Obesity is a highly important nutritional disorder in all species, including companion animals. Overweight in humans and rodents induces immunological alterations, resulting in a decreased resistance towards infections and concomitant disorders. This trial investigated whether diet-induced chronic obesity alters immunological parameters in adult healthy dogs.

Sixteen adult beagles with a body condition score (BCS) of 3/5 (using a 5-point score system) were randomly assigned to a control (CG) and weight gain (WGG) group. Weight gain was induced by an energy dense diet (1759 kJ/100 gram dry matter), which was administered at 1.3 x maintenance energy requirement during 47 weeks (Weight Gain Period:WGP), where-after obese body weight was maintained during 26 weeks (Stable Period:SP). The CG were maintained with the same diet at stable ideal body weight during the entire trial (WGP + SP = 73 weeks).

Body weight and BCS were followed up weekly, while immunological parameters and leptin were measured at week 0-4-9-16-24-31-40-47-59-73. Body composition was determined using the deuterium-technique at week 0-20-35-47-73. Data were analyzed using Repeated Measures for which significance was set at $P<0.05$.

After the WGP, a significant higher body weight was reached in the WGG. During the SP, body weight was maintained. The CG remained at initial body weight during both WGP and SP.

A significant increase in absolute fat mass was noted in the WGG. Leptin (ng/ml) increased in the WGG from 1.88±0.29 to 14.95±1.90 during the WGP but dropped back to 6.16±1.30 in the SP. This adipokine remained at baseline level in the CG during both WGP (from 2.34±1.05 to 2.04±0.19) and SP (1.1±0.12).

Proliferation of peripheral blood mononuclear cells (PBMC), stimulated by ConA, PHA and PWM was not altered during the WGP in both groups but was significantly lower in the WGG during the SP. Certain subtypes of PBMC (CD3, CD4, CD5 and MHC) were increased in the WGG at week 24, where-after it slowly decreased to be
significantly lower at week 47, compared to the CG. Tumor necrosis factor α (TNF-α) was undetectable in CG and WGG. Chronic obesity was successfully reached in this trial. Leptin and absolute fat mass run parallel with weight gain. From this study, it can be stated that lymphocyte function and phenotyping are altered during chronic obesity in adult healthy dogs, which might influence their body defence against infections and diseases.