# Acute effects of VPX Meltdown® on plasma catecholamines, free fatty acids, glycerol, metabolic rate, and hemodynamics in young men and women

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## ABSTRACT

**Background:** We have recently reported that the dietary supplement Meltdown® (Vital Pharmaceuticals) increases plasma norepinephrine (NE), epinephrine (EPI), glycerol, and free fatty acids (FFA), as well as metabolic rate in healthy men (Bloomer et al., J Int Soc Sports Nutr. 2009; Jan 28;6:4). However, in that investigation measurements ceased at 90 minutes post ingestion, with values for bloodborne variables peaking at this time. It was the purpose of the present investigation to extend the time course of post ingestion measurement to 6 hours. **Methods:** Ten exercise trained men (age = 24±4 yrs; BMI = 25±3 kg·m$^{-2}$; body fat = 9±3%; mean±SD) and 10 exercise trained women (age = 22±2 yrs; BMI = 23±3 kg·m$^{-2}$; body fat = 23±5%; mean±SD) ingested Meltdown® or a placebo, in a random order, double blind cross-over design, with one week separating conditions. Blood samples were collected before and at one hour intervals throughout the 6 hour protocol. Samples through the 3 hour post ingestion period were obtained in a fasted state and a standard meal was provided after the hour 3 collection. Blood samples were assayed for EPI, NE, glycerol, and FFA. Breath samples were collected at each time for measurement of metabolic rate and substrate utilization using indirect calorimetry. Area under the curve (AUC) was calculated for all variables. Heart rate and blood pressure were recorded at all collection times, and data were analyzed using a 2 (condition) x 7 (time) analysis of variance. **Results:** AUC was greater for Meltdown® compared to placebo for EPI (367±58 pg·mL$^{-1}$·6hr$^{-1}$ vs. 183±27 pg·mL$^{-1}$·6hr$^{-1}$; p=0.01), NE (2345±205 pg·mL$^{-1}$·6hr$^{-1}$ vs. 1659±184 pg·mL$^{-1}$·6hr$^{-1}$; p=0.02), glycerol (79±8 µg·mL$^{-1}$·6hr$^{-1}$ vs. 59±6 µg·mL$^{-1}$·6hr$^{-1}$; p=0.03), and FFA (2.46±0.64 mmol·L$^{-1}$·6hr$^{-1}$ vs. 1.57±0.42 mmol·L$^{-1}$·6hr$^{-1}$; p=0.05). For all variables, values were highest between 1 and 3 hours post ingestion of Meltdown®. The AUC for kilocalorie expenditure was not statistically different (p=0.12) for Meltdown® (449±29 kcal·6 hrs$^{-1}$) compared to placebo (392±21 kcal·6 hrs$^{-1}$), despite being 15% higher for Meltdown®. However, when only considering the AUC for kilocalorie expenditure from rest to hour 3 (prior to feeding), a difference was noted (p=0.05) for Meltdown® (224±14 kcal·3 hrs$^{-1}$) compared to placebo (187±10 kcal·3 hrs$^{-1}$). No difference (p=0.32) was noted in AUC for substrate utilization between Meltdown® (4.83±0.09·6 hrs$^{-1}$) and placebo (5.04±0.15·6 hrs$^{-1}$). A condition main effect was noted for both systolic and diastolic blood pressure (p<0.0001), with values increasing from a resting 111±2/69±2 mmHg to a peak of 124±2/75±2 mmHg at hour 3 with Meltdown®, while no change was noted for placebo. A condition main effect was noted for heart rate (p=0.01), with values increasing from a resting 57±2 bpm to a peak of 63±2 bpm at hour 5 with Meltdown®, while no change was noted for placebo. **Conclusion:** Ingestion of Meltdown® results in an increase in catecholamine secretion, markers of lipolysis, and metabolic rate in young men and women. An increase in hemodynamic variables is also noted, likely due to the catecholamine response to treatment. Intervention studies should be undertaken to determine the impact of this dietary supplement on weight/fat loss, while monitoring hemodynamic variables to ensure safety of treatment.

