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Milk Proteins, Food Intake and Post Meal Glucose Regulation

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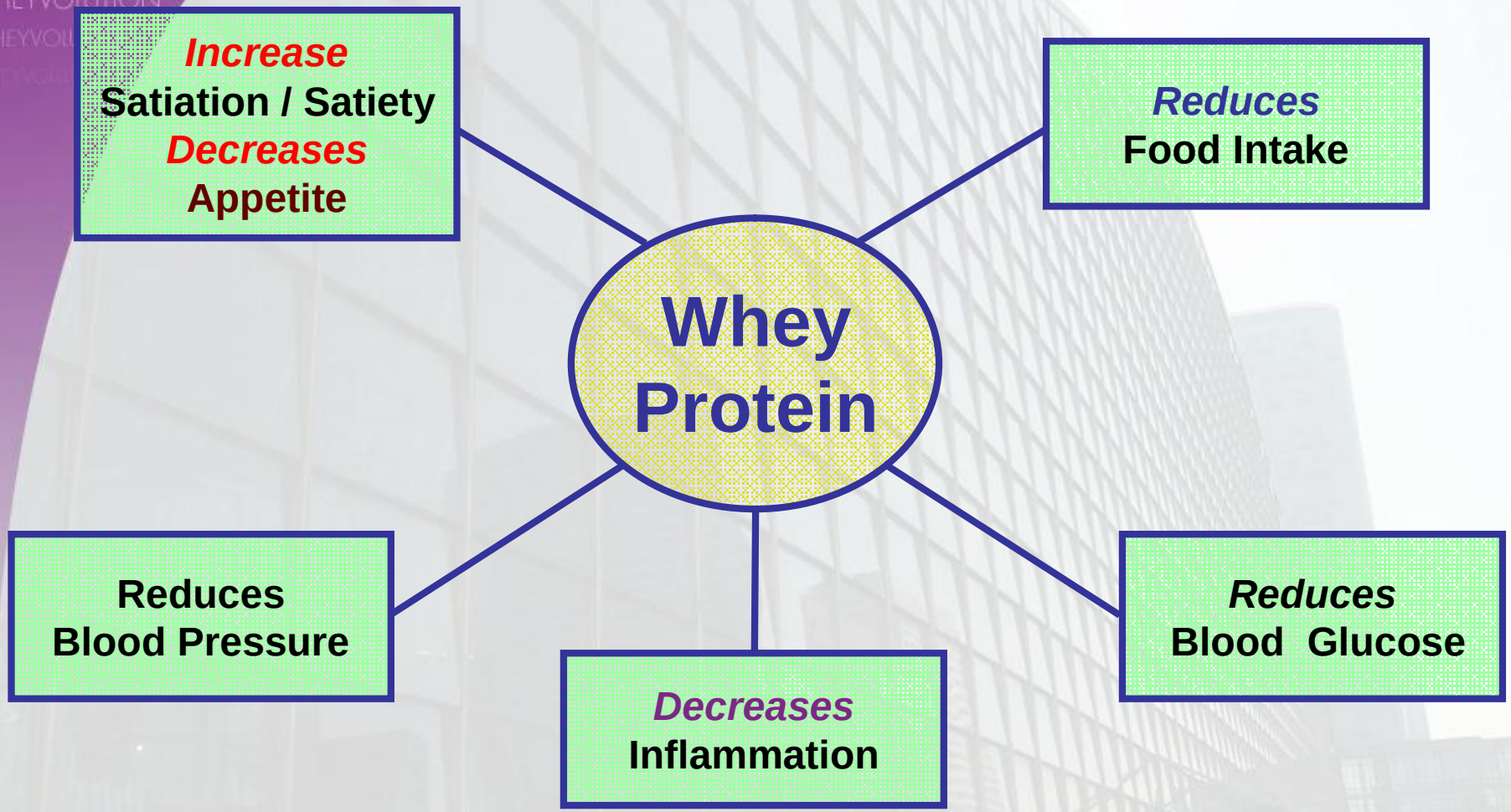
Whey protein, along with other milk proteins, contribute to regulation of food intake and the components of the metabolic syndrome



Luhovyy BL, Akhavan T, Anderson GH: J Am Coll Nutr. 26(6):704S-12S, 2007.

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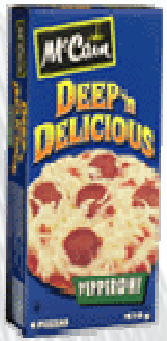
Preloads and Test Meal Food Intake

Calorie-free
(Control)

Defined time e.g. 60 min

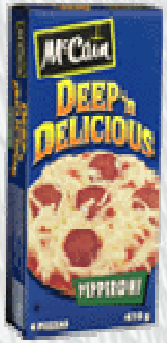


Measure
Food
Intake

900kcal

Test Protein Drink
(50g, 200 kcal)

+ 60 min



Measure
Food
Intake

700kcal?

Caloric
Compensation

$$\frac{900\ (\text{kcal}) - 700\ (\text{kcal})}{200\ (\text{kcal})} \times 100 = 100\%$$

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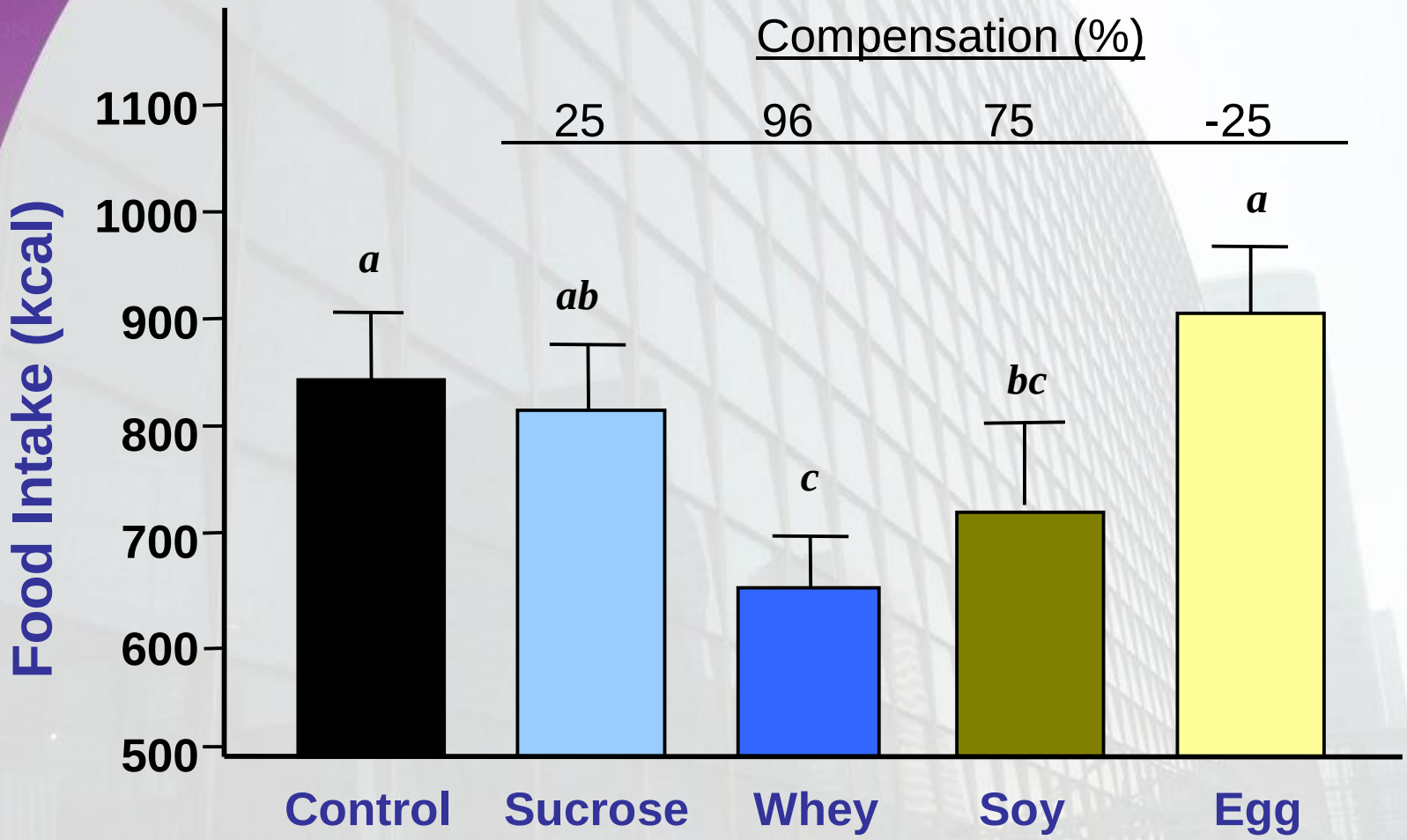
Protein Source (45 g) as Liquid Preload and Food Intake in Young Men at 60 min

