Soluble TNF receptor treatment does not affect raised TGFβ levels in RA

We read with interest the report by Drynda et al demonstrating that treatment of rheumatoid arthritis (RA) with anti-tumour necrosis factor α (anti-TNFα) induces subtle changes in the cytokine network such as down regulation of the proinflammatory cytokine interleukin 6 (IL6), but does not affect the persistently high plasma levels of transforming growth factor β (TGFβ). Furthermore, they suggest that the latter finding indicates the existence of as yet unknown mechanisms for TGFβ overexpression in RA that may predispose a patient to severe infections and altered tumour defence.

Complementing the observations noted above are our findings using DNA microarray in patients with RA treated with TNF antagonists as compared with patients with RA treated with methotrexate and healthy controls. A total of 12,000 genes were analysed (human genome U 95 A Array-Affymetrix) and a variety of gene functions, including apoptosis, transcription factors, cell survival, antigen presentation, cartilage degradation, B and T cell function, intracellular signals, transcription gene function, adhesion molecules, inflammatory mediators, clathrin factors, HLA class II molecules, oncogenes, cytokine production, and cytokine receptor expression, were altered (up or down regulated) in the group receiving TNF antagonists. Of interest, several proinflammatory cytokine receptors including interferon γ, TNF, IL10, and TGFβ were found to be down regulated. Therefore, pathway signalling of these cytokines including TGFβ may be impaired if their receptors are down regulated.

Altered expression of these genes function, alone or in combination, may have an impact on the predisposition to infection and tumour defence. Such is the case for the induced TNFα inhibitor down regulation in the expression of C9, B and T cell functions, signaling cascade (JUN B), adhesion molecules, heat shock proteins, and antigen presentation, and the predisposition to infection. Likewise, TNF antagonists also regulate the expression of oncogenes, such as Jun B, c-myc, fos and ras, which may have an impact on tumour defence.

Therefore, our study with DNA microarray confirms and expands the immunomodulatory functions of TNF antagonists. Data, however, seems to suggest that the increased predisposition to develop infection and altered tumour defence may not be related to increased plasma levels of TGFβ because its receptors are regulated, but rather to dysregulation of gene expression of other molecules induced by the TNF antagonists.1,2

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References

Authors’ reply
We read with interest the letter by Cuchacovich and Espinoza commenting on our previous paper,1 which, based on results of DNA microarrays showing that increased plasma levels of transforming growth factor β (TGFβ) persist in the course of anti-tumour necrosis factor α (anti-TNFα) treatment in rheumatoid arthritis (RA), suggests that patients may not have an altered tumour defence.

Complex effects of TGFβ on tumour development and progression, as well as cancer metastasis have been demonstrated in numerous studies.2 As a result of these studies, raised levels of TGFβ seen in patients with RA are thought to contribute to an altered tumour defence.

In our own additional experiments we monitored changes in the expression profiles of mononuclear cells from peripheral blood in the course of anti-TNF treatment in RA in 10 patients using the same human genome U95a Affymetrix chip. By applying a different experimental setting than Cuchacovich et al,3 different results were found. Only a small number of genes were found to be regulated in five or more of the 10 patients in either direction after anti-TNF treatment compared with baseline. Among these genes were proinflammatory cytokines, chemokines, apoptosis related proteins, and proteins involved in the cell cycle. Interestingly, different regulation patterns were found in our patients.3 In contrast to Cuchacovich et al,4 no down regulation was found in receptors for interferon γ, interleukin 10, or in either TGFβ receptors (TGFβRI and TGFβRII) within the first six days of anti-TNF treatment. Expression of oncogenes Jun B, c-myc, ras, and fos remained unchanged as well.

Finally, it should be mentioned that neither mRNA levels nor plasma concentrations of TGFβ completely reflect the real situation in vivo because the biological activity of TGFβ is tightly regulated post-translationally. This includes the proteolytic cleavage of active TGFβ1 from its precursor protein,5 the formation of the active ligand-receptor complex, and the downstream signalling via Smads.6

Further research is mandatory to explain the multiple effects of TGFβ and its role in the complex network of cytokines. Recently developed techniques such as DNA microarrays may help to understand the interactions and regulation of proteins and their biological activity.

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Usefulness of bone densitometry in postmenopausal women with clinically diagnosed vertebral fractures

We read with interest the article by Nolla et al, which demonstrates that only 3% of women with radiographically asymptomatic vertebral fracture have normal bone mineral density (BMD).7 We agree with their conclusions that in this clinical setting measurement of BMD is not required to confirm a diagnosis of osteoporosis before starting treatment.

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A large number of studies have shown that a previous history of vertebral fracture increases the risk of future vertebral and non-vertebral fracture, independently of BMD. Vertebral fractures are also associated with significant morbidity, leading to an impaired quality of life and increased mortality. A recent study by Lindsay et al demonstrated the speed of disease progression in osteoporosis, with 20% of patients experiencing a new incident vertebral fracture within 12 months after a vertebral fracture. These data suggest that osteoporosis treatment should be started as soon as possible after a fracture has been diagnosed, as any delay in initiating treatment while waiting for bone densitometry may put the patient at risk of further fractures. The availability of dual energy absorptiometry (DEXA) is poor in the United Kingdom in comparison with some other European countries. The Advisory Group on Osteoporosis noted that in the UK there were 1.6 DEXA machines per million population, compared with 2.9 in the USA and 6.6 in France. The limitation of DEXA machine provision in the UK compared with the clinical demand has led to long waiting lists for BMD measurements and a potential delay in starting osteoporosis treatment.

