of a rise in serum TGF-β1 after systematic exercise in patients with DM2, whereas an anti-inflammatory protective effect is exerted by a decrease in serum hs-CRP levels and the stabilization of cytokines. An increase of serum TGF-β1 levels has also been noted after strength training in healthy adults and in patients with DM2.

In agreement with other studies, exercise training in our patients induced favourable adaptations in anthropometric characteristics, glucose control, physical fitness and muscle strength (Table 1). The increase of serum TGF-β1, which functions as an anti-inflammatory growth factor and has an impact on plaque stability, is of additional clinical importance.

Indeed, exercise stimulus may act as the mechanical strain required to increase TGF-β1 mRNA expression and this effect is strain dependent. Few studies have examined the effects of exercise on TGF-β1. Hering et al detected an increase in serum levels of TGF-β1 after four weeks of strength training in healthy adults. Gordon et al showed increased TGF-β1 transcript in skeletal muscle of patients with DM2 after strength training. Our study confirms the data obtained from muscle biopsies using the more feasible procedure of blood sampling in patients with DM2. Therefore, the increased levels of serum TGF-β1 after exercise achieved in our patients may indicate a protective effect leading to prevention or reduction of atherosclerosis progression.

Elevated CRP concentration is considered a marker of subclinical inflammation and is associated with an increased risk of developing cardiovascular disease. A number of studies indicated that exercise stress has a protective cardiovascular and anti-inflammatory effect. In accordance with the aforementioned studies, we observed that eight weeks of combined exercise training was associated with significantly reduced levels of hs-CRP, but without alterations in IL-6, IL-10, INF-γ and TNF-α in patients with DM2. It seems that the favourable effect of regular exercise was associated with CRP reduction and stabilization of cytokines, which is in line with other studies. Probably longer period is required for an effect on ILs, INF-γ and TNF-α. Indeed, Balducci et al, in a study of patients with DM2, demonstrated a decrease in hs-CRP and IL-6 and an increase in the anti-inflammatory cytokines (IL-4 and IL-10) after twelve months of exercise training, whereas no significant changes were found in the first three months of training, thus indicating differences in the exercise adaptation of these inflammation related cytokines. Furthermore, other factors which significantly change with exercise training are stronger determinants of CRP concentrations than of other cytokines.

It is well known that an intervention program induces favourable adaptations in the metabolic and inflammatory profile of patients with DM2. Either aerobic or resistance exercise training alone control the glucose metabolism in patients with DM2, but the results are better with a combined aerobic and resistance training regimen. In addition, Balducci et al observed a decrease in hs-CRP and IL-6 and an increase in the anti-inflammatory cytokines (IL-4 and IL-10) after twelve months of exercise training, whereas no significant changes were found in the first three months of training, thus indicating differences in the exercise adaptation of these inflammation related cytokines. Furthermore, other factors which significantly change with exercise training are stronger determinants of CRP concentrations than of other cytokines.