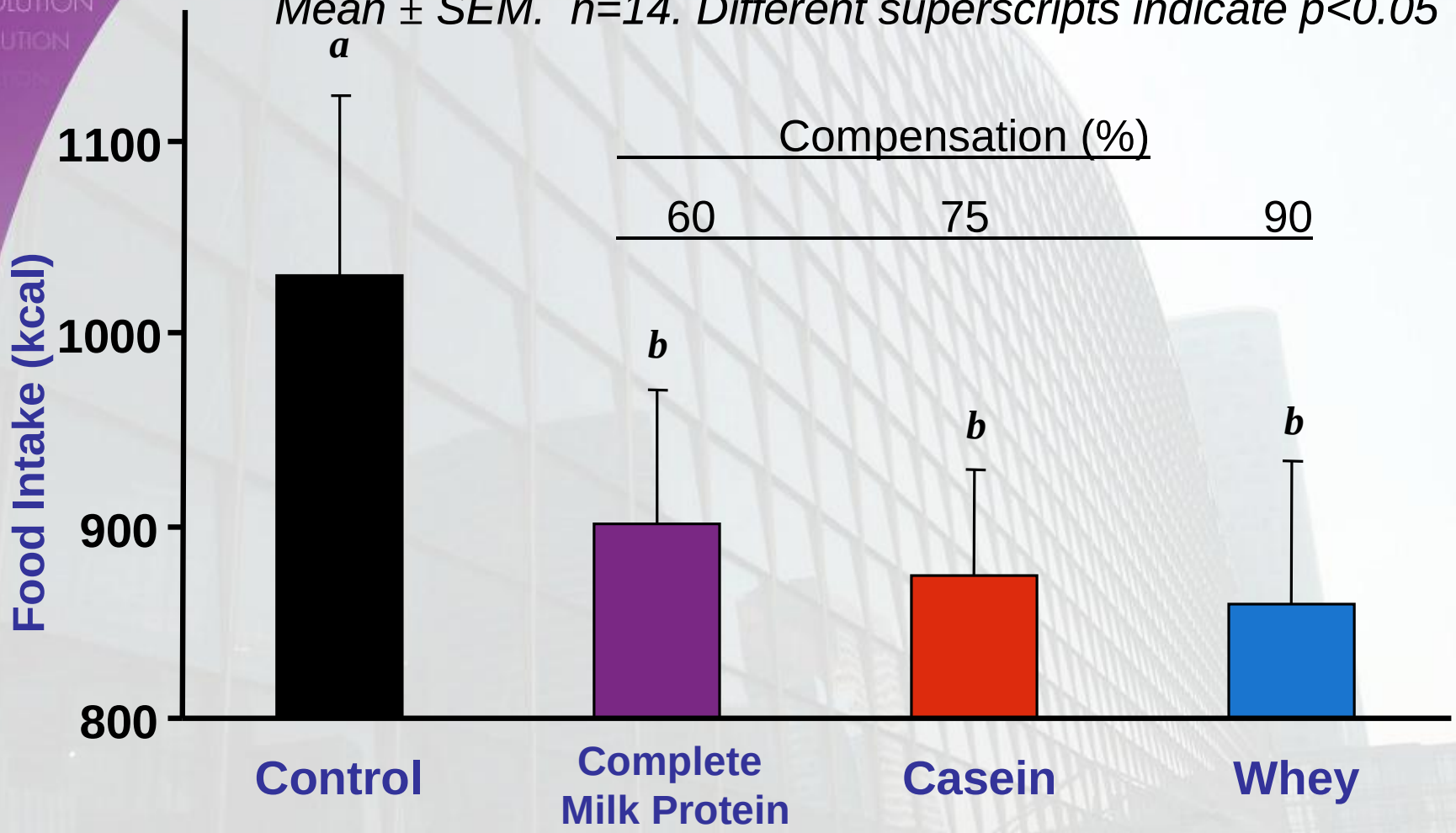
Mean ± SEM. n=14 Different superscripts indicate p<0.05



Anderson GH, Tecimer SN, Shah D, Zafar TA: J Nutr 134 (11):3011-5, 2004.

Milk Proteins (50 g) as Liquid Preloads and Food Intake of Young Men at 90 min

Mean ± SEM. n=14. Different superscripts indicate p<0.05



Moore SE: Thesis (M.Sc.)-University of Toronto, 2004.

