Protein kinase signals activate interleukin 16 encoding transcripts in rheumatoid arthritis versus osteoarthritis synovial fibroblasts

M K Schuler, S Sell, W K Aicher

Interleukin 16 (IL16) is a proinflammatory cytokine and a chemoattractant factor for CD4+ T cells. IL16 has been detected at higher concentrations in rheumatoid arthritis (RA) synovial fluid than in osteoarthritis (OA) specimens. IL16 is expressed in inflammatory infiltrates and in CD68+ synovial lining cells of patients with RA as detected by in situ hybridisation. In this study we compared the modulation of IL16 steady state mRNA in synovial fibroblasts (SF) from six patients with RA and from three patients with OA. SF were prepared, expanded, and characterised as described previously.

To examine the IL16 encoding transcript amounts, SF were incubated in complete medium for 24 or 48 hours in the presence of one of the following chemicals: 1 ng/ml phorbol-12-myristate-13-acetate (PMA), an activator of protein kinase C (PKC); 200 ng/ml ionomycin (Iono), a calcium ionophor; 10 µM of adenosine-3′,5′-cyclic monophosphate (cAMP), which stimulates protein kinase A (PKA); 10 nM okadaic acid (Oka), a phosphatase inhibitor; 10 µM MAS-7, which activates G-proteins; 100 µM H-7 dihydrochloride (H-7), an inhibitor of protein kinases; and 10 nM staurosporine (Stauro), a protein kinase inhibitor (all from Calbiochem or Biomol). Differences of IL16 encoding steady state mRNA amounts in activated cells compared with controls were detected after 33 cycles of reverse transcriptase-polymerase chain reaction (RT-PCR) amplification (Taq DNA polymerase, Roche Biochemicals). Glyceraldehyde-3-phosphate dehydrogenase (GAPDH) RT-PCR served as a control for RNA content. The PCR amplification plateau was reached after 35 cycles. This suggested that the IL16-specific RT-PCR was suitable for detecting different levels of IL16 encoding transcripts as the PCR was stopped before reaching the amplification plateau. Still, the limitations of this method are evident and we therefore consider our data as a semiquantitative enumeration of transcripts encoding IL16.

Both, early passage RA SF and OA SF spontaneously transcribed IL16 encoding mRNA. Addition of protein kinase inhibitor staurosporine enhanced the IL16 RT-PCR signals in all samples of OA SF, whereas specific protein kinase C activator PMA reduced the IL16 encoding RT-PCR signals in OA SF (fig 1). Ionomycin, cAMP, and MAS-7 had minor and variable effects in OA SF (fig 1). Addition of protein kinase inhibitor staurosporine also enhanced the IL16 encoding signal in RA SF (fig 2). Incubation of the cells with PMA and ionomycin reduced the IL16 encoding RT-PCR signal intensity in these cells (fig 2). Again, cAMP and MAS-7 produced minor and variable effects in the different samples analysed (fig 2). Application of okadaic acid

Figure 1 Modulation of IL16 transcripts in OA SF. SF of a patient with OA were expanded in culture and analysed for IL16 transcripts during the second passage. The synovial fibroblasts were incubated with phorbol ester (PMA), ionomycin (Iono), cAMP, okadaic acid (Oka), MAS-7, H-7, or staurosporine (Stauro). Untreated cells served as controls (C). OA SF transcribed IL16 encoding mRNA (C). Staurosporine and MAS-7 enhanced the RT-PCR signal to some extent, whereas in PMA, Oka, and H-7 treated cells the IL16 RT-PCR signal was reduced. A recombinant IL16 plasmid served as a positive control (+) and the RT-PCR master mix without cDNA served as a negative control (−, top). GAPDH RT-PCR served as control to show sufficient quality and quantity of the cDNA employed (bottom). A 100 bp DNA marker shows PCR product sizes (M).

