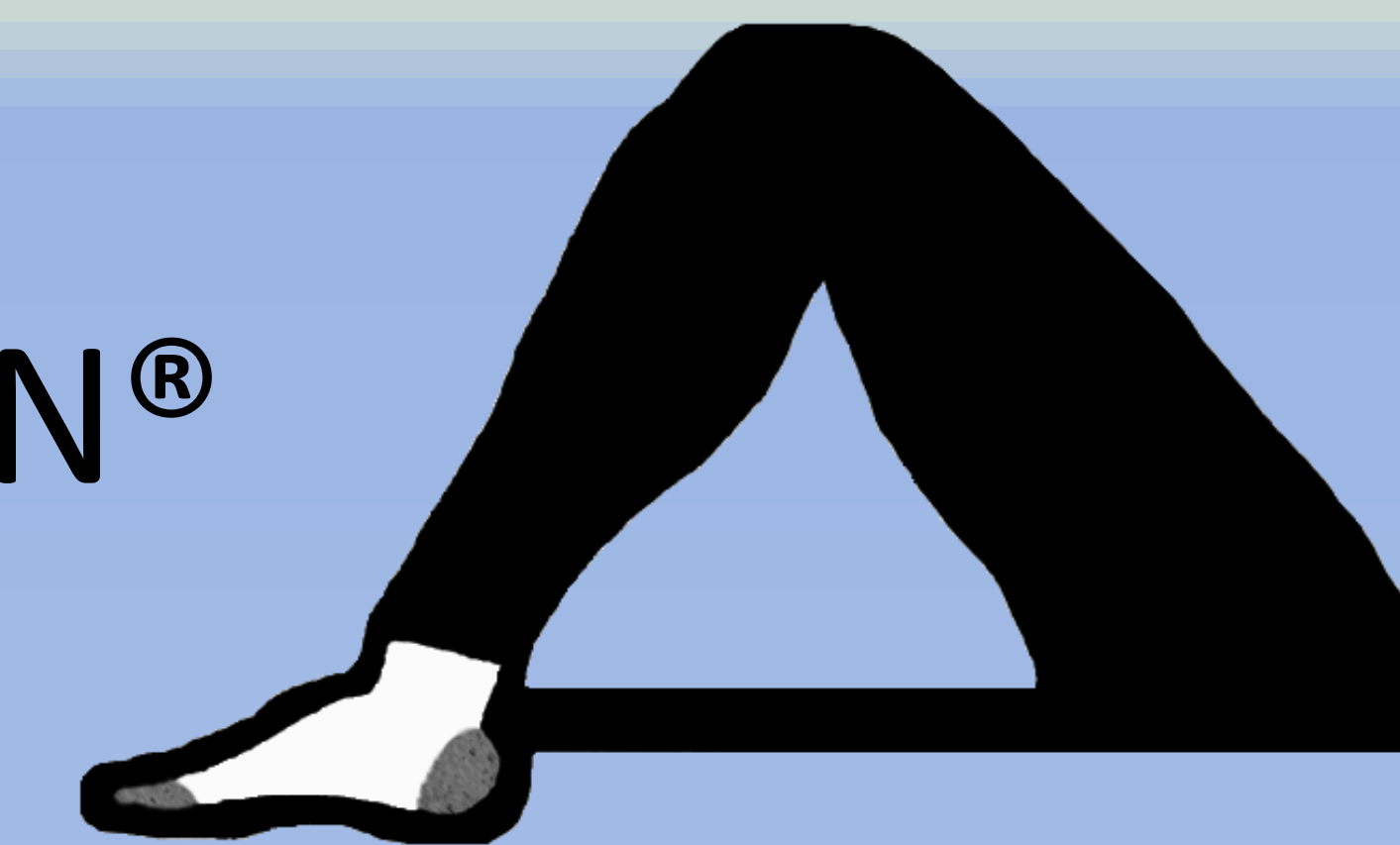




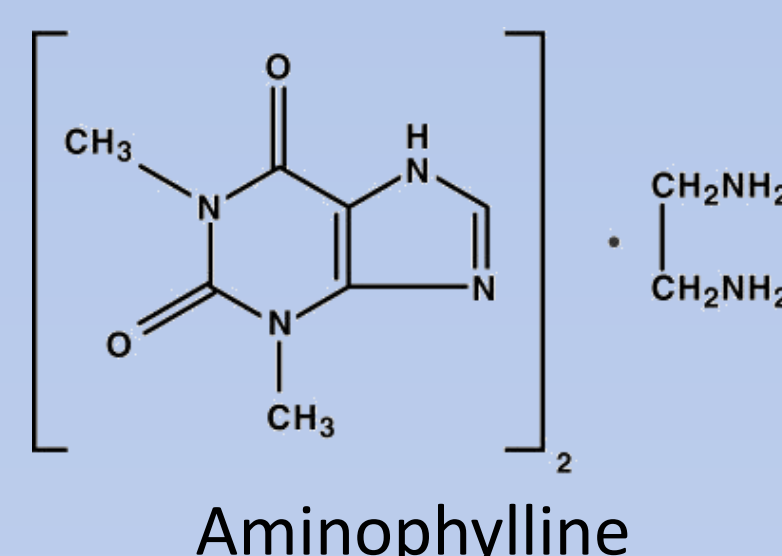
The Delta Thigh Project: The Unmiraculous Effect of the Miracle Cream CELLULEAN®

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Introduction

Aminophylline, belonging to a family of molecules called methylxanthines, has been traditionally used as a drug for asthma therapy. It consists of a complex of theophylline and ethylenediamine in a ratio of approximately 2:1. Recently, studies have suggested that fatty acids are released from adipose tissue when it is exposed to aminophylline *in vitro*. However, no such studies have confirmed that the drug is able to penetrate skin tissue. A company, MWT inc., produces and distributes a product, "CELLULEAN®" and claims that it is able to transport aminophylline across cutaneous tissue to the adipose tissue beneath; thus causing the supported finding. The aim of our study is to test this statement in a placebo-controlled experiment. This study is a continuation of a similar project from last year.



Rationale

Aminophylline inhibits the enzyme Phosphodiesterase in the phosphorylation pathway signaled by the hormone epinephrine. Phosphodiesterase cleaves cyclic AMP (cAMP) producing AMP, which cannot activate the protein kinases that phosphorylate and activate triacylglycerol lipases that degrade fats into free fatty acids that can be used for energy. Without this activity, more cAMP will be available in the cell to activate the breakdown of fats. MWT inc. claims that their product leads to the mobilization of fats away from the area of application by this pathway. The theoretical effectiveness of aminophylline *in vivo* has never been proven.