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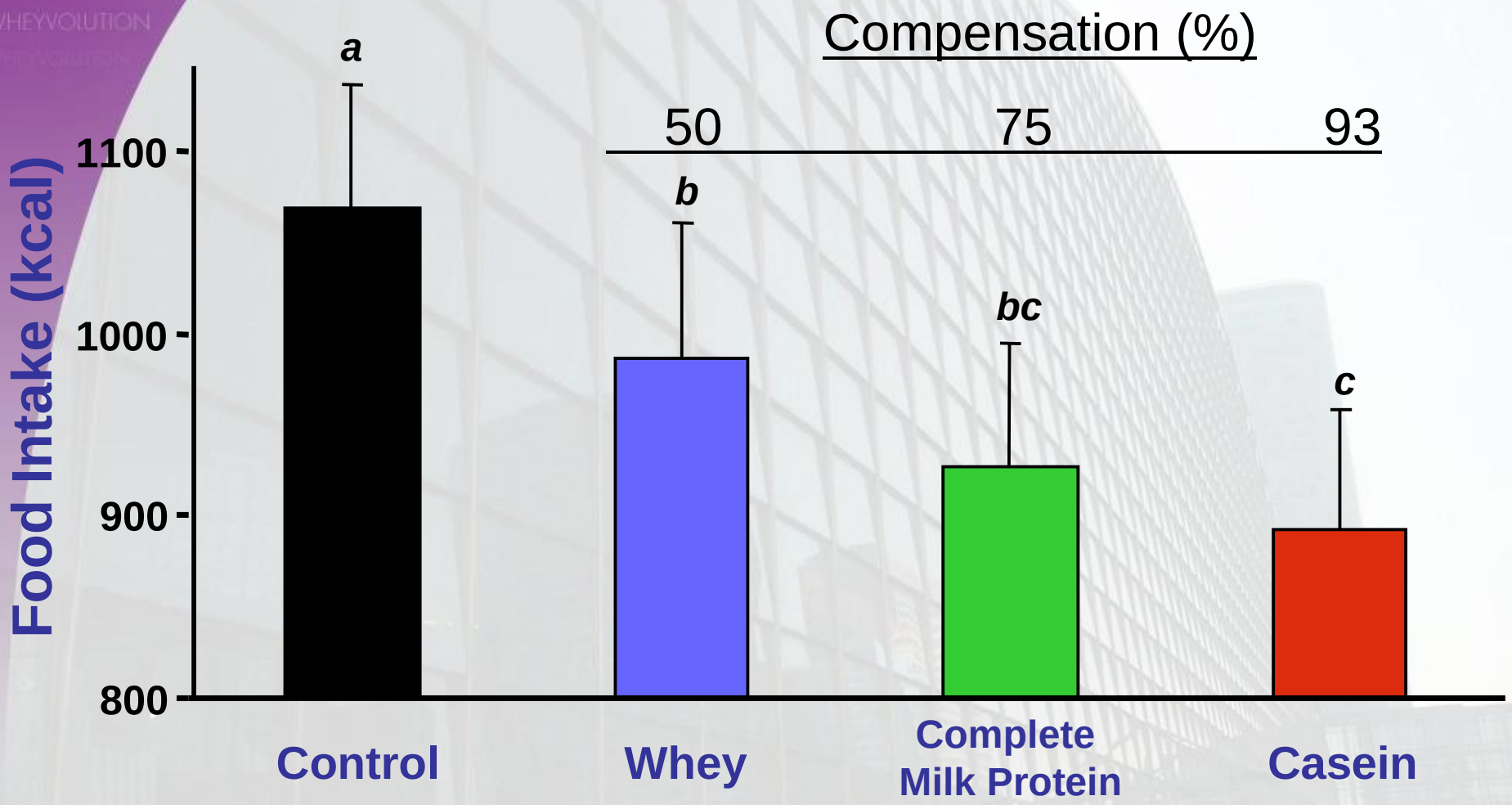
Milk Proteins (50 g) as Liquid Preloads and Food Intake of Young Men at 150 min

Mean ± SEM. N=14 Different superscripts indicate p<0.05



Moore SE: Thesis (M.Sc.)-University of Toronto, 2004.

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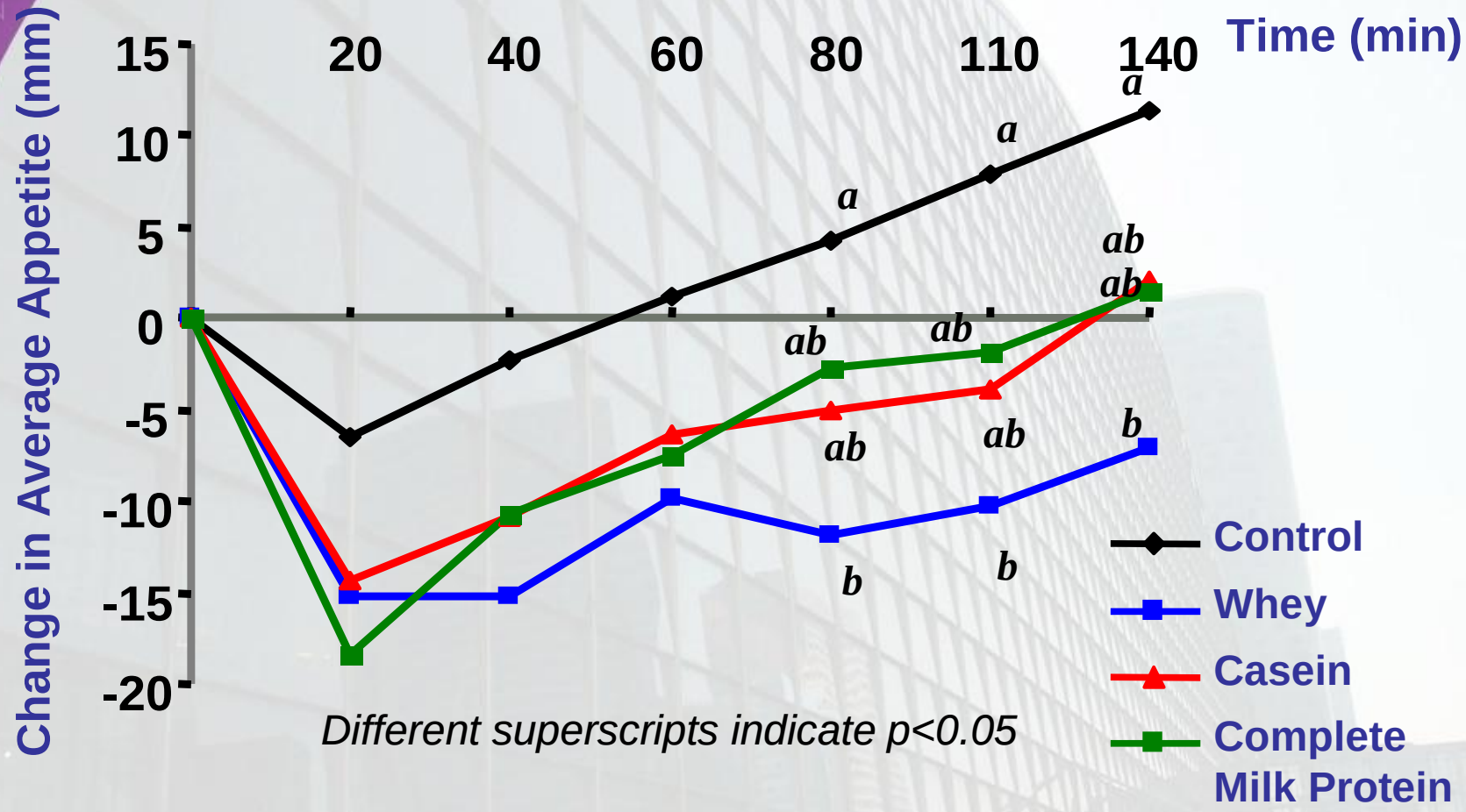
Milk Proteins (50 g) as Liquid Preloads and Average Appetite of Young Men over 140 min



Different superscripts indicate p<0.05

Moore SE: Thesis (M.Sc.)-University of Toronto, 2004.

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But-What about the Dose?

-Food Intake
-Blood glucose?
-Insulin?

