between the groups by analysis of variance in repeated measures (one way ANOVA).

Results

The total amount of leucine ingested is identical between meals: 3, 2.8, 3.1 and 2.9g for Lac and PPF1,2,3. The same is true for valine, isoleucine, lysine and the sum of sulfur AAs (Met and Cys). The ingestion of aromatic AA (Phe and Tyr) and Arg is higher for PPF vs Lac (+68% and +66%) and that of lower Thr for PPF vs Lac, -35%. 2). The iAUC tended to be lower (-24% for Leu; $p<0.05$ PPF3 vs Lac), -20% for Val (ns), -27% for Ileu, $p<0.05$ for all PPF vs Lac)) . For Thr, the difference is accentuated on the iAUC (-66% vs Lac against -35% for the ingested for all the PPFs). For Met and Cys, despite an identical intake between PPF and Lac, no significant increase in their plasma concentration is observed and the iAUC remains zero for all, unlike that of Lac ($p<0.05$).

Conclusion

The theoretical construction of mixtures of vegetable proteins allowing an identical intake in Leu to 30g of whey does not allow in vivo in healthy elderly men to obtain the same plasma leucinaemias Moreover, at the same ingested, the sulfur-containing AAs do not increase with the PPFs, suggesting a very altered and specific bioavailability for these AAs.. In conclusion, there is a difference in the use and/or metabolism of certain AAs depending on whether they are of plant or animal origin. This aspect should be taken into account in seniors where AA intake may already be reduced.