Figure 2 Regulation of IL16 transcripts in RA SF. SF of a patient with RA were expanded and analysed for IL16 transcripts in the second passage. The synovial fibroblasts were incubated with phorbol ester (PMA), ionomycin (Iono), cAMP, okadaic acid (Oka), MAS-7, H-7, or staurosporine (Stauro). Untreated cells served as controls (C). RA SF transcribed IL16 encoding mRNA (C). cAMP and staurosporine enhanced the RT-PCR signal. In PMA, Iono, Oka, and H-7 treated cells the IL16 RT-PCR signal was reduced. A recombinant IL16 plasmid served as a positive control (+) and the RT-PCR master mix without cDNA served as a negative control (−, top). GAPDH RT-PCR served as a control to show sufficient quality and quantity of the cDNA employed (bottom). A 100 bp DNA marker shows PCR product sizes (M).
acid or H-7 dihydrochloride reduced the IL16 RT-PCR signals. As okadaic acid and H-7 reduced the cell viability prominently, the decreased IL16 signals probably result from the induction of cell death. In contrast, incubation of the cells with PMA, ionomycin, cAMP, MAS-7, or staurosporine did not reduce the viability.

Protein kinase inhibitor staurosporine has been reported to induce apoptosis in some cells.\(^7\) Enumeration of dead cells and observation of morphological changes by microscopy upon staurosporine treatment did not give any indication of reduced cell viability at concentrations 10- to 100-fold above the concentrations used in our experiments. RA SF are resistant to induction apoptosis by overexpression of sentrin, Bcl-2, and mutant forms of p53.\(^2\) Therefore the RA SF, especially, may be able to respond to a staurosporine induced pathway with enhanced IL16 transcript amounts. Because protein kinase C activator PMA reduced IL16 transcripts in SF, the data suggest that in SF the transcription of IL16 might be regulated through protein kinase C dependent pathways.

**ACKNOWLEDGEMENTS**

We thank A Hack for excellent technical service. This study was supported by grants to WKA (fortüne 411, in part by DFG Ai 16/10–1) and by institutional funding.

**Authors’ affiliations**

M K Schuler, S Sell, W K Aicher, Centre for Orthopaedic Surgery, UKT University Hospital, Tübingen, Germany

**REFERENCES**


**Obstructive sleep apnoea as a cause of fatigue in ankylosing spondylitis**

N Erb, D Karokis, J P Delamere, M J Cushley, G D Kitas

**PATIENTS AND METHODS**

Consenting volunteers with classical AS (modified New York Criteria 1984) were recruited prospectively from a hospital rheumatology clinic and assessed using: (a) the BASDAI \(^3\); (b) the Epworth Sleepiness Scale (ESS), \(^4\) a validated self administered eight item questionnaire that assesses daytime sleepiness in adults (a score of ≤10 is normal); (c) the Hospital Anxiety and Depression Scale (HAD) \(^5\) (a score of ≤7 indicates normal mood); (d) height, weight, neck circumference; (e) spinal mobility by occiput-wall distance, chest expansion, and Schöber’s test; (f) respiratory measurements consisting of full spirometry and carbon monoxide diffusion studies, arterial blood gases, and night oximetry on two consecutive nights (using a five channel EdenTec Recorder and EdenTrace Software Version 1.3, Nellcor, Puritan and Bennett, Ltd) to assess heart rate, chest impedance, nasal airflow, oxygen saturation, and snoring level.

**RESULTS**

Of 22 recruited patients, 17 (77%) completed the assessments, 14 male and three female. Pulmonary function testing was normal in nine (53%) patients, classically restrictive in six (35%), borderline restrictive in two (12%), and obstructive in none. Two (12%) patients fulfilled criteria for SAS when the data suggest that in SF the transcription of IL16 might be regulated through protein kinase C dependent pathways.

**ACKNOWLEDGEMENTS**

We thank A Hack for excellent technical service. This study was supported by grants to WKA (fortüne 411, in part by DFG Ai 16/10–1) and by institutional funding.

**Authors’ affiliations**

M K Schuler, S Sell, W K Aicher, Centre for Orthopaedic Surgery, UKT University Hospital, Tübingen, Germany

**REFERENCES**

assessed by night oximetry. Both these patients had an obstructive type of SAS (table 1).