Unpublished

Tina Akhavan, Clara Cho, Bohdan Luhovyy, Harvey Anderson

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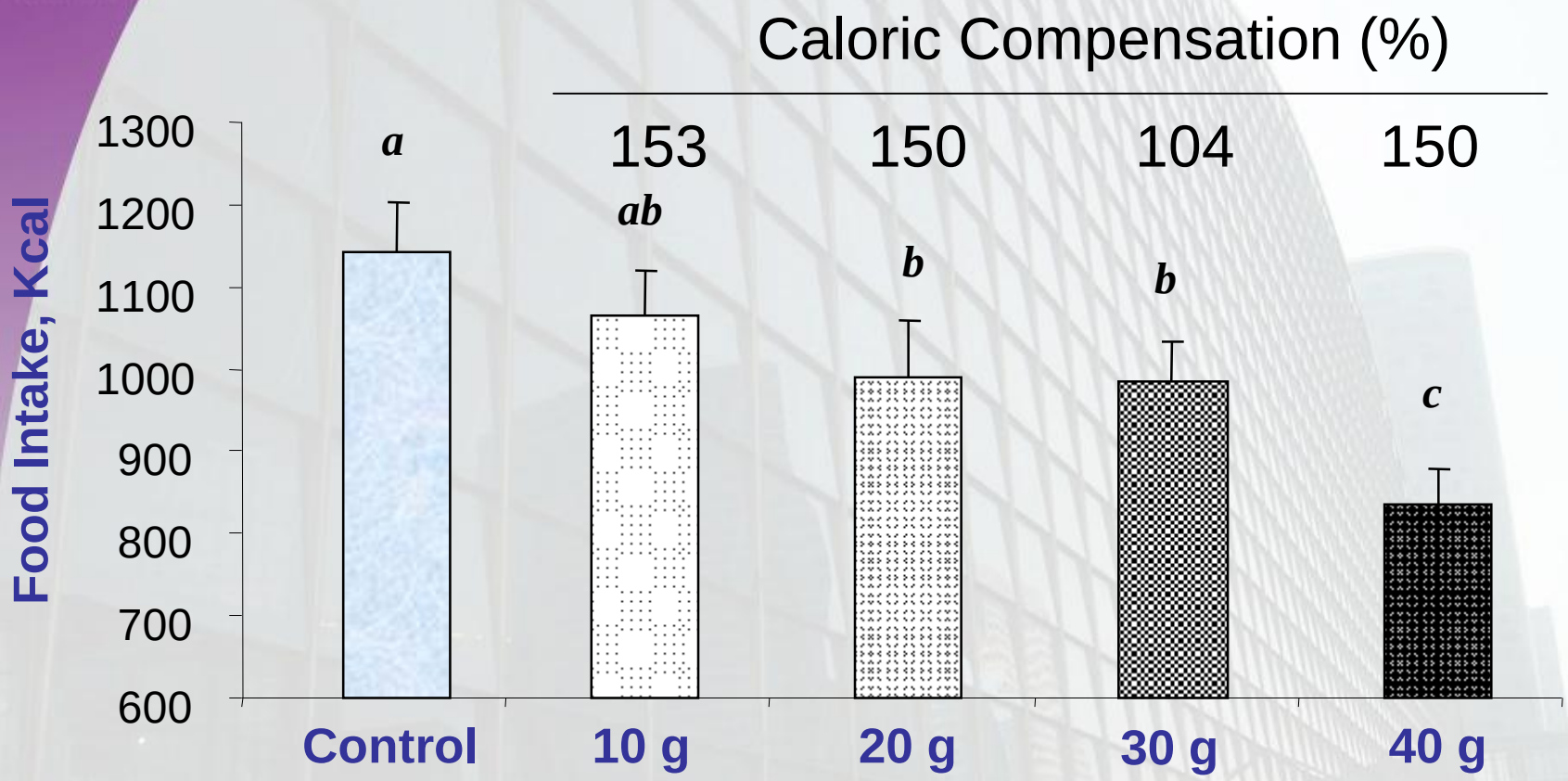
Dose of Whey Protein and Food Intake of Young Men 30 min Later

Mean ± SEM. n=16. Different superscripts indicate p<0.05



Akhavan T: Unpublished data -University of Toronto, 2008.

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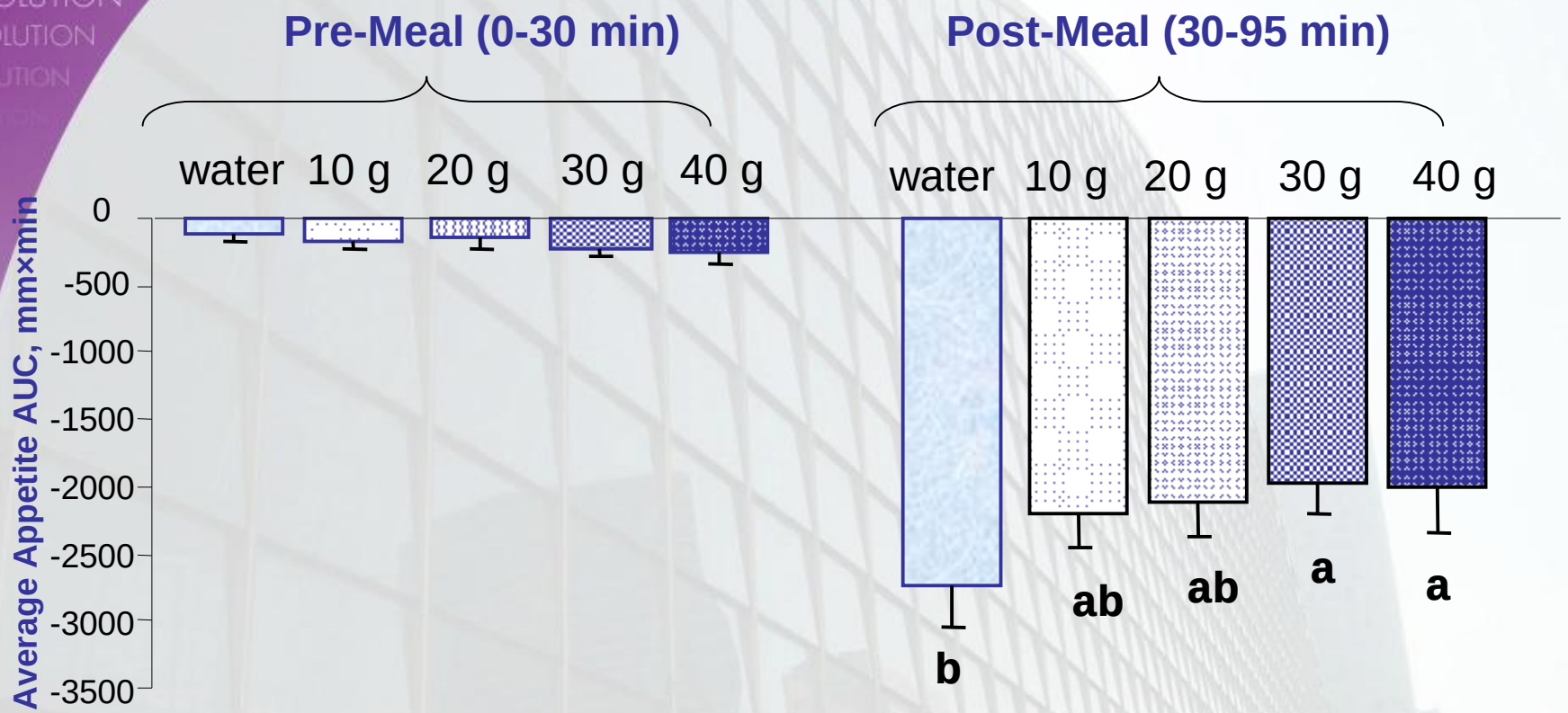
Dose of Whey and Average Appetite



Different superscripts show significant difference among treatments at post-meal (GLM, p< 0.05, n= 16).