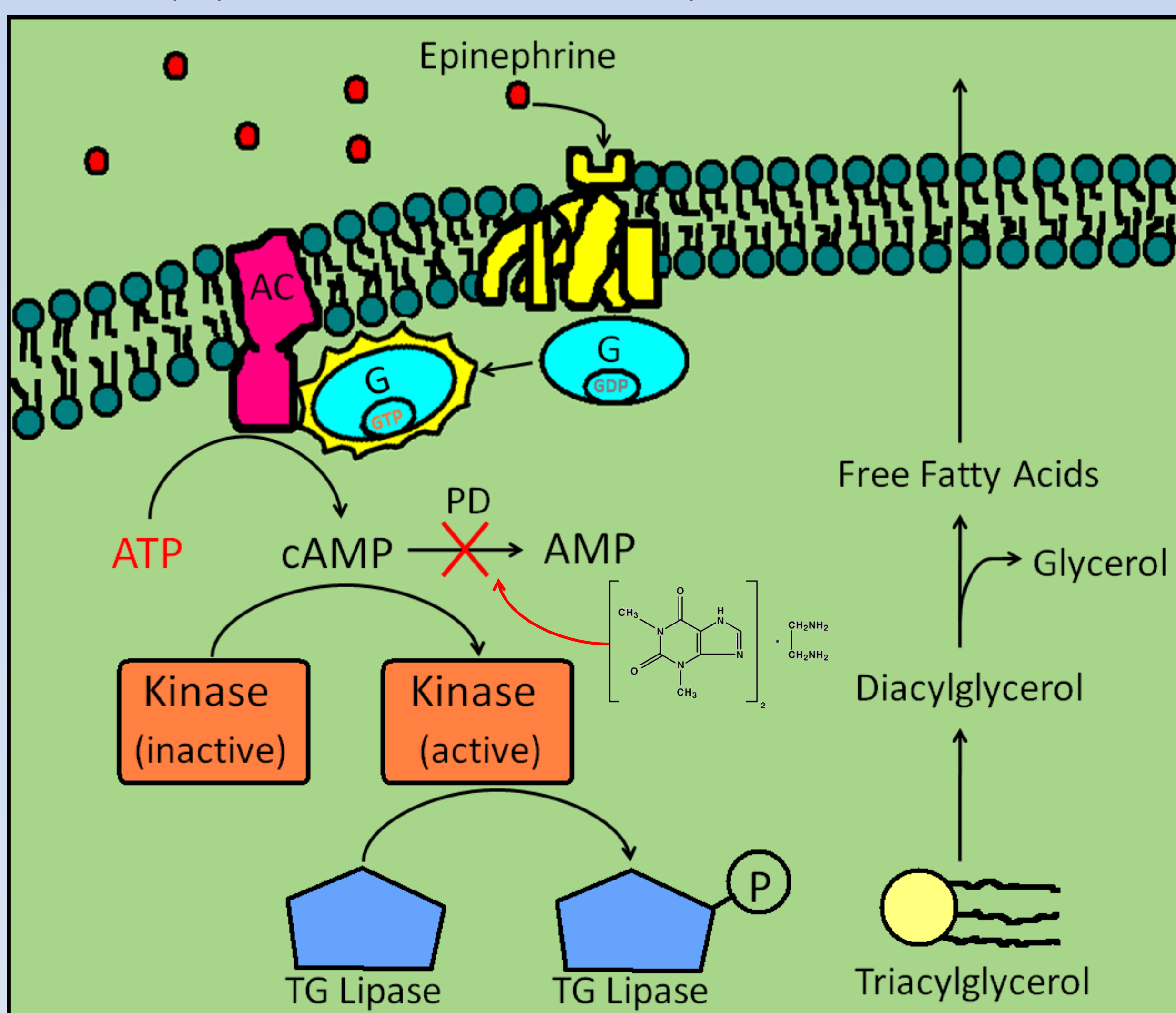


Diagram 1: A diagram of the phosphorylation pathway leading to the degradation of triacylglycerides. Epinephrine binds to the β -Adrenergic receptor which activates its associated G protein (G). This protein travels to the Adenylate Cyclase (AC) complex which produces cAMP to activate protein kinases. Phosphodiesterase (PD) removes cAMP from the pathway so that Triacylglycerol Lipase (TG Lipase) isn't activated. The red "X" marks the point of inhibition.

Materials and Methods

In this study we had subjects apply CELLULEAN® to one thigh, and a skin moisturizer, as a control, to the other over the course of 30 days. Thigh measurements were taken weekly. Each participant was informed on how to properly measure their leg according to instructions found on limebarb.com. Initial measurements were taken and recorded before the first week of the study. Application of an aminophylline free body lotion was applied to one leg, and the CELLULEAN® product to the other one every morning and night for 36 days. Statistical analysis and data plotting were performed using GraphPad Prism 5 computer software.

