

The Effects of Increasing Fat Intake on Body Composition and Blood Monocytes in CD-1 Mice

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ABSTRACT

Background: Obesity is a chronic, inflammatory state. Blood monocyte concentrations/proportions have been previously used to assess immune inflammatory status in humans. Although mouse monocytes exist in three subsets, shifts among these cells types have not been documented during a period of diet-induced weight gain. **Purpose:** Thus, our purpose was to determine longitudinal changes in mouse monocyte subsets during 12 weeks of low, moderate or high-fat feeding. **Methods:** 40 CD-1 mice were randomly divided into 4 groups (N=10 per group): stock control (13.5% fat, CN), 30% fat (F30), 45% fat (F45) and 60% fat (F60). Non-lethal, saphenous vein blood samples (~70 μ L) were collected bi-weekly throughout the 12-week treatment. Monocyte subsets (non-classic - CD115⁺/Gr-1^{Low}, intermediate - CD115⁺/Gr-1^{Int} and classic - CD115⁺/Gr-1^{High}) were assessed using 3-color flow cytometry. Body weight and body composition were assessed using digital weighing and MRI scanning. Data were analyzed using a repeated measures (4 x 7) ANOVA; significance was set at $P < 0.05$. **Results:** Consuming the 30%, 45% and 60% fat diets for 12 weeks significantly increased bodyweight by 31%, 49% and 66%, respectively, compared to baseline values by ($P < 0.05$). By week 12, only F60 and F45 body weights were significantly heavier compared to stock controls ($P < 0.05$). While body fat in each treatment group was significantly higher than stock controls from weeks 2-12 ($P < 0.05$), no significant difference was detected between treatment groups. At week 12, total monocyte concentration was 123% greater in F60 compared to CN mice ($P < 0.05$) while classic, intermediate and non-classic subset concentrations were 441%, 204% and 110% greater, respectively, compared to CN ($P < 0.05$). Furthermore, the ratio of inflammatory (classic and intermediate) to non-inflammatory (non-classic) monocytes was 0.89 in F60 compared to 0.41 in CN ($P < 0.05$). **Conclusions:** Consumption of a 60% fat diet led to an elevation in total monocytes as well as an increased proportion of monocytes that respond to inflammatory stimuli, suggesting immune

dysfunction in the blood compartment. Based on these findings, assessing blood monocyte subset characteristics may be beneficial in mouse obesity models.

KEYWORDS: Outbred, High-fat diet, Classic, Non-classic, Non-lethal