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Milk and The Glucose Regulation

Treatment (25g CHO)	Glycemic Index	Insulin Index
W. Bread	100[a]	100[a]
Lactose	68±8[b]	50±6[b]
Whole Milk	30±4[c]	90±8[a]

Ostman EM et al, AJCN 2001, 74:96-100

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Dose Response Study: Fixed Meal: Effects of Whey on Glucose and Insulin

Treatments

1. 5 g whey protein
2. 10 g whey protein
3. 20 g whey protein
4. 40 g whey protein
5. 10 g hydrolyzed whey protein
6. Water (control)

Subjects

Male, n	12
Female, n	12
Age, y	18-25
BMI, kg/m^2	20-24.9

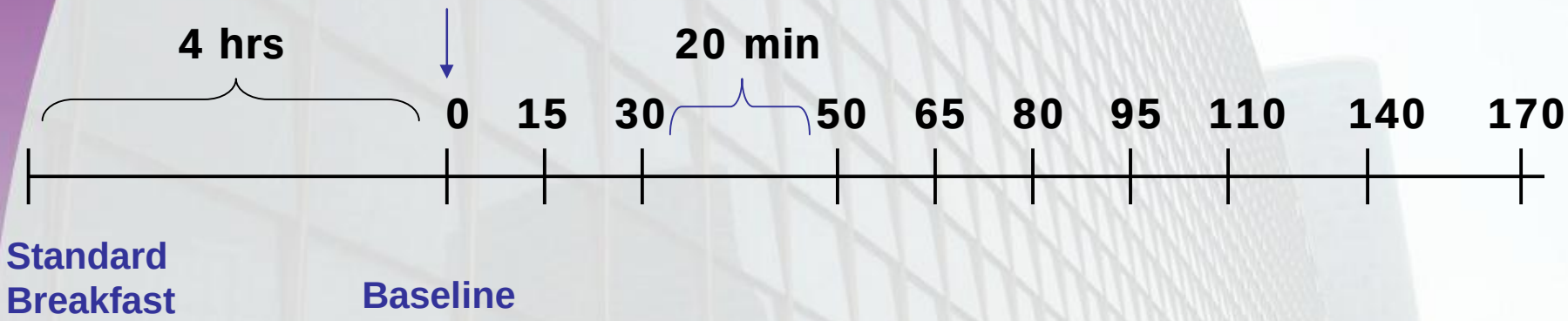
Preloads served in liquid forms (300 ml) in random order.

Additional 100 ml of water was served with preloads. N=12

Protocol

Treatments

Fixed Meal



Blood glucose and blood sample for insulin measurement (Finger Prick)

Average Appetite (Visual Analogue Scale Questionnaire)

Standard Breakfast = 2% milk, orange juice and cereal (340 Kcal)

Fixed Food Intake = 12 kcal/ kg body weight

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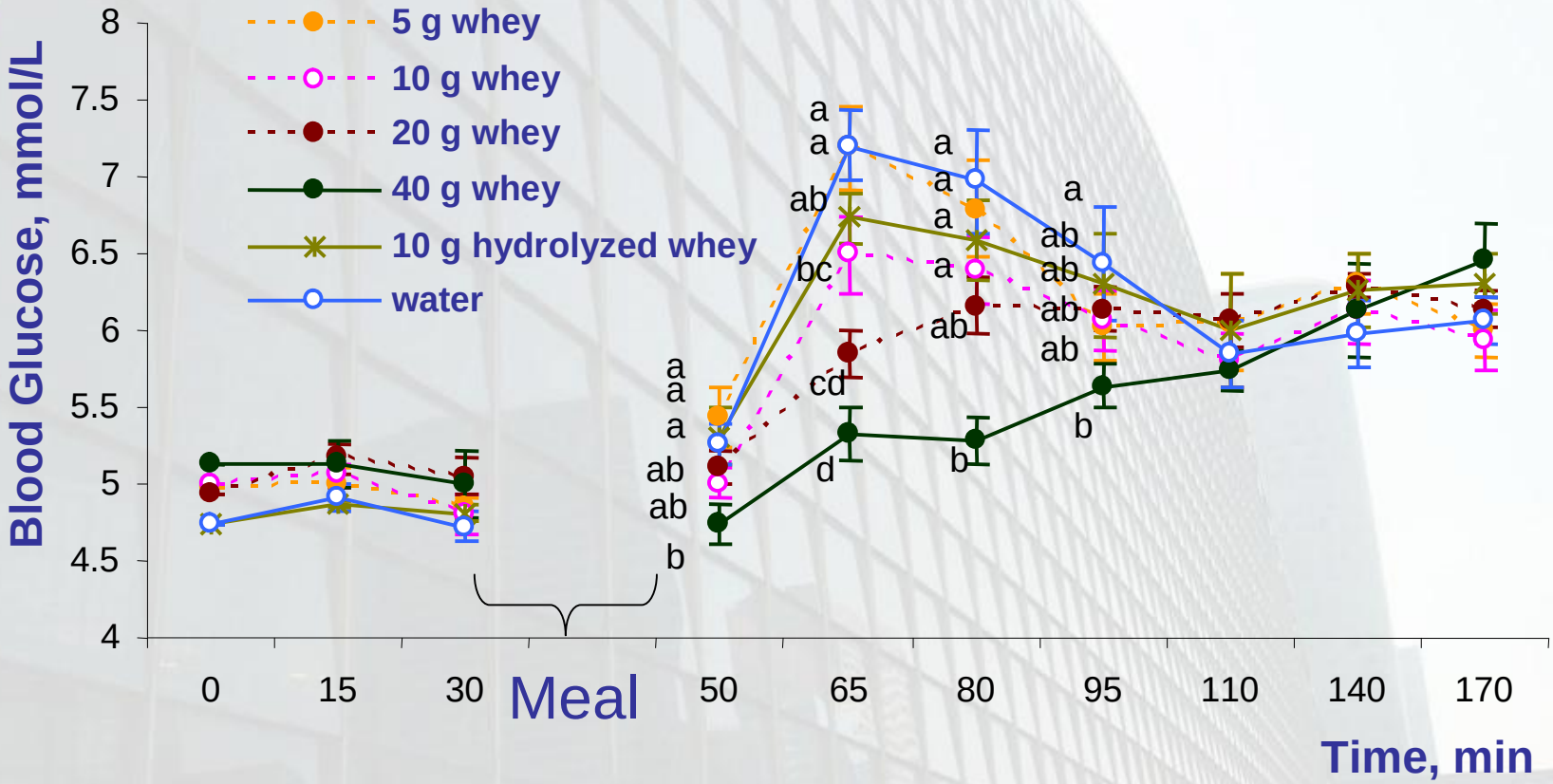
Dose of Whey and Blood Glucose Pre and Post Fixed Meal



Different superscripts are significantly different at each time by one-way ANOVA (GLM, Tukey's post hoc, $p<0.05$, $n = 10$).