Results

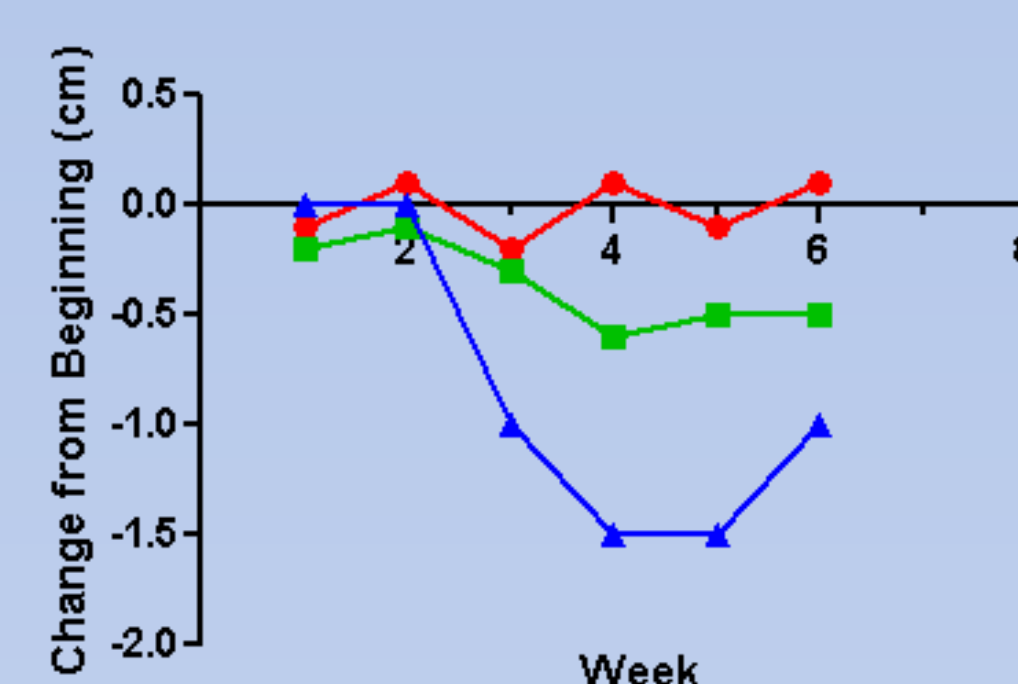


Figure 1: Control treatment. Change in female thigh circumference (in cm) over the course of 36 days. Circumference change compared to initial measurements. Subjects differentiated by color and shape.

Figure 2: CELLULEAN® treatment. Change in female thigh circumference (in cm) over the course of 36 days. Circumference change compared to initial measurements. Subjects differentiated by color and shape.