Compared with those without SAS, the two patients with SAS had significantly higher mean ESS scores (SAS 16.5 (0.7) vs no SAS 8.6 (1.2), p=0.01), fatigue component of the BASDAI (SAS 8.0 (0.7) vs no SAS 5.8 (2.5), p=0.04), and neck circumference (SAS 41.0 (4.2) vs no SAS 39.2 (9.2), p=0.02). The overall BASDAI scores (SAS 5.5 (1.3) vs no SAS 4.8 (1.9), p=0.59) and body mass index (SAS 32.7 (3.1) vs no SAS 25.6 (4.6), p=0.13) were not significantly different between the two groups. Neither of the two patients with SAS drank alcohol, but no other significant differences were found between the two groups (table 1).

**DISCUSSION**

SAS and AS can coexist. We found a higher prevalence of SAS in patients with AS (12%) than has been reported in the general population (1–4%). However the sample size was small and a larger study would be required to determine the true prevalence. As might be expected, the patients with SAS had high subjective scores of daytime sleepiness, which was mirrored by the high scores on the fatigue component of the BASDAI. The overall BASDAI scores of the patients with SAS were not significantly different from the remainder of the cohort, suggesting that disease activity in these two patients did not differ from that of the cohort, and the high fatigue component scores were rogue results reflecting the underlying SAS and not AS activity. None of the specific measurements of spinal involvement in the affected patients were significantly different from those of the cohort, suggesting that the degree of spinal involvement in AS was not a contributing factor in the development of SAS in these two subjects. The two affected patients were both obese middle aged men and had a classical restrictive pattern on pulmonary function testing, all of which are known to be risk factors for the development of SAS. Both patients were treated with continuous positive airway pressure ventilation at night, and their levels of fatigue improved subjectively, which was reflected in a fall of their ESS scores (patient 1: 17 to 9, patient 2: 22 to 12).

SAS can be a contributing factor to fatigue in AS. Patients with excessive fatigue or scoring high on the fatigue component of the BASDAI without other evidence for continuing disease activity should be assessed for other causes of fatigue. Detection and treatment of SAS can lead to improvement in fatigue symptoms in these patients and reduce the associated morbidity and mortality of SAS.

**ACKNOWLEDGEMENTS**

Many thanks to the staff of the Pulmonary Function Laboratories in the Dudley Group of Hospitals NHS Trust for carrying out the respiratory tests and sleep studies.

**Authors’ affiliations**

N Erb, D Karokis, J P Delamere, G D Kitas, Department of Rheumatology, Dudley Group of Hospitals NHS Trust, UK

M J Cushley, Department of Respiratory Medicine, Dudley Group of Hospitals NHS Trust, UK

Correspondence to: Dr N Erb, Department of Rheumatology, Dudley Group of Hospitals NHS Trust, The Guest Hospital, Tipton Road, Dudley, West Midlands DY1 4SE, UK; nik@erb.org.uk

Accepted 7 June 2002

**REFERENCES**


Thoracic high resolution computed tomography in patients with ankylosing spondylitis and without respiratory symptoms

A El Maghraoui, S Chaouir, A Bezza, F Tabache, A Abouzahir, D Ghafir, V Ohayon, M I Archane

The incidence of pleuropulmonary disease in ankylosing spondylitis (AS) varies from 0 to 30% in the medical literature. The most frequently recognised manifestations are upper lobe fibrosis, mycetoma formation, and pleural thickening. The advent of high resolution computed tomography (HRCT) made it possible to examine the entire lung parenchyma and pleura in many conditions with diffuse lung disease by a non-invasive method.

Consecutive patients with a diagnosis of AS according to the modified New York criteria who attend our department during one year were included in the study. All patients had a prospective rheumatological assessment conducted by two rheumatologists (AEM and AB) using a structured questionnaire, a pulmonary function testing measurement, posteroanterior chest radiography; on the same day an HRCT of the thorax was performed using a Siemens Somatom S CT scanner with images windowed to highlight both lung and mediastinal structures. Nine HRCT slices were obtained on suspended respiration at 2 cm intervals from the lung apices to bases. The results of the chest radiographs and HRCT were assessed by a radiologist (SC) who was unaware of the clinical data of the patient. The CT scans were evaluated for the presence, distribution, and extent of airway and parenchymal abnormalities. Standard CT criteria were used to establish a diagnosis of interstitial lung disease (ILD), bronchiectasis, and emphysema.