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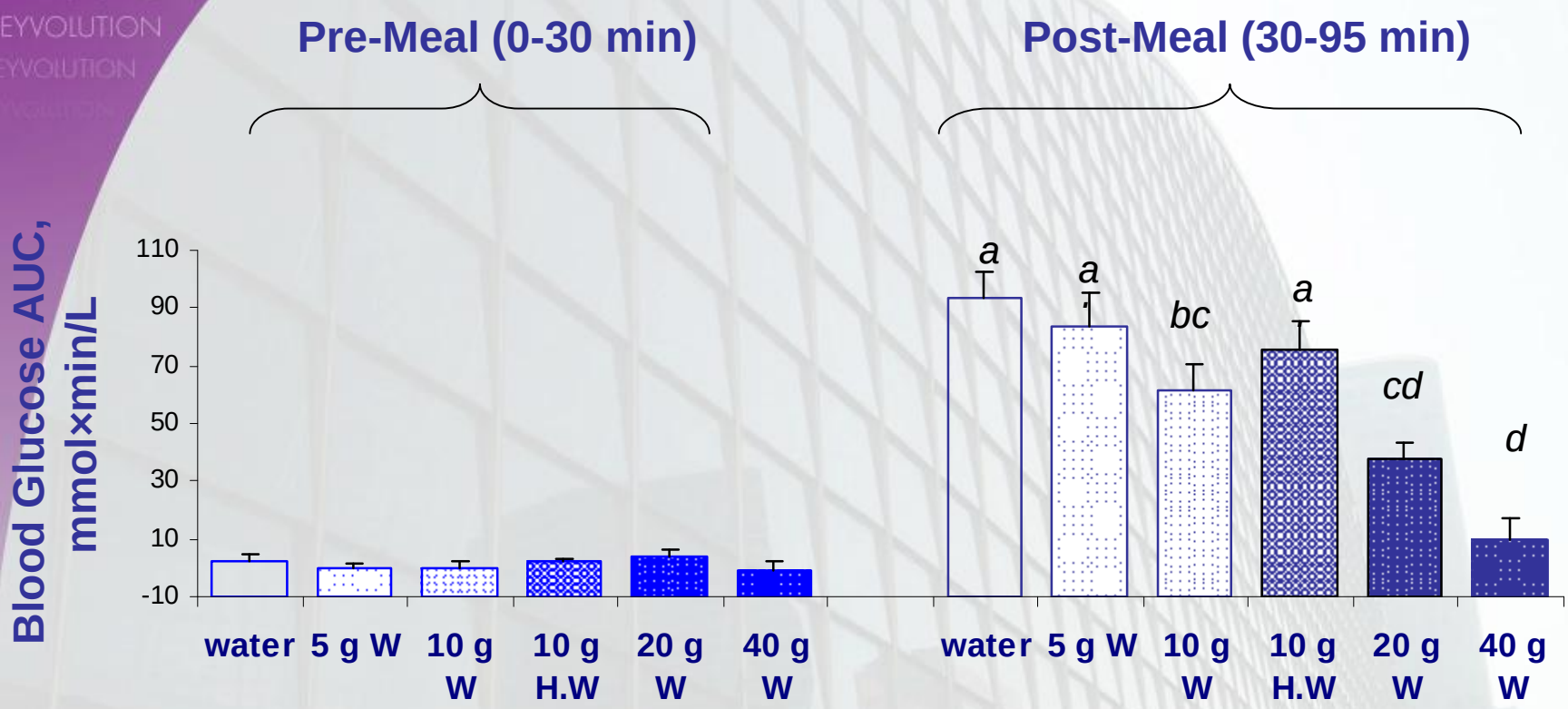
Dose of Whey and Blood Glucose Pre and Post Fixed Meal (AUC)



Different superscripts show significant difference among treatments (GLM, p< 0.01, n=10)., Tukey's test.

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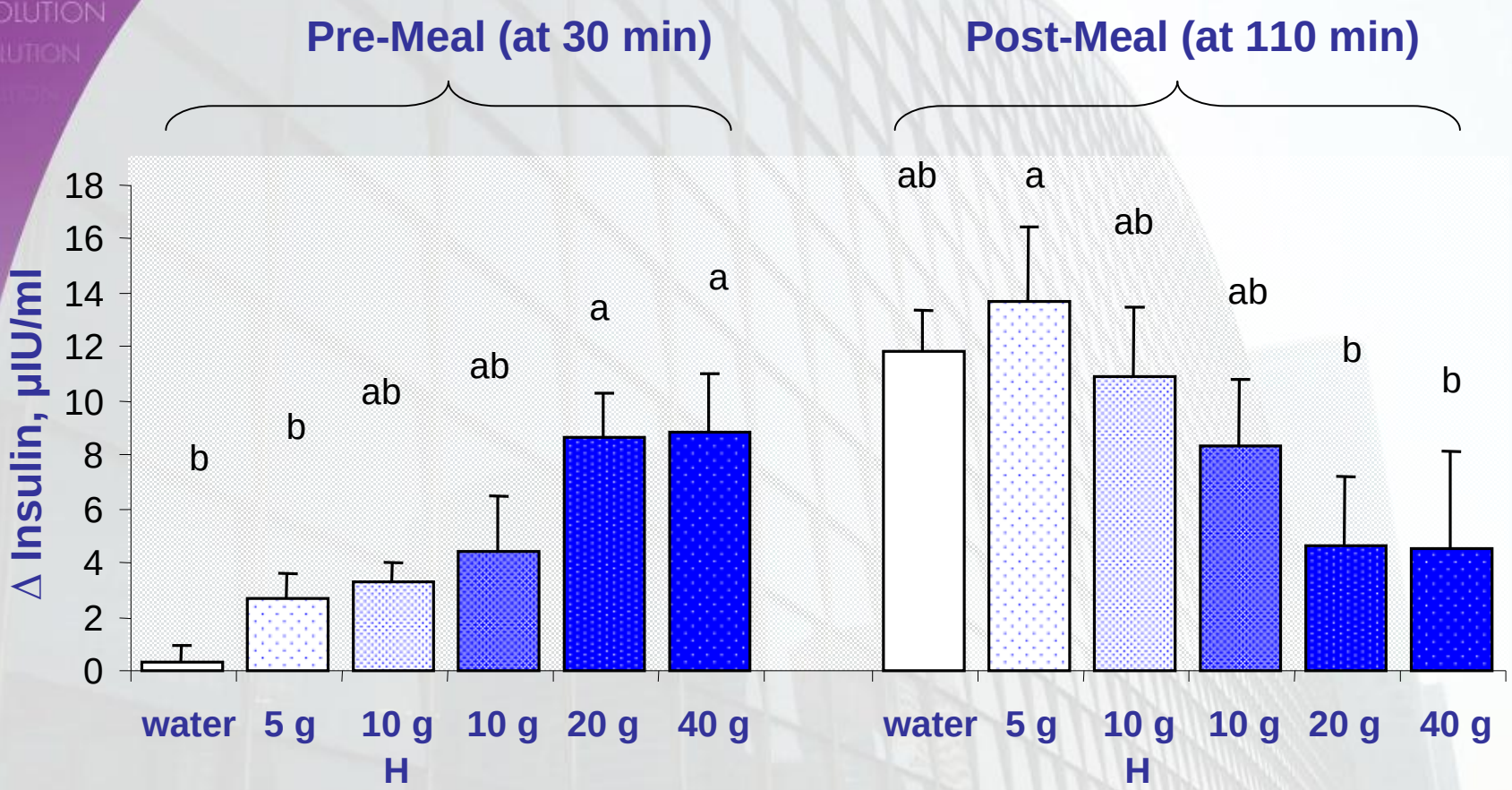
Dose of Whey and Blood Insulin Pre and Post Fixed Meal



