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The Effects of Exercise on Inflammatory Biomarkers over a 36-h Fast

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Introduction

Diet-induced chronic inflammation has become a popular point of discussion over recent years in lifestyle medicine as studies have uncovered the effects that inflammation markers have on chronic diseases including heart disease, diabetes, and arthritis. Each time we eat, an immune response is stimulated resulting in increased levels of inflammatory biomarkers.^{1,2} Interventions to help lower inflammation could help promote longevity and decrease risk of chronic diseases. This study assessed the impact of an acute 36h fast with and without exercise at the beginning on inflammatory biomarkers IL-6, C-peptide, GIP, MCP-1, and TNF-alpha.

Methods

- 20 healthy subjects (11 Male, 9 Female)
- Each participant completed two 36-Hour fasts (water only)
- One fast began with exercise and the other did not
- Venous blood draws taken every 12 hours and later analyzed

Results

- **MCP-1 and C-Peptide decreased over the first 24 hours** ($p < .0001$ for both) of the fast and then leveled off from 24 to 36 hours ($p = 0.1883$, $p = 0.2798$, respectively).
- **Significant difference in area under the curve between conditions for C-Peptide and MCP-1.** The difference in area under the curve for MCP-1 was 173 ± 61 pg/ml ($F = 7.97$, $p < .012$) and 1809 ± 791 pg/ml ($F = 5.23$, $p < .035$) for C-Peptide.
- **GIP decreased over the first 12 hours of the fast** ($p < 0.0001$) and then remained low at 24 and 36 hours.
- **No significant difference between conditions for IL-6, TNF- α , and GIP.**

Discussion

C-Peptide is a byproduct of proinsulin which is used to produce insulin. As such C-Peptide is released in equal levels as insulin.³ C-Peptide has been shown to have both pro and anti-inflammatory properties.^{3,4} It is probable that levels of C-Peptide in this study were dependent upon the body's decreased need for insulin. Further research on inflammatory properties of C-Peptide may provide further insight into what benefits are provided by decreasing levels through fasting.

MCP-1 is a pro-inflammatory biomarker that plays a vital role in recruitment of immune system cells.⁵ MCP-1 levels were significantly higher in the exercise group when compared to fasting only. Regular exercise has been shown to reduce inflammatory markers over time, but short bouts can cause an increase in levels as the body responds to skeletal muscle damage.⁶ This may explain the increased levels of MCP-1 in the exercise group. While this appears to show that adding exercise to an acute fast did raise levels of inflammation, further research is warranted to better understand how exercise with fasting may affect inflammation markers, particularly the long-term effects of combining fasting and exercise

Fasting lowers levels of the proinflammatory marker MCP-1.

Beginning an acute fast with exercise increased levels of MCP-1 and decreased levels of C-Peptide.

Lower levels of inflammation are associated with improved health outcomes.

