



**TIME RESTRICTED FEEDING AND ITS IMPACT ON NUTRITION AND  
METABOLIC PATHWAYS**

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**Introduction**

In recent years, an increase in rates of obesity has occurred throughout all age groups, especially in the growing elderly population, leading to an increase in other age-related diseases such as Type 2 Diabetes and cardiovascular diseases. In an effort to combat this recent trend, the calorie-restricted diet has gained popularity in being prescribed to older patients and implemented in assisted living facilities, having been proven to slow aging-related issues because of factors such as a decrease in body fat and insulin resistance in individuals. Though it offers many benefits, calorie-restricted diets have also come with many drawbacks, including not being sustainable long term and causing decreased bone density and muscle mass, leading to an increase in injury occurring, especially in the older population. A time-restricted feeding (TRF) diet has therefore been proposed as an alternative diet, based on the knowledge of the body's circadian clock and its role in metabolic activities that occur in the body throughout the day. The idea behind the diet is to focus more on when one eats, rather than mainly on what one eats throughout the day. Having been tested in mice against those on an ad libitum feeding diet, time-restricted feeding has been shown to have similar effects to that of a calorie-restricted diet, with the mice having a lower fat mass and decreased insulin resistance than the mice in the ad libitum group. The next step in research of a time-restricted feeding diet is to determine if the aging-related effects are similar to those of a calorie-restricted diet, but without the drawbacks that come with restricting calories.

**Method**

Three different groups of C57BL/GJ mice were formed, each being fed either a time restricted, calorie restricted, or ad libitum diet. The food given to the mice was a 45% high-fat, high-calorie diet, reflecting the standard "Western Diet". Each diet group had 34 cages with 4-5 male mice per cage, with the ad libitum and time restricted feeding groups having 3 cages with 4-5 female mice per cage. Ad libitum mice were given 24hr access to food, while time restricted mice were fed every day at 8am and fasted starting at 5pm. Calorie restricted mice were given a specific amount of food each day, which was usually eaten within 2-3 hours of receiving the food. Food intake and leftovers were recorded every week for each cage, along with the weekly body weights of each mouse.

Various tests were conducted throughout the experiment, including blood draws, DEXA scans, and metabolic monitoring. A 24-hour data collection occurred every 6 months, starting with the first month of the experiment. If a mouse was euthanized or found dead, a necropsy was performed, conserving both the body and organs for later testing and analysis, along with documenting any notable finds or possible causes of death.

## **Results**

Currently, no results have come from our ongoing study. Although observational analysis has occurred throughout the study, including body weight differences between the groups and possible causes of death, further quantitative analysis is needed to provide any significant results. Moving forward, preparation for testing and analysis of collected bones and mouse organs has begun as the number of mice remaining continues to decrease in the coming months. One of the main aspects of the data collection will be the results from DEXA scans of the collected bones, allowing for comparisons between the bone densities of time-restricted and calorie-restricted fed mice, which is a major drawback often seen in individuals on a calorie restricted diet.

## **Conclusion**

The ultimate goal of this research is to apply time-restricted feeding in assisted living facilities and to the aging population, to combat age-related diseases and disorders, along with offering a new diet option to other age groups to slow the increasing rates of obesity and related diseases. Aside from focusing on the metabolic system, other areas of research testing the effect of TRF have begun, including looking at its effect on those genetically at risk for Alzheimer's disease, and recovery after muscle atrophy has occurred due to being bed-bound or on a restricted activity medical order.