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## Cardiorespiratory fitness is inversely associated with the inflammatory status in the general population

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**Background/Introduction:** Low-grade systemic chronic inflammation is a major risk factor for cardiometabolic diseases. Higher physical activity has athero- and cardioprotective effects, potentially through its anti-inflammatory properties. However, the relation between resting inflammatory status and cardiorespiratory fitness (CRF) in population-based settings remains to be elucidated. While previous research has shown inverse associations between CRF and high-sensitive C-reactive protein (hs-CRP) levels, relations with other inflammatory markers are not yet well examined.

**Purpose:** We assessed the relation between markers of CRF (i.e. maximal oxygen uptake [VO<sub>2</sub>peak], oxygen uptake at the anaerobic threshold [VO<sub>2</sub>@AT], oxygen pulse [O<sub>2</sub>HRmax] and maximal workload [max. Watt]) and hs-CRP as well as total white blood cell (WBC), monocyte, neutrophil, lymphocyte, eosinophil and basophil counts.

**Methods:** Data of the population-based cohort Study of Health in Pomerania (SHIP) was used (n=1,481; 51% male; age range 20–81 years). CRF was assessed using standardized cardio-pulmonary exercise testing (CPET) according to a modified Jones protocol. The Dimension Vista 500 analytical system was used to measure hs-CRP concentrations. Fluorescence-activated cell sorting was used to assess total as well as subpopulation WBC count. We excluded subjects with missing data, anti-rheumatic/steroid/anti-inflammatory medication as well as chronic inflammatory and hepatic diseases, gastritis, hepatitis infection, severe renal dis-

ease, chronic lung disease, asthma, chronic bronchitis, previous myocardial infarction, left ventricular ejection fraction <40% and previous cancer. Linear regression models, adjusted for age, sex, current smoking and lean-mass, were used to assess the relation between CPET and inflammatory parameters.

**Results:** A 14 ml/min (95%-confidence interval [CI] –23 to –6, p=0.004) lower VO<sub>2</sub>peak was associated with a one mg/L higher hs-CRP. A lower VO<sub>2</sub>peak was also related with a one Gpt/L greater WBC (β: –42, 95% CI: –55 to –27 ml/min, p<0.001) as well as neutrophil (β: –57, 95% CI: –77 to –36 ml/min, p<0.001), lymphocyte (β: –63, 95% CI: –107 to 19 ml/min, p=0.005) and monocyte count (β: –204, 95% CI: –360 to –47 ml/min, p=0.011). No significant associations were found for eosinophil and basophil count. Similar results were found for VO<sub>2</sub>@AT, O<sub>2</sub>HRmax and max. Watt.

**Conclusion:** Results suggest an inverse association between CRF and resting inflammatory status. Our non-significant findings with regards to eosinophils and basophils may be expected since these cell types are generally involved in type 2 immune responses related to allergic skin and airway inflammation as well as immunity against parasites. Overall, our results imply that potential biological mechanisms underlying the athero- and cardioprotective effects of high CRF may be related to lower chronic inflammation in fitter individuals.