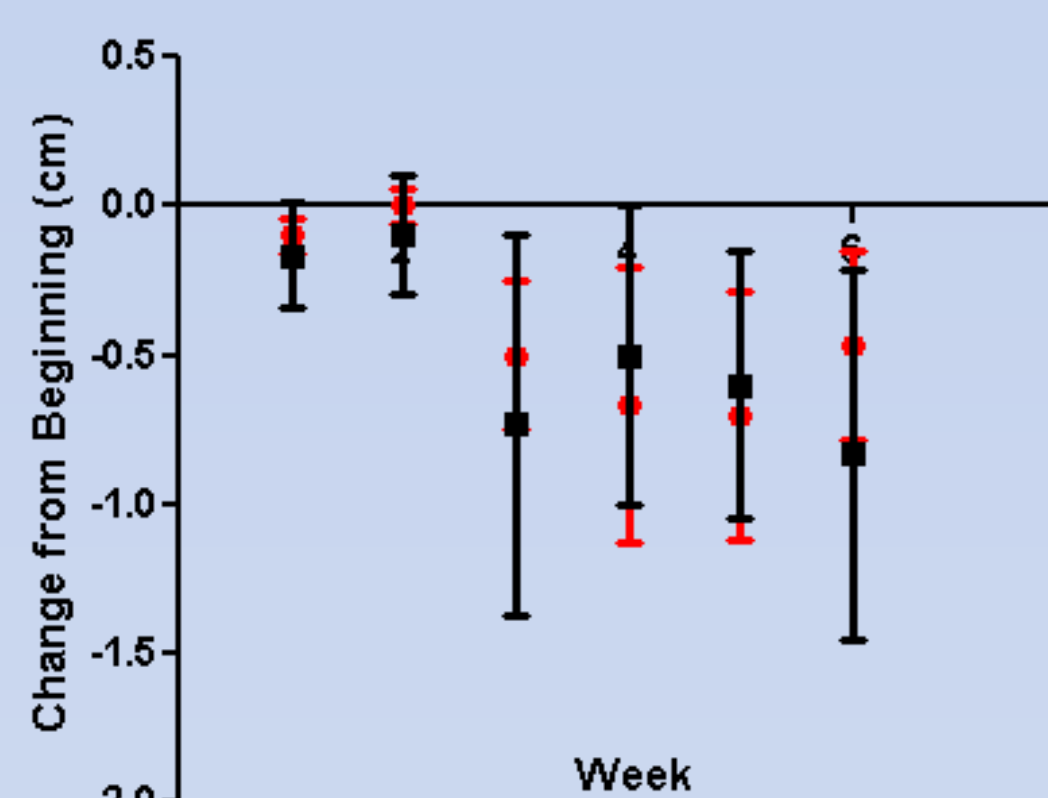
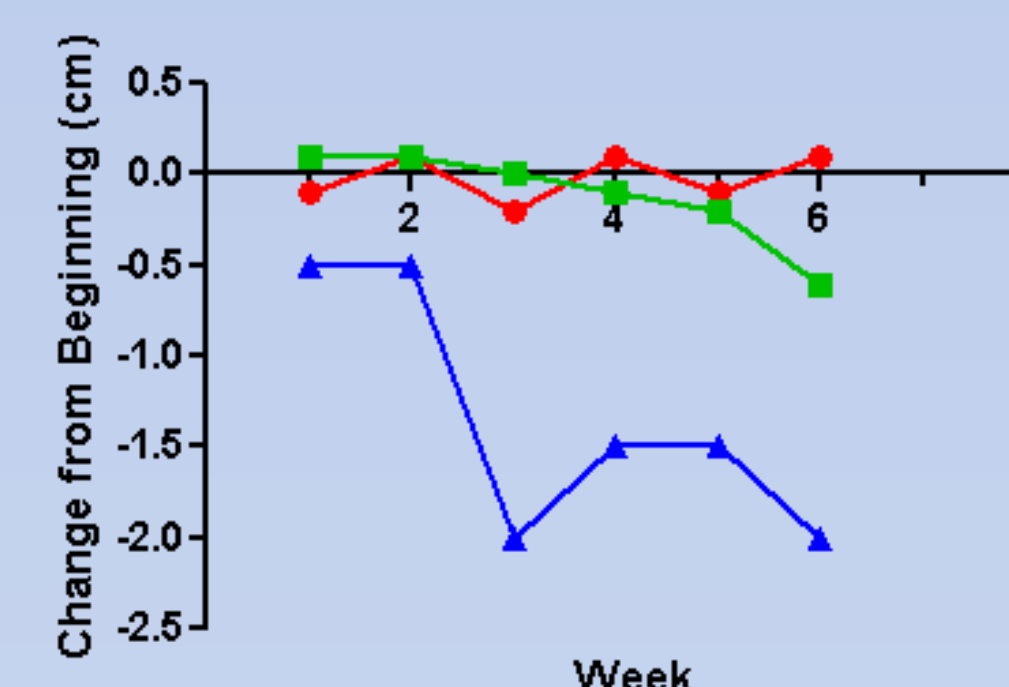


Figure 3: Averages of thigh circumference change (in cm) in female subjects. Control (red) and CELLULEAN® (black) treatment results differentiated by color and shape. Error bars represent Standard Mean Error (SEM).

Figure 4: Control treatment. Change in male thigh circumference (in cm) over the course of 36 days. Circumference change compared to initial measurements. Subjects differentiated by color and shape.

