Workshop

The Future of Damage Assessment in Vasculitis

PHILIP SEO, RAASHID A. LUQMANI, OLIVER FLOSSMANN, BERNHARD HELLMICH, KAREN HERLYN,
GARY S. HOFFMAN, DAVID JAYNE, CEES G.M. KALLENBERG, CAROL A. LANGFORD, ALFRED MAHR,
ERIC L. MATTESON, CHETAN B. MUKHTYAR, TUHINA NEOGI, ABRAHAM RUTGERS, ULRICH SPECKS,
JOHN H. STONE, STEVEN R. YTTERBERG, and PETER A. MERKEL

ABSTRACT. Damage denotes the aspects of chronic disease that do not reverse with therapy. This concept is particularly important for the primary systemic vasculitides, since the careful differentiation between activity and damage may help avoid unnecessary exposure to cytotoxic medications. Damage significantly influences both longterm prognosis and quality of life. Because the primary systemic vasculitides have diverse manifestations, the use of a damage assessment instrument is crucial to ensure reproducibility. The Vasculitis Damage Index (VDI) is the only validated measure for damage assessment in vasculitis. Use of the VDI in recent clinical trials has shown that it may not adequately determine the full spectrum of damage experienced by patients with vasculitis of small- and medium-size vessels. We propose reexamining the way in which damage is assessed, focusing on vasculitides of small- and medium-size vessels, and outline an initiative to create a substantially revised and improved damage assessment instrument using data-driven approaches. This initiative is part of a larger international effort to create a unified approach to disease assessment for the primary systemic vasculitides. (J Rheumatol 2007;34:1357–71)

Key Indexing Terms:
VASCULITIS   OUTCOMES   DAMAGE

Although clinical trials of vasculitis frequently focus on disease activity, for the individual patient the most concerning issue may actually be damage (i.e., the disease sequelae that are unlikely to respond to immunosuppressive agents).

International interest has led to a new initiative that will reexamine the way damage in vasculitis is assessed. In 2004, an international group of investigators with an interest in vasculitis began reexamining all aspects of outcome measures in vasculitis. The 2004 OMERACT 7 Vasculitis Special Interest Group led to development of a consensus regarding the status of outcome measures in vasculitis and set in motion an agenda directed to replacing existing measures with data-driven revisions or new methods of disease assessment[1]. The VCRC-OMERACT Working Group continued to meet and work toward these goals. The OMERACT 8 Vasculitis Workshop provided a forum to refine a research agenda for vasculitis outcomes measurement, with a particular focus on damage assessment.

The OMERACT initiative is a collaborative project of the Vasculitis Clinical Research Consortium (VCRC; www.RareDiseasesNetwork.org/vcrc) and the European Vasculitis Study Group (EUVAS; www.vasculitis.org), and is supported by grants from the US National Institutes of Health and the European League Against Rheumatism. Our report provides an introduction to the concept of damage assessment in vasculitis, gives the results of the OMERACT 8 Vasculitis Workshop, and outlines the agenda for an international project to redefine the assessment of damage in vasculitis.

Background

After a disease flare is successfully controlled, patients continue to experience the consequences of the damage that result from disease flare, persistent low-level ("grumbling") disease, and the toxic effects of therapy. Distinguishing activity from damage is crucial to identify aspects of disease that will not respond to immunosuppressive therapy, and to prevent unnecessary use of cytotoxic medications.

Although the concept of damage seems intuitive, it must be strictly defined in order to ensure reproducibility among clinicians from diverse backgrounds and with different levels of experience. The aim of a damage index is to catalog the forms of damage that occur as a consequence of vasculitis, so that they can be consistently identified and recorded as a measure of the cumulative burden of disease.

The Vasculitis Damage Index (VDI) comprises 64 items of damage (grouped into 11 organ-based systems) that a group of experts agreed was representative of the forms of damage incurred by patients with systemic vasculitis (Appendix 1)[2]. Damage was defined in the VDI by the following characteristics:

- Irreversibility: By definition, the VDI items of damage are irreversible.
- Time element: By definition, a finding must be present continuously for at least 3 months before it can be considered to be an item of damage.
- Attribution: The VDI records all forms of damage that have occurred since the onset of vasculitis, regardless of cause.