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Graphs and Figures

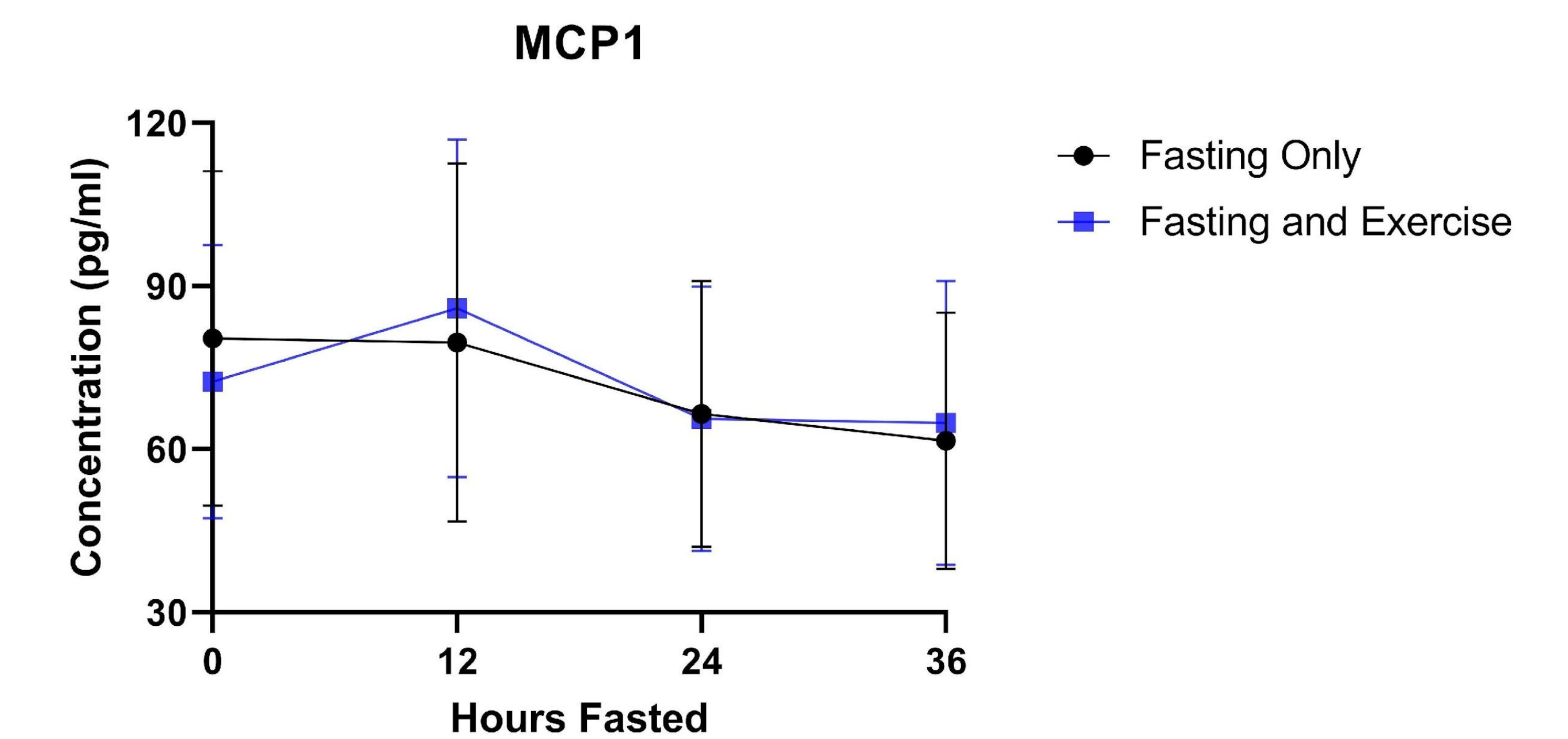


Figure 1: MCP-1 level vs time graph.

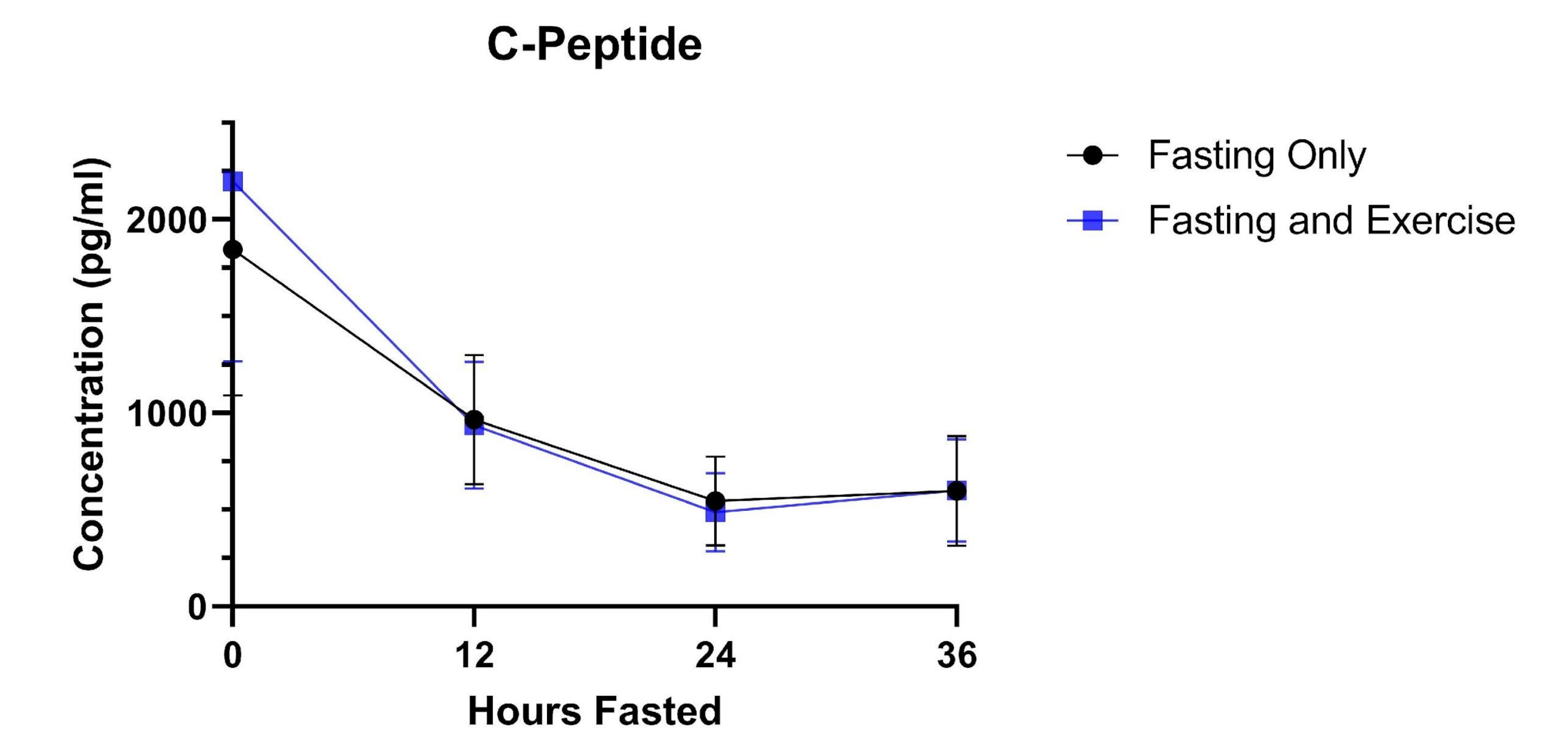


Figure 2: C-Peptide levels vs time graph.

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