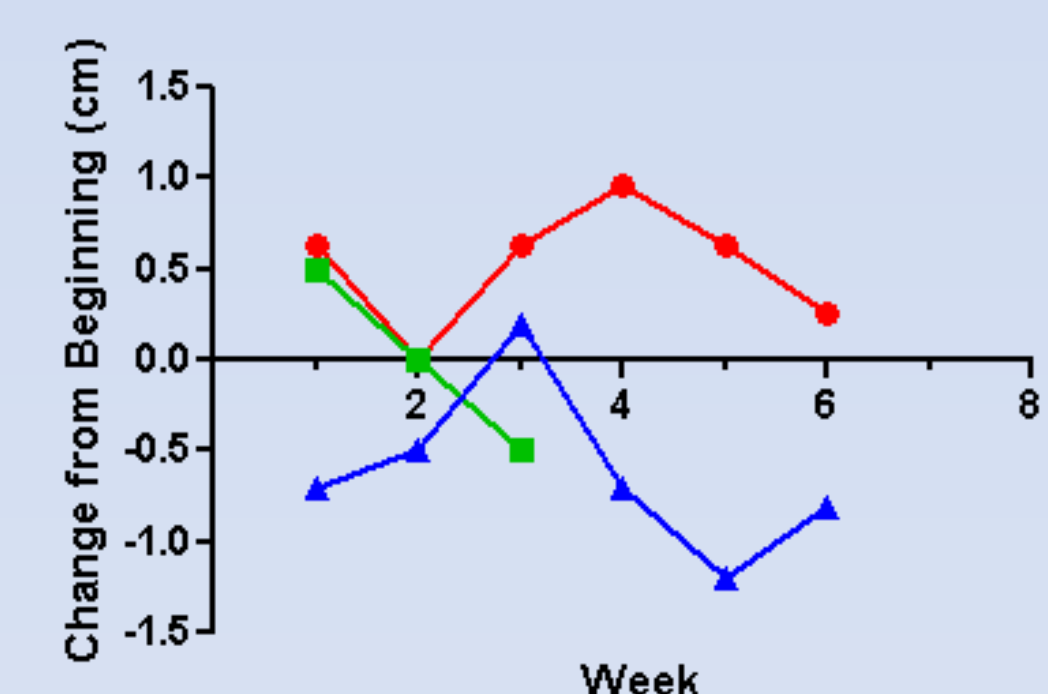
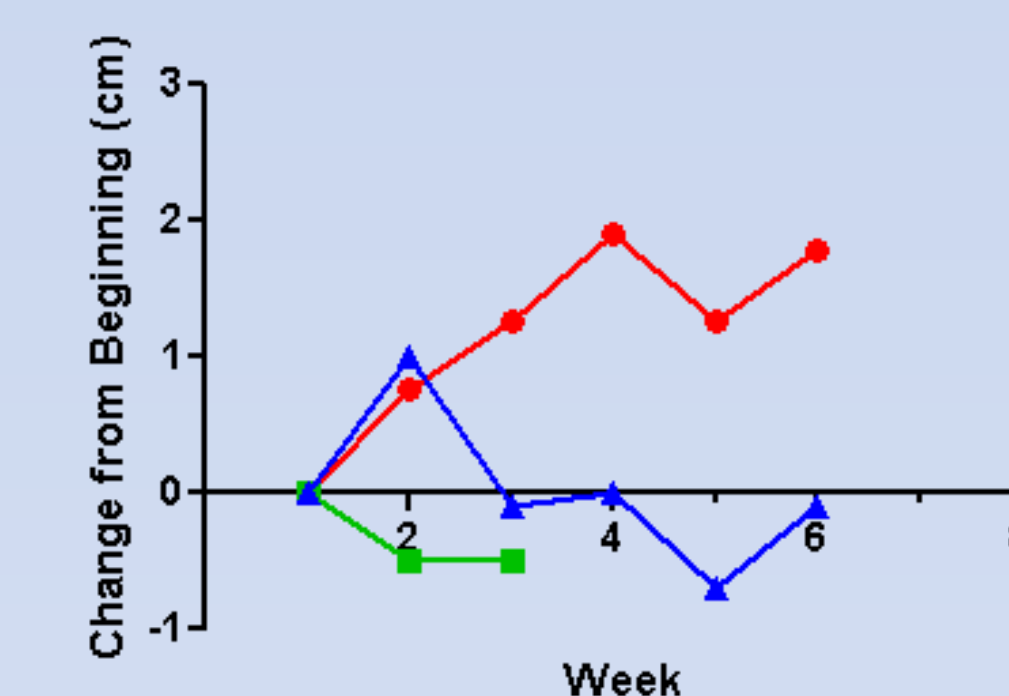