- Grading and weighting: Individual items of damage are not scaled according to severity; all items of damage contribute equally to the overall VDI score.

Increasing use of formalized damage assessment in clinical trials of vasculitis has led to a growing need to improve the evaluation of damage in vasculitis and to reexamine the principles on which damage assessment is based. This process is a natural part of the cycle of revision and improvement that occurs with all outcomes measures. This reexamination will strengthen our understanding of this fundamental concept, improve our ability to track patient outcomes and response, and provide stronger outcome tools for use in clinical trials.

In 2004, investigators with expertise in the assessment of vasculitis assembled at OMERACT 7 to discuss the current status of outcome measures in vasculitis[2]. As a starting point, the group concentrated on the ANCA-associated vasculitides, i.e., Wegener's granulomatosis (WG) and microscopic polyangiitis (MPA), which have recently been the focus of important clinical trials in the US and in Europe[3-5]. This meeting was the start of a new initiative to reexplore the definition of damage to improve existing instruments for the assessment of vasculitis, and to achieve broader consensus within the vasculitis research community for outcome assessment in clinical trials.

As a result of meetings in preparation for OMERACT 8, we recognized that there was significant intellectual overlap between American efforts to develop an index of damage specific for the ANCA-associated vasculitides (AAV) and a European project to refine the VDI. Because of this overlap, and the strong desire to avoid the creation of multiple overlapping outcome measures, we elected to combine these efforts toward creating a Combined Damage Assessment index (CDA) that will lead to the development of an improved instrument that will eventually be used to assess many forms of small and medium-vessel vasculitis.

Objectives and Hypotheses

The purpose of a damage index for vasculitis is 3-fold:
- To provide a clear distinction between disease activity and disease damage
- To record the natural history of disease (whether treated or untreated)
- To serve as an outcome measure for clinical trials.

The application of a damage index at a predetermined time following disease onset or flare (probably 1 year) may be a valuable endpoint for clinical trials and may serve as a method for comparing the efficacy of competing therapies. Such an endpoint could be defined by the number of patients who exceed a threshold damage index at time X or by the rate of accumulation of damage after Y months of therapy. Since many patients in clinical trials may have already suffered significant amounts of damage at the time of enrollment, it may also be important to specify the level of baseline damage.

We propose to reexamine the assessment of damage in vasculitis in 4 phases (Figure 1):

Figure 1. The process of the VCRC-OMERACT damage assessment initiative.

- Phase 1: Development of the CDA
- Phase 2: Testing and refining the CDA
- Phase 3: Development of a weighting schema
- Phase 4: Validation of the CDA

Phase 1: Development of the CDA

Because the VDI was designed to assess damage for all of the vasculitides, there has been concern that it might not adequately record all forms of damage incurred by patients with these diseases. For example, the VDI does not distinguish among conductive, sensorineural, and mixed causes of hearing loss, making it difficult to collect reliable data regarding etiology. Further, data for gradations within specific manifestations, such as the severity or degree of proteinuria, renal insufficiency, muscle atrophy, pulmonary impairment, or hypertension, cannot be systematically recorded by the VDI.

This concern led to a project to develop a new damage assessment instrument that would focus specifically on the AAV. A draft version of a new instrument for damage assessment in AAV was created in 2005 with contributions from vasculitis investigators in the US and the European Union. This new instrument, named the ANCA-associated Vasculitis Index of Damage (AVID), was specifically designed for AAV because of the primacy of these diseases internationally in vasculitis research (Appendix 2).