Plain radiography was abnormal in only two patients. Twenty-four patients (55%) showed abnormalities on HRCT. Table 1 lists the abnormalities detected on HRCT. Twenty (45%) patients had mild non-specific interstitial abnormalities of insufficient severity or extent to be labelled as ILD. Pulmonary function tests showed a restrictive process in eight patients, in whom three had normal chest HRCT and three had ILD. The two remaining patients had non-specific interstitial abnormalities of insufficient severity or extent to be labelled as ILD. The significance of such changes is unknown and must await a prospective longitudinal study to determine their natural history.

Our study disclosed a great percentage of defined as well as mild and non-specific interstitial abnormalities on HRCT undetectable on plain radiography in a series of patients with AS and without history of respiratory symptoms. Only one patient had evidence of ground glass shadowing, which is associated with active alveolitis (fig 1). This is usually considered a feature of early and potentially reversible disease. As previously described, the overall correlation of pulmonary function with radiographic appearance was poor. Casserly and Fenlon studied 26 patients with AS using HRCT and noted pulmonary abnormalities in 19 patients (73%). Findings consisted of interstitial lung disease (four patients), bronchiectasis (six patients), emphysema (four patients), apical fibrosis (two patients), mycetoma (one patient), and non-specific interstitial lung disease (12 patients). In that study plain radiographs revealed abnormalities in four patients. In contrast with our study, all patients with ILD had respiratory symptoms.

Another study conducted by Turetschek et al showed that 15/21 (71%) patients had abnormalities on thin section CT. The most common abnormalities were thickening of the interlobular septa (7/21 patients), mild bronchial wall thickening (6/21), pleural thickening and pleuropulmonary irregularities (6/21), and linear septal thickening (6/21). The HRCT findings in our study, as was the case in the study of Casserly et al, suggest an inflammatory process rather than a mechanical cause for the interstitial disease found in patients with AS. Twenty patients (45%) in our study had non-specific interstitial abnormalities as had 11 (42%) patients in the study of Casserly et al, which implied HRCT evidence of interstitial change that was of insufficient severity or extent to be labelled as ILD. The significance of such changes is unknown and must await a prospective longitudinal study to determine their natural history.

Table 1 Result of chest HRCT in 44 patients with anklosing spondylitis

<table>
<thead>
<tr>
<th>Number (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>20 (45)</td>
</tr>
<tr>
<td>Emphysema</td>
<td>5 (11)</td>
</tr>
<tr>
<td>Interstitial lung disease</td>
<td>4 (9)</td>
</tr>
<tr>
<td>Upper lobe fibrosis</td>
<td>3 (7)</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Ground glass attenuation</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Non-specific interstitial change</td>
<td>20 (45)</td>
</tr>
<tr>
<td>Pleural thickening</td>
<td>12 (27)</td>
</tr>
<tr>
<td>Parenchymal bands</td>
<td>10 (23)</td>
</tr>
<tr>
<td>Subpleural bands</td>
<td>6 (14)</td>
</tr>
<tr>
<td>Blebs</td>
<td>6 (14)</td>
</tr>
<tr>
<td>Parenchymal micronodules</td>
<td>4 (9)</td>
</tr>
<tr>
<td>Irregular interfaces</td>
<td>3 (7)</td>
</tr>
</tbody>
</table>

Chest HRCT of a 37 year old patient showing ground glass aspect (black arrow) with parenchymal band (white arrow).
Effect of low dose weekly methotrexate on bone mineral density and bone turnover

S Patel, G Patel, D Johnson, L Ogunremi, J Barron

W

E

R

REFERENCES


Evaluation of a screening tool for inflammatory joint disease

J A Barbour, J Binding, M Bridges, C Kelly

The benefit of early treatment of inflammatory joint disease (IJD) with disease modifying drugs (DMARDs) to avoid progressive irreversible joint damage is well established. The time delay from onset of symptoms to starting a DMARD is determined by a number of factors, and early synovitis clinics have been developed to facilitate speedy referral and initiation of DMARD treatment. The efficiency of these clinics is dependent on appropriate referral. Diagnosing early IJD is not easy; even specialists have been shown to disagree when the consultant assessed one joint was affected by pain or stiffness, but negative if the consultant and then passed to the nurse practitioner who had referred to one consultant for early assessment over a 10 month period. GP letters were initially screened by the consultant’s assessment. It uses well recognised markers of inflammation (erythrocyte sedimentation rate (ESR), rheumatoid factor, and erosions) but also includes more general signs of bone turnover or BMD (both baseline and longitudinally).