Under these circumstances, what is the evidence that patients can be treated solely on the basis of vertebral fracture without the need for BMD measurement? The majority of studies have evaluated drug treatment in patients with low BMD alone, or with low BMD and prevalent vertebral fractures. Studies of raloxifene, alendronate, and parathyroid hormone have, however, included patients with two or more asymptomatic vertebral fractures in the absence of BMD readings.

In the study by Harris et al 80% of patients had two or more vertebral fractures, and analysis of this subgroup showed that patients treated with risedronate had a 43% reduction in new vertebral fractures at three years compared with those receiving placebo. A further study of risedronate recruited patients solely on the basis of vertebral fracture history (>2) irrespective of BMD and demonstrated that active treatment reduced the risk of new vertebral fractures by 49% and of new non-vertebral fractures by 33% over three years compared with placebo.

Studies of raloxifene and parathyroid hormone also included patients with a vertebral fracture history alone. Although the results of these studies showed an overall reduction in fracture risk, subgroup analysis of the patients with two or more vertebral fractures and no BMD measurement was not performed. It is therefore not possible to determine accurately the effect of treatment in this group.

We feel that the evidence suggests that patients presenting with two or more asymptomatic vertebral fractures should be considered for treatment of osteoporosis without the need for measurement of BMD, after a metabolic or secondary cause of fracture has been excluded. This is reflected in some of the recent guidelines for the management of osteoporosis.

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References

Author’s reply

We thank Dr Moss and Dr Keen for their interest in our article and for their comments, especially relevant for clinical practice. We agree that whenever the availability of DXA is limited, treatment for osteoporosis in postmenopausal women presenting with non-traumatic vertebral fractures can be started without the measurement of BMD.

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Infection and SLE

We read with great interest the leader by Gilliland and Tsokos on the prophylactic use of antibiotics and immunisation in systemic lupus erythematosus (SLE).1 We strongly agree that prophylactic treatment against tuberculosis should be considered in certain groups of patients with SLE, and in particular that co-trimoxazole prophylaxis should be used in patients receiving potent cytotoxic treatment such as cyclophosphamide.

However, the important relationship between hypocomplementaemia, splenic dysfunction, and infection in SLE should also be emphasised. In Western countries, pyogenic infection has previously been seen in SLE. Furthermore, patients with SLE often have chronic hypocomplementaemia, even when their disease is inactive, with low levels of C3 and C4 resulting in defective opsonisation of bacterial complexes. This, together with an acquired reduction in levels of complement receptor type 1 on the surface of erythrocytes, impairs delivery of immune complexes to the spleen. An important cause of death in certain cohorts of patients with SLE are those with homozygous deficiencies of early components of the classical complement pathway. Not only do these deficiencies predispose to the development of SLE but they also increase the risk of infection. For example, among patients with CIq deficiency, 13 had recurrent bacterial infections, including meningitis and pneumococcal pneumonia. CIq is known to have a vital role in host defence against infection, and may also be important in the processing of Gram negative organisms.2 Gram negative infection is also an important cause of death in certain cohorts of patients with SLE.

An increased risk of infection with S. pneumoniae, N meningitidis, and Haemophilus influenzae type B is also seen after surgical splenectomy. Such patients should receive lifelong prophylaxis with penicillin V and immunisation with pneumococcal polysaccharide vaccine. Children and adults with this or severe splenic dysfunction due, for example, to coeliac disease, should also receive a single dose of H influenzae type B vaccine. We have previously recommended that patients with SLE and chronic hypocomplementaemia should also receive similar prophylaxis3 and wish to reiterate the importance of these measures in order to prevent life threatening infection in this disease.

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hypocomplementaemia. the following possible risk factors: female sex, infections, Mitchell and colleagues suggested hypocomplementaemia is not clear. In a small infections, the evidence to support prophylactic agents at the time of who are at risk of developing certain functional hyposplenism, immunosuppressive treatments, attempts should have not been made to secure a pathological diagnosis, either before or after the final outcome. No mention of this was made in the report.

I remain unconvinced that this was a case of Takayasu's arteritis and there is no evidence presented to suggest that this child did have a CD4+ lymphopenia.

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Reference

Author's reply
We thank Dr Smith for his comments and would like to reply to the points he made.

Firstly, we agree that the absolute CD4 number was not correct in the table. It was incorrectly converted in the editorial process from the value/mm$^3$ and should have been 0.2×10$^9$/l rather than 2×10$^9$/l. We regret that this point was overlooked on the proofs.

Secondly, a polyclonal hypergammaglobulinemia is present in one third of cases with Takayasu arteritis. The serum immunoglobulin levels of our patient are consistent with Takayasu arteritis. Dr Smith mentioned a modest rise in the IgG level, with a normal IgA level, but our patient had high levels of both IgG and IgA.

Finally, the classification criteria for Takayasu arteritis according to the American College of Rheumatology (ACR) are: (a) age at disease onset in years <40; (b) classification of the arms and legs; (c) decreased brachial artery pulse; (d) blood pressure difference >10 mm Hg, or bruit over subclavian arteries or aorta; (f) arteriogram abnormality. Our patients had all six of these criteria. In addition to the ACR criteria, our patient had one obligatory, one major, and five minor criteria for the clinical diagnosis of Takayasu's disease according to Ishikawa's criteria. These criteria comprise one obligatory criterion, two major criteria, and nine minor criteria. In addition to the obligatory criterion, one major and two or more minor criteria suggest a high probability of the presence of Takayasu's disease.

These data prove that there is no reason to doubt the diagnosis of this case as Takayasu arteritis. Additionally, the patient had a low CD4 count associated with hypergammaglobulinemia.

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Reference