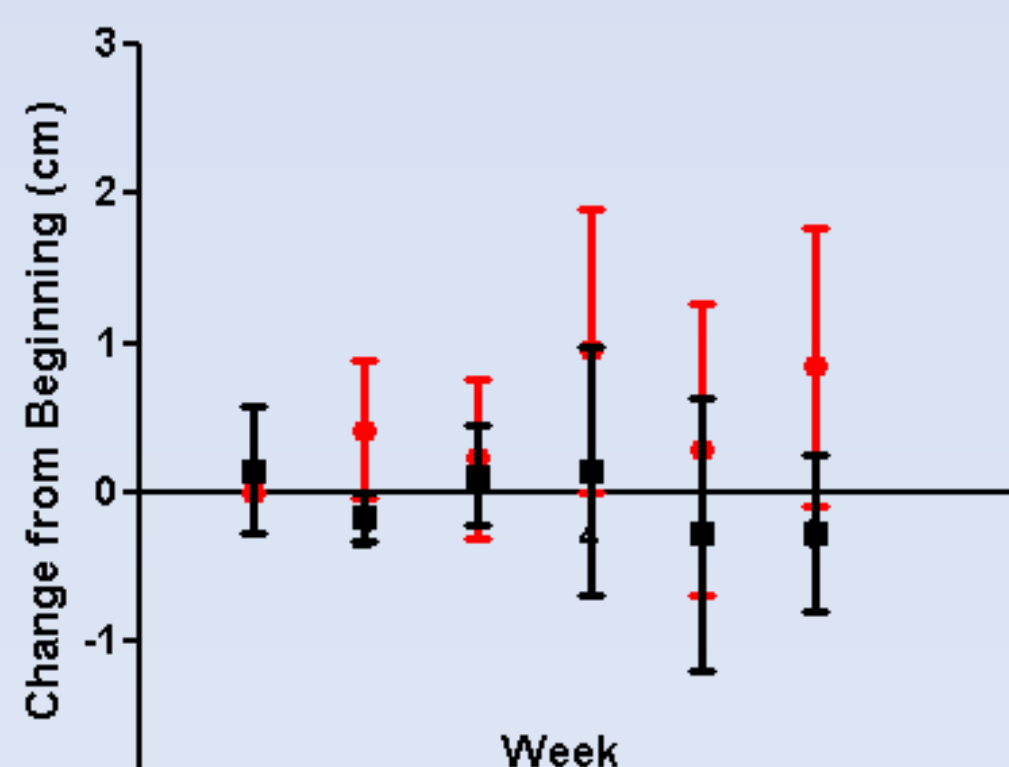