At the OMERACT 7 conference, we reexamined the basic elements used to define damage, and created the following guidelines for AVID:

- Irreversibility: Unlike the VDI, the AVID allows items of damage to be reassessed (and unscored) as necessary.
- Time element: Three months was deemed insufficient time to differentiate between the consequences of irreversible damage and reversible disease flare. Therefore, in AVID, the time element has been increased to 6 months.
- Attribution: In the VDI, attribution of the cause of a damage item is not taken into consideration. The variability in scoring introduced by this rule was felt to be greater than the variability resulting from relying on the clinical judgment of investigators. For that reason, in AVID only items of damage felt to be secondary to some combination of the underlying vasculitis or its therapy are scored.
- Classification: For purposes of analysis, items of damage are divided into 3 categories: items of damage attributed to the vasculitis (AVID-V); items of damage attributed to the consequences of treatment (AVID-T); and items of damage for which the attribution is unclear (AVID-U).
- Grading and weighting: In the VDI, scoring of damage is binary (i.e., either an item is present or it is not). AVID expands the range of damage that can be recorded by grading items of damage such as renal insufficiency and hypertension according to widely recognized standards. Moreover, there must also be some acknowledgment in a damage index that certain items of damage (e.g., renal failure) have a greater effect on the quantity and quality of life than others (e.g., cataracts).

As this work on AVID was taking place, a EUVAS-based initiative began to reexamine some of the fundamental concepts underlying damage assessment in vasculitis, including a critical look at the performance of the VDI as applied to patients with AAV. When the VDI was developed, the original intent was to return to it at some future point to appraise its performance. The EUVAS Study Group proposed to accomplish this by conducting a retrospective longterm outcome study of over 500 patients enrolled in EUVAS trials.

During OMERACT 8 discussions, we realized that there is significant overlap between the AVID project and European efforts to revise the VDI. We now propose to develop a Combined Damage Assessment (CDA) that would promote our overall goal of creating a standardized approach to disease assessment more broadly applicable to the small- and medium-vessel vasculitides. A proposed list of items of damage for this CDA appears in Table 1. Development of the CDA will be data-driven, taking advantage of the data acquired by the application of the VDI and AVID to large cohorts of patients with WG and MPA enrolled in clinical trials in the US and in Europe, as well as a new patient-derived outcomes project.

The Wegener's Granulomatosis Etanercept Trial (WGET) Cohort
The WGET was a multicenter, double-blinded trial that randomized 180 patients with active WG to receive adjunctive treatment with etanercept (or placebo) in addition to standard-of-care therapies[6]. The addition of tumor necrosis factor blockade did not alter disease outcomes[3], thus providing the opportunity to examine the spectrum of damage accrued by a well characterized cohort of patients with AAV.

In the WGET, the VDI was applied at the time of enrollment and then every 6 months until trial closeout, and it revealed the broad spectrum of damage experienced by patients with WG[7]. The most frequently scored item was hearing loss, reported by 26% of patients in the cohort. Proteinuria (> 0.5 g/24 h) was observed in 18.9% of patients in the cohort. Nasal blockade/chronic discharge, nasal bridge collapse/septal perforation, and renal insufficiency were each scored on 32 patients (17.8%). Significant muscle atrophy or weakness, osteoporosis, cataracts, chronic sinusitis, subglottic stenosis, pulmonary fibrosis, chronic breathlessness, impaired lung function, hypertension, endstage renal disease-gonadal failure, and diabetes were all reported in 5%–10% of patients.

Study of damage in the WGET cohort highlights some ways the VDI could be refined to be potentially more responsive to damage specific to the small- and medium-vessel vasculitides. Investigators in the WGET recorded 38 additional items of damage that were not captured by the set VDI items (by means of a blank "other" field open to completion at each VDI assessment). These items included psychiatric conditions (i.e., anxiety and depression); the direct consequences of disease (i.e., tympanic membrane scarring, lung nodules, nasolacrimal duct obstruction, proptosis, and scleral scarring or thinning); the consequences of therapy (i.e., weight gain and striae); and fibromyalgia. Subsequent studies based on the WGET cohort also revealed a previously unsuspected relationship between WG and both solid tumor malignancy[8] and venous thromboembolic disease[9]. Analysis of the WGET data indicated that 26% of the items listed in the VDI were not scored by any patient in the WGET cohort; the majority of these items described the consequences of large-vessel vasculitis, which are rare events among patients with WG. Additionally, several WGET investigators were frustrated by the lack of gradation in the VDI, which prevents recording different degrees of damage.

