UNIVERSITY of LIMERICK
OLLSCOIL LUIMNIGH

Study Protocol

The Effect of Milk-Derived Protein Supplementation on the Recovery of Muscle Function following Resistance Exercise

Project context.

In order to maximise training adaptation during a resistance exercise program effective recovery is critical. Exercise-induced muscle damage (EIMD) occur following resistance exercise and, whilst this can lead to positive training effects e.g. increased muscle size, speed & strength, EIMD may also cause muscle soreness & inflammation that have detrimental effects on training and performance.

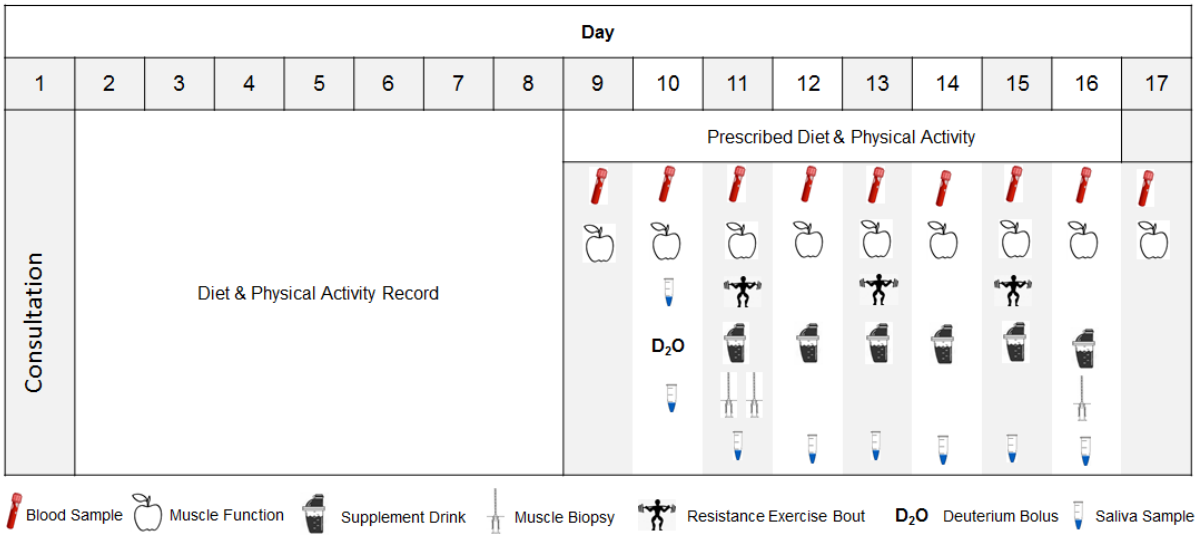
Research Question:

This study aims to analyse the use milk-derived protein supplementation for effective recovery of muscle following resistance exercise.

Study Protocol:

All aspects of the study and risks involved will be explained clearly to all involved.

This study requires **17 DAYS** split into 2 distinct phases, illustrated in Figure 1 and described below. The study will be conducted in the PESS Building at the University of Limerick.



Phase 1: Days 1 – 8

I. Food and fluid intake for every eating occasion, every day for days 1 to 7 under the guidance of a qualified dietician/sports nutritionist.
II. familiarisation resistance exercise / muscle function sessions (around 1 hour each)

Day 1:

Pre-screening: Each subject will undertake preliminary screening consisting of:

i. medical history and examination by a clinician
ii. blood sample (SS023) to be evaluated for health-related contraindications
iii. body composition measurement by DXA to determine whole body and segmental lean tissue mass (SS077);
iv. exercise training log (6 month recall)
v. dietary consultation
vi. habitual physical activity level assessed by EPAQ-2

Day 2 - 8: Subject will be "free-living" during this time. Record of dietary intake under the guidance of a qualified dietitian and sports nutritionist. Physical activity recorded by an exercise physiologist and strength and conditioning coach.

Phase 2: Days 9 - 17

Day 9:

i. Familiarisation sessions to the testing procedures (EHSREC10-RA04, SS014, SS003, SS017, SS035)
ii. A single blood sample (5ml) will be drawn (SS203).

Day 10:

I. In the afternoon 200ml of water containing deuterium (heavy water) will be consumed. A small saliva sample will be collected before and 1 hour after consuming the water.

Days 11-1: A prescribed diet (gratis) is provided. The meal plan (3 meals, 2 snacks, 1 'shake' per day) based on the habitual dietary intake of resistance-trained athletes and standardised to body mass (Table).

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Breakfast	Porridge made with water and coconut oil topped with banana and dried cranberries	Scramble eggs with toasts and avocado	Milk & yoghurt shake with fruits, toasts with peanut butter	Porridge made with milk, seeds and nuts	Omelette with mushrooms and vegetables, toasts with butter	Poached eggs, with grilled back bacon, sandwich with vegetables
Lunch	Beef burger with multigrain bun and vegetables	Wrap with chicken and vegetables	Chicken curry with brown rice	Roasted pork chops with lettuce salad and mashed potatoes	Beef stir-fry with vegetables and rice	Roasted pork chop with beetroot salad and sweet potatoes wedges
Snack	-	Yoghurt with oats and fruits	Sandwich with ham, yoghurt	Pasta with pesto and turkey	Sandwiches with ham cheese and vegetables	Chicken salad with sweet potatoes and sauce based on mayonnaise
Dinner	Chicken Breast in the sauce with spinach and potato wedges	Beef stew	Beef steak with green beans and mashed potatoes	Chicken breast with rice, sauce and broccoli	Tuna salad with bread on the side	Spaghetti Bolognese
Pre-bed snack	Yoghurt with mixed nuts, honey and pear	Smoothie with protein milk, banana and berries	Cottage cheese, toast with butter and sliced tomatoes	Chocolate milk with a banana	Milk , Weetabix and a mandarin	Yoghurt with crunchy cereal clusters and dried fruits

Day 11:

I. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
II. A micro-muscle biopsy sample will be taken from the outside portion of the thigh

III. A prescribed protein supplement will be ingested
IV. A prescribed resistance-exercise Training bout will be completed
V. 3-hours later a 2nd micro-muscle biopsy sample will be taken from the outside portion of the thigh

Day 12:

I. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
II. A series of muscle function tests will be conducted
III. A prescribed protein supplement will be ingested
IV. No further exercise is permitted

Day 13:

V. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
VI. A series of muscle function tests will be conducted
VII. A prescribed resistance-exercise Training bout will be completed
VIII. A prescribed protein supplement will be ingested
IX. No further exercise is permitted

Day 14:

I. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
II. A series of muscle function tests will be conducted
III. A prescribed protein supplement will be ingested
IV. No further exercise is permitted

Day 15:

I. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
II. A series of muscle function tests will be conducted
III. A prescribed resistance-exercise Training bout will be completed
IV. A prescribed protein supplement will be ingested
V. No further exercise is permitted

Day 16:

I. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
II. A series of muscle function tests will be conducted
III. A prescribed protein supplement will be ingested
IV. No further exercise is permitted

Day 17:

I. A fasted venous blood sample (5ml; by venepuncture) is drawn and saliva sample collected.
II. A series of muscle function tests will be conducted

END OF STUDY