Figure 5: CELLULEAN® treatment. Change in male thigh circumference (in cm) over the course of 36 days. Circumference change compared to initial measurements. Subjects differentiated by color and shape.

Figure 6: Averages of thigh circumference change (in cm) in male subjects. Control (red) and CELLULEAN® (black) treatment results differentiated by color and shape. Error bars represent Standard Mean Error (SEM).



Discussion

Our study shows no indication that aminophylline can reduce the amount of cutaneous fat through observation of thigh circumference reduction, as evidenced by Table 1. Though it is not significant, a decreasing trend can be seen in the CELLULEAN® treated male thighs. This finding may be supported by a study using more subjects. Fat may have been mobilized, but not utilized, leaving the free fatty acids to be reformed to triacylglycerides. The cream did have one effect, however. During the study, one of our male subjects did have to drop out of the project before its completion due to an uncomfortable rash on his CELLULEAN® thigh.

Male Thigh Comparisons			Female Thigh Comparisons		
Week	p Value	df	Week	p Value	df
1	0.7498	2	1	0.7376	2
2	0.3005	2	2	0.656	2
3	0.8679	2	3	0.7502	2
4	0.5834	1	4	0.8195	2
5	0.7143	1	5	0.8785	2
6	0.4103	1	6	0.6254	2

Table 1: Unpaired, two tailed t-test results with p-values and degrees of freedom (df). Comparisons were done between mean thigh circumference changes between the control and CELLULEAN® thighs. These data coincide with Figure 3 (Female) and Figure 6 (Male).

We were unable to ascertain that the aminophylline passed through the skin to the adipose tissue beneath. This phenomenon might have been a factor in another study at Louisiana State University. Researchers there found that topical application of aminophylline significantly reduced abdominal fat in conjunction with a strict diet and moderate exercise compared to subjects put through similar conditions, but given a placebo topical rub. More studies need to be done to determine the validity and mechanism of aminophylline's ability to pass through the skin.

Sources

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Acknowledgements

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