The mean followup period of patients in the WGET cohort was 1.8 years[3]. Longer followup is likely to lead to greater understanding of the accrual of damage among patients with vasculitis over time. For that reason, we are conducting a prospective survey of the patients in the WGET cohort that will collect data on the accrual of damage that had occurred since the end of the trial (September 2002). In addition to the items listed in the VDI and AVID, we will also collect information on the additional items of damage identified by the WGET investigators (including the incidence of malignancy), which may provide a fuller picture of damage accrual, and will serve to inform revisions to a future version of a damage instrument. By deliberate intent, the longterm followup data collection for WGET will include a substantial portion of the questions planned for use by EUVAS in the longterm EUVAS trial cohort study, outlined next.

The European Vasculitis Study Group (EUVAS) Cohort
We are also in the process of conducting a retrospective longterm outcome study of the first 567 patients entered into EUVAS trials (to determine patient survival and morbidity[10]). All 567 patients were newly diagnosed with AAV at the time of trial entry, and were evaluated using the VDI during the trials. All participating investigators in 68 centers were sent questionnaires to collect data on patient survival, renal function and survival, immunosuppressive therapy, relapses, malignancy, and cardiovascular morbidity as well as fractures and serious infections (Appendix 3). In addition, the investigators are asked to complete a VDI for the 5-year timepoint. We will be examining the utility of VDI in the setting of small-vessel systemic vasculitis. In this study, we will use the VDI data in the EUVAS longitudinal database for each patient at the time of trial enrollment and at Year 1 and Year 5.

Because we are collecting the same data in the longterm followup studies of the WGET and EUVAS cohorts, the data can be combined for increased power. The WGET and EUVAS cohorts will allow us to analyze each VDI item as follows:

- By definition, items of damage as scored by the VDI are not reversible. The longterm followup dataset will provide an opportunity to check the consistency of this convention.
- The VDI allows the clinician to record additional "other" items of damage that are not explicitly stated in the form. Examining the frequency of use of these additional items will guide the choice of new items for inclusion in a revised damage index.
- We will consider discarding items that are not used, rewording the definitions of items that have caused confusion, and combining items that provide overlapping information.
- For each patient, external validation will be recorded by an assessment of a series of endpoints that will include documented measures of disease severity such as relapse, severe organ failure, endstage renal disease, and specific comorbidities. These external measures may be useful in the development of a new damage assessment index.

The Rituximab in ANCA-Associated Vasculitis (RAVE) Trial Cohort
The RAVE trial is a multicenter, randomized, double-blind, placebo controlled trial designed to compare the efficacy of rituximab versus cyclophosphamide for the induction of sustained remission. The trial began enrollment in December 2004, and has a total goal of 200 subjects. Both AVID and the VDI are applied to every patient in the RAVE trial at the time of enrollment and every 6 months thereafter. This trial will provide us with another opportunity to examine the effect of damage and include the new elements and approaches in the AVID draft instrument. For example, the presence of certain items of damage, such as the presence of chronic kidney disease, may have prognostic value as an early indicator of patients who are at higher risk for poor outcomes (such as faster accumulation of damage, higher cumulative levels of damage, diminished quality of life, or mortality). Data from the RAVE trial will be useful to determine the correlation between the total damage scores from AVID and the VDI, and their correlation with several factors, including cumulative BVAS/WG activity scores[11], initial physician global assessment, cumulative glucocorticoid exposure, cumulative cyclophosphamide exposure, adverse events, serious adverse events, and mortality. This information will heavily influence refinement of the CDA in the following ways:

