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Perspective

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Optimize meal timing to minimize diabesity

Abstract

This perspective article addressed a rising question if optimizing meal timing can help minimize obesity and diabetes (diabesity) via optimizing glucose and insulin circadian metabolism. Meal properties including timing, sequence, and frequency are of metabolic importance in ruminants and humans. The modern man consumes fast foods at wrong times of the 24-h circadian period. Suboptimal meal timing and inadequate physical activity can impair normal biological rhythmicity of glucose and insulin metabolism, which may lead to diabetes. Type 2 diabetes mellitus (T2D) and obesity could, thus, largely be a consequence of suboptimal meal timing and lifestyle. Avoiding sugar- and carbohydrate-rich evening and nocturnal meals should help improve glucose and insulin metabolism. Optimal meal timing is a growing practice that should be incorporated into healthy nutritional programs to help avert obesity and T2D in today's stressful life. Subsequently, nutrient-dense evening and night meals must be avoided to reduce diabesity risk.

Keywords: meal timing, nocturnal eating, glucose, insulin, metabolism, diabetes

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Background and discussion

This aim of this perspective article was to form and generally address a rising question if optimizing meal timing can help avert obesity and diabetes (diabesity) by optimizing glucose and insulin circadian metabolism. The suprachiasmatic nucleus, located in the hypothalamus, acts as a central clock to orchestrate circadian glucose metabolism.[1,2] Evening vs. morning feeding may increase milk fat in dairy cows.[3] In humans, glucose tolerance decreases as evening and night begin logically because less energy is required overnight.[3] This principle implies that consuming large evening and night meals must be avoided to lower T2D and obesity risks. In light of the circadian biology of glucose and insulin metabolism, insulin sensitivity and pancreatic β-cells function decrease overnight.[2] Reduced insulin sensitivity or increased insulin resistance predisposes human metabolism to T2D.[4] In addition, energy over-consumption is associated with hepatic/abdominal adiposity, which possibly increases hepatic insulin resistance and impairs hepatic and peripheral glucose metabolism.[4] This can increase T2D risk.[5]

Altering the major meal time from morning to evening could, hence, increase blood glucose concentrations and cause metabolic issues. Night workers do have lower glucose tolerance, and thus, are at greater risks of diabetes development. This suggests that circadian metabolism of glucose and insulin is negatively impacted in shift workers and night eaters.[6] Moreover, increased melatonin secretion overnight alongside large evening meals can exacerbate the problem by damaging the glucose metabolism.[7] Furthermore, melatonin inhibits insulin secretion that further enlarges the challenge.[7]

From a chrono-nutritional viewpoint, optimal meal timing requires energy-dense nutrients to be consumed during earlier times of the circadian period (i.e., morning) when body and brain activities are maximal. Thus, breakfast eating is greatly encouraged. However, evening and night heavy eating must be avoided. Notably significant needing future research, times of eating and exercise should be well coordinated. To conclude, meal timing is a practical tool to enhance gut and human health likely via optimizing circadian gut microbiome physiology and glucose metabolism. These should lead to lower diabetes and obesity risks. Of note, preventing obesity and diabetes demands a multi-approach strategy that warrants far more research.[8–11] Of global note, taking heavy energy-dense evening and night meals must be avoided to reduce risk of diabesity in the post-modern era.

Summary

The modern mankind has sub optimally altered his/her meal properties. He/she consumes unhealthy fast foods at wrong times of the 24-h circadian period. Glucose and insulin turnover and metabolism possess circadian rhythmicity. Glucose tolerance is lower during evening and night. Hence, nocturnal heavy consumers of energy-dense foods display hyperglycemia that alongside varying degrees of insulin resistance leads to diabetes. Optimizing meal timing would be a practical workable approach for modern and postmodern humans to effectively manage glucose and insulin metabolism towards lower diabesity risk. As a general school of thought, heavy nutrient-dense evening and night meals must be avoided to reduce diabesity risk.

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Conflicts of interest

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