## BACKGROUND

The incidence of overweight and obese status within the United States has grown to epidemic proportions in recent years, with an estimated 400 million people classified as obese, and many more as overweight. Over the counter (OTC) dietary supplements are often used as an aid in body fat/weight loss. Unfortunately, many such supplements have little to no scientific support in human subjects. Specifically, many products rely exclusively on "borrowed research" which is often conducted using the "key ingredient" within the product of sale, typically at dosages that are much higher than what is used in the actual finish products. Although many isolated ingredients have been shown to have promise in relation to lipolysis, three that have been well studies and included in man dietary supplements currently sold on the market include yohimbine, synephrine, and caffeine. The specific mechanisms of action of these ingredients have been presented in our recently published paper (Bloomer et al., JISSN 2009). Novel variants of these ingredients have been combined into a single dietary supplement developed recently by Vital Phamaceuticals. We have recently reported that this finished product called Meltdown® (Vital Pharmaceuticals) results in a significant increase in the area under the curve (AUC) for blood norepinephrine (NE), glycerol, and free fatty acids (FFA), in addition to a significant increase in metabolic rate compared to placebo (Bloomer et al., JISSN 2009). Moreover, treatment with this agent produced only a minor increase in heart rate (4-5 bpm) and systolic blood pressure (5-6mmHg), while causing no increase in diastolic blood pressure. Measurements were only made for 90 minutes post ingestion (pre, 30min, 60min, 90min) and blood values for all variables peaked at the 90 minute post ingestion time. These data indicate that a longer time course of measurement is needed to more fully evaluate the potential lipolytic effects of this dietary supplement. Aside from our failure to include a longer time course of measurement, in our prior work we used men exclusively as subjects. Therefore, it is presently unknown whether or not women respond to this treatment in the same manner as do men. It was our purpose in the present investigation to extend our prior findings and to study the impact of this agent on blood catecholamines, markers of lipolysis, and metabolic rate in men and women over the course of a six hour post ingestion period.

## METHODS

### Subject Characteristics

- 10 exercise trained men (age = 24±4 yrs; BMI = 25±3 kg·m$^{-2}$; body fat = 9±3%; mean±SD)
- 10 exercise trained women (age = 22±2 yrs; BMI = 23±3 kg·m$^{-2}$; body fat = 23±5%; mean±SD)

### Testing Procedures

- All subjects arrived in the lab following an overnight fast (> 8 hours), on two separate occasions (cross-over design) separated by one week.
- During the 24 hours before each test day, subjects consumed prepackaged meal replacement drinks and bars provided by the project sponsor. No other food or calorie containing drinks were allowed. The amount consumed during the day preceding the initial test day was mimicked during the day preceding the second test day.
- Women reported during the first seven days of their menstrual cycle in order to avoid any potential influence of estrogen on our chosen outcome measures.
- Following a 10 minute quiet rest period a baseline blood sample was taken.
- Subjects then consumed either 3 capsules of the supplement (Figure 1) or an identical looking placebo (random, double blind design) and remained inactive during the entire test period.
- Blood samples were then collected at one hour intervals throughout the 6 hour protocol.
- Samples through the 3 hour post ingestion period were obtained in a fasted state and a standard meal was provided after the hour 3 collection.
- Breath samples were also collected at one hour intervals for measurement of metabolic rate and substrate utilization using indirect calorimetry.
- Measurements of heart rate (via palpation) and blood pressure (via auscultation) were taken immediately prior to each blood sample.