In summary, our findings suggest that weekly methotrexate treatment in the doses used in this study, is unlikely to increase fracture risk at the common skeletal sites for osteoporotic fractures.

Authors’ affiliations
S Patel, G Patel, D Johnson, Department of Rheumatology, St Helier Hospital, Epsom and St Helier NHS Trust, UK
J Barron, Department of Chemical Pathology, St Helier Hospital
S Patel, L Oggunremi, Osteoporosis Unit, Department of Rheumatology, St George’s Hospital, UK

Correspondence to: Dr S Patel, Department of Rheumatology, St Helier Hospital, Carshalton, Surrey SMS 1AA, UK; spatel@sthelier.sghms.ac.uk
Accepted 10 June 2002

REFERENCES
Anti-annexin V antibodies in patients with cerebrovascular disease

N Gašperšič, U Rot, S Ćučnik, T Kveder, B Božič, B Rozman


Antennexin V (ANXV) is a protein with a high affinity for negatively charged phospholipids and shows in vitro a potent anticoagulant activity. It has been suggested that it has a significant role in the prevention of arteriovenous thromboses or fetal loss, or both.1 Increased levels of antibodies against ANXV (aANXV) have been reported in patients with different systemic autoimmune disorders5–4 as well as in women with recurrent fetal loss and pre-eclampsia.7 The presence of aANXV in patients with thromboembolic cerebrovascular disease (CVD), however, has not yet been described. We report on two patients with CVD who had evidently raised levels of IgG aANXV, whereas all the other tested antiphospholipid antibodies (aPL) were negative.

We examined 37 young patients with no evident systemic autoimmune disease (23 women, 14 men; mean age at CVD 32 years (range 18–40)) 11 months to six years after CVD: seven with transient ischaemic attack (TIA), 25 with ischaemic cerebrovascular insult, and five with venous sinus thrombosis. Diagnoses based on the history and clinical manifestations were objectively verified by computed tomography (CT), magnetic resonance imaging (MRI), and/or angiography at the time of the onset of symptoms. After prospective clinical re-examination, two blood samples were obtained from each patient eight weeks apart.

Serum samples were analysed by enzyme linked immunosorbent assay (ELISA) for the presence of aANXV, anticardiolipin, anti-β2-glycoprotein, and anti-prothrombin antibodies.6 Antinuclear antibodies (ANA) were determined by indirect immunofluorescence.

CASE REPORTS

Patient 1

A 36 year old woman with a history of fetal loss in 1982 became pregnant for the second time in 1998. At the 36th gestation week a caesarean section was performed owing to placental abruption. A few days after the delivery, she became somnolent with mild right sided hemiparesis. CT and an MRI scan confirmed superior sagittal sinus thrombosis and therefore treatment with warfarin was started. Three years later, her condition was stable with mild occasional headaches and mild right sided pyramidal symptomatology. Laboratory examinations showed positive ANA (up to 1/320) and persistently raised levels of IgG aANXV, while all the other tested aPL were negative. No clinical manifestations of a systemic autoimmune disease could be found. Except for a short period of smoking, no other thrombotic risk factors were identified.

Patient 2

A 24 year old woman had a TIA in 1996, two months after starting hormonal contraceptives. She experienced paraesthesia over both arms and legs and gait ataxia was found. MRI, echocardiography, and sonography of the neck vessels were normal, suggesting TIA in the vertebrobasilar region. In 2000 she became pregnant for the first time. Generalised oedema and hypertension appeared in the fifth and eighth month, respectively. A healthy child was born one month pre-term. In 2001 she was in good health except for rather frequent headaches. Clinical and special neurological examinations were completely normal. Among the tested aPL only IgG aANXV were found to be positive. Contraceptives were the only risk factor for CVD.

DISCUSSION

ANXV is one of the possible cofactors for aPL. Rand et al reported that aPL can disrupt the protective shield of ANXV on procoagulant surfaces, leaving sufficient space for the formation of coagulation complexes. aANXV were shown to induce the apoptosis of endothelial cells, creating a procoagulant environment with increased risk for thrombosis.