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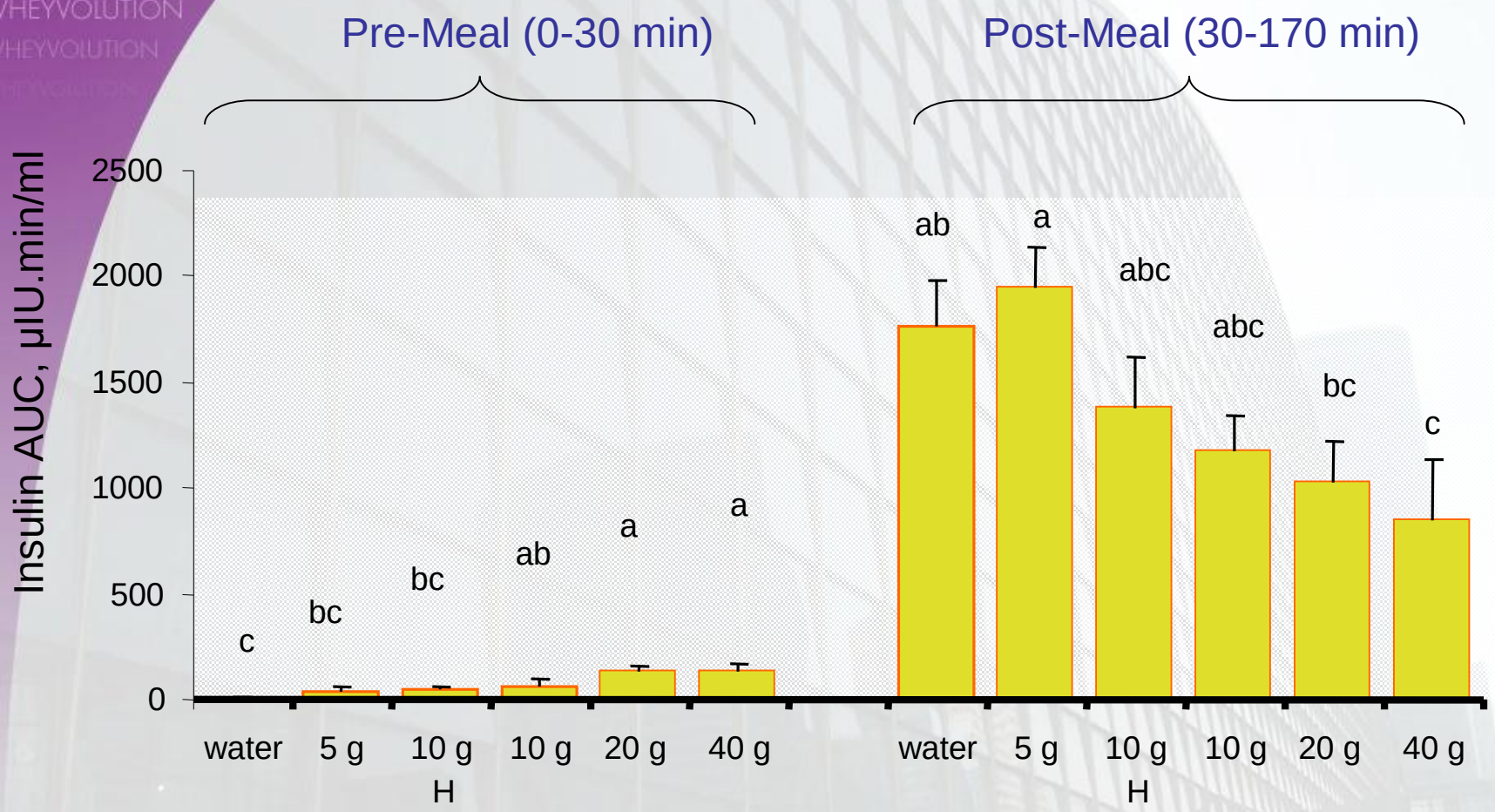
Dose of Whey and Blood Insulin Pre and Post Fixed Meal (AUC)



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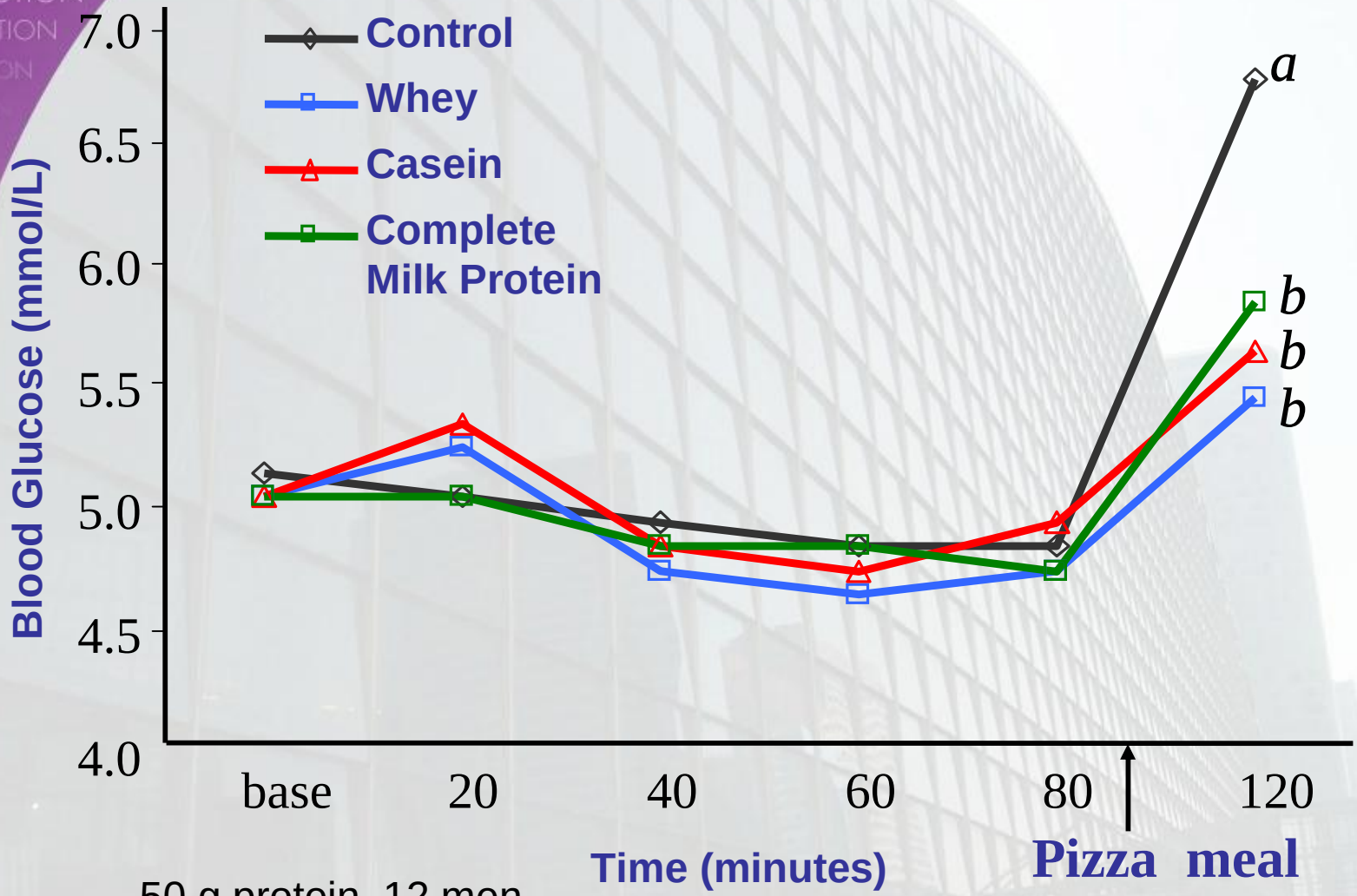
Is the Post-meal Blood Glucose Response to Milk Protein only due to Whey?