### Main Outcome Variables

1. Total oxygen consumption (L·min$^{-1}$)
2. Respiratory exchange ratio ($CO_2/O_2$)
3. Plasma Norepinephrine (NE)
4. Plasma Epinephrine (EPI)
5. Plasma Glycerol
6. Plasma Free fatty acids (FFA)

### Data Analysis

Area under the curve (AUC) was calculated for each variable for both conditions using the trapezoidal method ($AUC_G$). Statistical comparisons were made using a 2 (condition) x 2 (sex) analysis of variance (ANOVA). Tukey's post hoc tests were used where appropriate. All analyses were performed using JMP statistical software (version 4.0.3, SAS Institute, Cary, NC). Statistical significance was set at P≤0.05. The data are presented as mean ± SEM, except for subject descriptive characteristics (mean ± SD).

## RESULTS

AUC was greater for Meltdown® compared to placebo for EPI (Figure 2; p=0.01), NE (Figure 3; p=0.02), glycerol (Figure 4; p=0.03), and FFA (Figure 5; p=0.05). For all variables, values were highest between 1 and 3 hours post ingestion of Meltdown®. The AUC for kilocalorie expenditure was not statistically different (Figure 6;p=0.12) for Meltdown® (449±29 kcal·6 hrs$^{-1}$) compared to placebo (392±21 kcal·6 hrs$^{-1}$), despite being 15% higher for Meltdown®. However, when only considering the AUC for kilocalorie expenditure from rest to hour 3 (prior to feeding), a difference was noted (p=0.05) for Meltdown® (224±14 kcal·3 hrs$^{-1}$) compared to placebo (187±10 kcal·3 hrs$^{-1}$). No difference (p=0.32) was noted in AUC for substrate utilization between Meltdown® (4.83±0.09·6 hrs$^{-1}$) and placebo (5.04±0.15·6 hrs$^{-1}$). A condition main effect was noted for heart rate (p=0.01), with values increasing from a resting 57±2 bpm to a peak of 63±2 bpm at hour 5 with Meltdown®, while no change was noted for placebo.

## CONCLUSION

In conclusion, we report that the finished product Meltdown®, ingested at the exact dosage as recommended by the manufacturer, results in an increase in plasma EPI, NE, glycerol, and FFA over the course of six hours with values highest between 1 to 3 hours post ingestion. Metabolic rate also increased during the first 3 hours post ingestion of Meltdown®. This occurs despite a minimal increase in heart rate and systolic blood pressure, likely due to the catecholamine response to treatment. Our findings are specific to a sample of young, healthy exercised trained men and women. Further study is needed to determine if similar or more pronounced findings are observed in a sample of overweight/sedentary men and women, who often respond to a greater extent to such treatment. Finally, intervention studies are warranted to determine the impact of this dietary supplement on weight/fat loss.

## ACKNOWLEDMENTS

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Figure 1


Figure 2

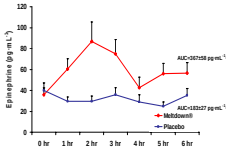


Figure 3

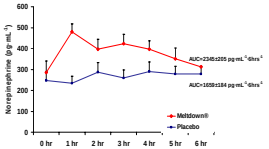


Figure 4

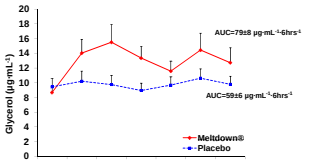


Figure 5

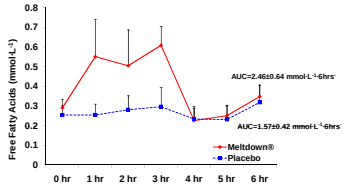


Figure 6

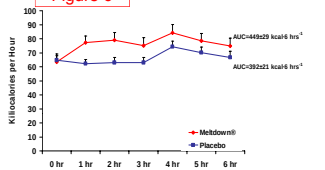


Figure 7

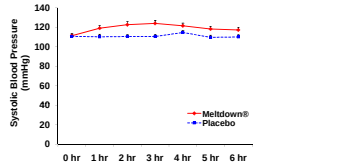


Figure 8