Two of 37 young patients after CVD had significantly raised IgG aANXV only. Besides some CVD risk factors (smoking, delivery and bleeding, oral contraceptives) both patients had pregnancy complications, which might be associated with aANXV.1 Our results did not show a statistically significant association between aANXV and CVD. Nevertheless it is possible that aANXV represented an additional risk factor, and together with other factors might have led to thrombosis. A study of larger groups of patients will enable firm conclusions to be drawn about the clinical significance of aANXV in CVD.
Intra-alveolar haemorrhage in temporal arteritis

D Le Thi Huong, M R Andreu, P Duhaut, P Godeau, J C Piette

Temporal arteritis (TA) is the most common systemic vasculitis. We report herein a case of TA complicated with intra-alveolar haemorrhage. To our knowledge, this manifestation has not previously been reported.

CASE REPORT

A woman born in 1926 presented in 1999 with persistent dry cough and raised erythrocyte sedimentation rate at 60 mm at the first hour. C reactive protein was 14 mg/l. She had a history of pulmonary tuberculosis treated in 1951 with streptomycin and isoniazid. She complained of headache without fever, jaw claudication, scalp tenderness, and visual or musculoskeletal manifestations. She denied any other upper airways symptoms. Physical examination was normal. Arterial pressure was 140/70 mm Hg. Leucocyte count was 6.8 × 10⁹/l with 4.2 × 10⁹/l polynuclear neutrophils and 0.2 × 10⁹/l eosinophils, haemoglobin 130 g/l, and platelets 310 × 10⁹/l. A dipstick urinary test showed no proteinuria and no haematuria. Chest radiography disclosed calcified nodular densities in the upper right lobe, which was confirmed by computed tomography. An electrocardiogram and echocardiogram were normal. Fibre optic bronchoscopy was normal. Bronchoalveolar lavage fluid examination showed 120 × 10⁹ cells/l comprising macrophages 56% with siderophages 30%, lymphocytes 39%, polynuclear neutrophils 1%, and polynuclear eosinophils 4%. Bronchoalveolar lavage was sterile on cultures for bacterial infection, clear eosinophils 4%. Bronchoalveolar lavage was sterile on lymphocytes 39%, polynuclear neutrophils 1%, and polynuclear eosinophils 4%. Bronchoalveolar lavage was sterile on cultures for bacterial infection, clear eosinophils 4%

REFERENCES

patients with histologically proved TA. IgM directed against human para-influenza type 1 virus were associated with TA onset. In conclusion, intra-alveolar haemorrhage may be one of the various causes of cough in TA. Further studies are necessary to ascertain whether it is the expression of a primary vasculitis or the consequence of an as yet unknown viral infection.

Authors’ affiliations
D Le Thi Huong, M R Andreau, P Duhaout, P Godeau, J C Piette, Department of Internal Medicine, Groupe Hospitalier Pitie-Salpetriere, 83 bd de l’Hôpital, 75013 Paris, France.

Correspondence to: Dr D Le Thi Huong, du.boutin@wanadoo.fr

Accepted 20 June 2002

REFERENCES

Circulating soluble CD40 ligand in patients with eosinophilic fasciitis

M Jinnin, H Ihn, N Yazawa, Y Asano, K Yamane, K Tamaki

Recently, some reports showed the increased expression of CD40 ligand in autoimmune diseases. CD40 ligand can be expressed in a soluble form. Soluble CD40 ligand (sCD40L) is present in supernatants of in vitro activated T cells in 15 kDa and 18 kDa forms, and these forms are the products of enzymatic cleavage at a metalloproteinase sensitive site in the membrane proximal region of the extracellular domain of the molecule. Their abnormalities have been demonstrated in various kinds of diseases such as chronic lymphocytic leukaemia or systemic lupus erythematosus. But, there has been no report demonstrating the serum levels of sCD40L in patients with eosinophilic fasciitis (EF). In this study we determined the serum levels of sCD40L in patients with EF, and investigated their clinical significance in this disease, in order to evaluate whether sCD40L might be a useful marker for this disease.