50 g protein, 12 men.

Moore, S.E. M.Sc. Thesis

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Conclusions

1. **Proteins reduce short-term food intake compared to other macronutrients, but their effect on the dependent measure is affected by dose and source, and timing.**

2. **Whey and milk proteins are functional in appetite and metabolic control in practical quantities for food formulations.**

3. **Whey consumed alone has important short term benefits in the regulation of blood glucose response POSTMEAL to carbohydrates.**

4. **Maximum benefits of whey proteins for food intake and glucoregulation may be dependent on consumption of the intact protein**

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Acknowledgements

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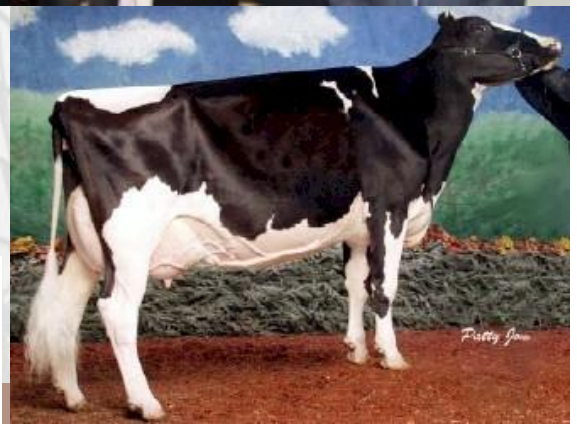
- **Ontario Ministry of Agriculture, Food and Rural Affairs**
- **Unrestricted matching funds: *General Mills, Kraft, Canadian Sugar Institute, Heinz***
- **Special Thanks to the TEAM**

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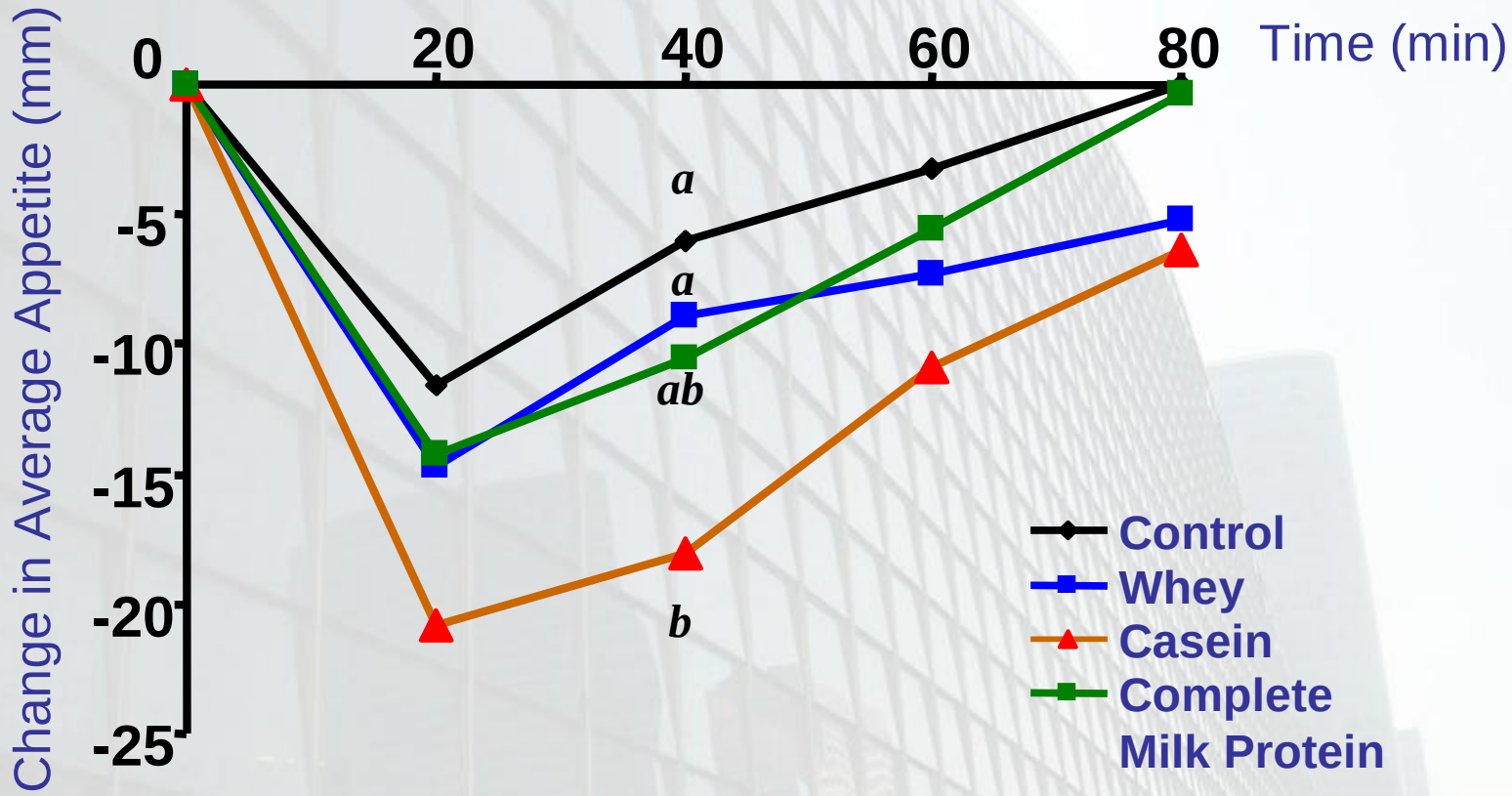
Milk Proteins (50 g) as Liquid Preloads and Average Appetite of Young Men over 80 min



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