METHODS AND RESULTS

Eleven patients (disease duration 1–8 months) with a classic clinical picture of EF, who had received no treatment, were included in this study. All the patients had a recent history of increased skin induration. Skin biopsies including deep subcutaneous tissue and fascia showed markedly infiltrated and thickened fascia in all cases. Additionally, the thickened fascia contained accumulation of collagen and intense inflammatory cell infiltrates comprising lymphocytes, macrophages, and eosinophils. Clinical manifestations and laboratory findings of each patient were obtained from the medical records. All the laboratory findings were obtained at the time of serum sampling. We also collected control serum samples from 20 healthy volunteers matched for age and sex. Levels of sCD40L were measured with a specific enzyme linked immunosorbent assay (ELISA) kit (Bender MedSystems, Vienna, Austria), according to the manufacturer’s instructions. Values greater than the mean plus 2SD for normal control subjects were regarded as raised. Additionally, serum IgG was evaluated by a turbidimetric immunoassay as described previously. Statistical analysis was carried out with Student’s t test for the comparison of means, and Fisher’s exact probability test for the analysis of frequency. Values of p<0.05 were considered significant.

Figure 1 shows the serum sCD40L levels in patients with EF and in the healthy control subjects. The serum sCD40L levels in patients with EF were significantly higher than those in the healthy controls (mean (SD) 0.29 (0.16) ng/ml v 0.13 (0.08) ng/ml, p<0.01). When the cut off value was set at 0.29 ng/ml (mean + 2SD for the controls), raised serum sCD40L levels were seen in 5/11 (45%) patients with EF.

Serum sCD40L levels correlated significantly with serum IgG levels (r=0.75, p<0.05). On the other hand, serum sCD40L levels were not significantly correlated with serum gammaglobulin, peripheral cell count of eosinophils, erythrocyte sedimentation rate, or serum levels of aldolase. Additionally, three of the five patients with raised serum
sCD40L levels were examined longitudinally before and after corticosteroid treatment for two months to three years. Their clinical manifestations and laboratory abnormalities improved with treatment. Serum sCD40L levels became normal in all three patients (fig 2).

DISCUSSION

As described above, expression of sCD40L in patients with several connective tissue diseases has already been evaluated and shown to be increased. Berner et al reported that increased expression of CD40 ligand on CD4+ T cells in rheumatoid arthritis indicated prolonged and increased activation of CD4+ T lymphocytes and was associated with active disease and, possibly, an unfavourable prognosis. 1 Valenti et al found that expression of CD40 ligand in activated CD4+ T lymphocytes was increased in patients with systemic sclerosis. 5 On the other hand, Vakkalanka et al reported that the mean concentration of serum sCD40L was statistically significantly higher in patients with systemic lupus erythematosus (SLE) than in disease controls or healthy subjects, and segregation of patients with SLE by severe, moderate, or mild extent of disease showed a relationship between disease severity and sCD40L concentration. 1 These findings suggest that CD40 ligand or sCD40L are associated with clinical features of these diseases. In our study, serum levels of sCD40L in patients with EF were significantly higher than those in healthy controls. sCD40L is present in supernatants of in vitro activated T cells. 1 In patients with EF, activated T cells were thought to be increased because of the presence of raised interleukin 5 and interleukin 10. 8 Thus, our results may reflect such a condition. Additionally, serum levels of sCD40L correlated significantly with serum IgG levels in patients with EF, and serum sCD40L levels normalised after treatment in patients with raised sCD40L levels. As well as peripheral cell counts of eosinophils, erythrocyte sedimentation rate or serum levels of aldolase, hypergammaglobulinaemia is reported to be one of the markers of disease activity. 6 which occurs in 75% of patients and is usually due to a polyclonal increase in IgG. 9 Thus, our results suggest that sCD40L is also good marker of EF, reflecting the effects of treatment. However, only 5/11 patients showed raised levels of sCD40L. Thus, the usefulness of sCD40L as a marker of disease activity was not completely substantiated in this study. Additionally, serum sCD40L levels did not correlate with gammaglobulin despite significant correlation with IgG, possibly owing to the small number of patients studied. Moreover, we performed the longitudinal study in only three patients with raised sCD40L levels because other serum samples were not available, so the longitudinal data may be incomplete. Additionally, there is a possibility that corticosteroid treatment, independently of disease, can reduce sCD40L levels. Further studies are needed to clarify the significance of the role of sCD40L in this disease.

REFERENCES