- Reexamination of specific items of damage: AVID is the result of expert consensus, which was used to identify specific items of damage thought to be relevant to the assessment of WG and MPA, but not explicitly captured by the VDI. It is not clear, however, if the inclusion of a larger number of items of damage will lead to an improvement in our ability to fulfill the requirements of the OMERACT filter, particularly with regard to truth (i.e., does the new instrument effectively capture all forms of damage) and discrimination (i.e., is the AVID instrument better able to detect different levels of damage). The application of the new instrument to a large population of patients evaluated by multiple investigators will allow us to identify other items of damage that are not captured by the draft instrument. This will also allow us to judge both the relevance and the utility of specific items of damage that appear in both instruments. Items of damage that are not used in RAVE (or are scored inconsistently) will be reviewed and potentially removed, modified, or combined with other items of damage to streamline the instrument.
- Attribution of specific items of damage: Damage may be attributed either to the recurrent flares of vasculitis or to the medications used for its treatment. The use of a summation damage index score, however, implies that all forms of damage are roughly equivalent, regardless of etiology. Examining damage according to etiology, despite the inherent difficulties and pitfalls, may improve our ability to apply these concepts to clinical trials. Identification of specific items of damage that result from disease activity, for example, will help highlight the limitations of current therapeutic strategies. Items of damage that result from drug toxicity, on the other hand, may be more amenable to prevention.

The RAVE trial dataset will provide an additional dataset for validation of prognostic data derived from the analyses in the longterm WGET and EUVAS cohorts, each of which could be viewed as a "derivation" set for predictive variables for damage.

Patient-Reported Outcomes of Damage
At OMERACT 8 it was concluded that patient-reported outcome assessment is lacking in vasculitis clinical trials. The VCRC-EUVAS-OMERACT group is therefore launching a separate research project involving patient-derived outcomes.

This project, which will be conducted in several phases, will start by collecting data from patients with vasculitis during the 2006 Vasculitis Foundation Symposium, a meeting that attracts hundreds of patients with vasculitis from several countries (Appendix 4). Through focus groups and questionnaires, we will gain important input from patients on both the range of damage items to consider for the CDA and the items' relative importance.

Development of Draft Combined Damage Assessment
Based on the results of the activities outlined above, a draft of the CDA form will be created. It is anticipated that the CDA will include many items from the original VDI, additional items from AVID, some form and style from AVID (e.g., ability to document bilateral involvement), more gradations of severity, and new items based on data from trials and patient input. Wherever possible, the revisions/drafting will be based on data analysis rather than expert opinion.

Phase 2: Testing and Refining the CDA
The CDA will be vetted by means of a series of projects involving investigators in both the US and Europe, including paper-case exercises and application to clinical trials, and will include comparisons between the CDA and the VDI. These projects will allow us to assess the ability of the CDA to satisfy the 3 elements of the OMERACT filter (truth, discrimination, and feasibility).

Paper-Case Exercise
The purpose of the paper-case exercise is to test the reliability and feasibility of the CDA draft and to compare the CDA to the VDI. Fifteen investigators from 15 centers in the US and Europe with expertise in the evaluation of patients with AAV will be asked to select 2 patients with WG or MPA from their clinic populations who have had disease for over 1 year: 1 patient who is alive and has had disease for over 1 year, and 1 patient who died due to the vasculitis or its therapy. The clinical course and significant events of the 2 patients will be excerpted. Investigators will be provided with sample cases to use as a template and cases will be reviewed to ensure that a uniform format is used.

Two investigators from each of the 15 centers will score the 30 paper cases, using electronic forms on the VCRC website. All investigators will be asked to repeat the exercise in 6 months using the same 30 cases.

This exercise will address the 3 components of the OMERACT filter:
Truth. Face validity and content validity of the indices for detecting damage will be examined. Convergent validity will be demonstrated by comparing the performance of the new instrument to that of the VDI. We predict that there will be a high correlation between the 2 instruments.
Discrimination. The concept of damage assessment was first

developed to serve as a surrogate marker for mortality in clinical trials. Damage index scores have been shown to correlate with mortality in both vasculitis[12] and systemic lupus erythematosus[13]. This exercise will permit calculation of odds ratios of mortality based on arbitrary cutoffs (e.g., CDA and VDI index scores from 1 to 5) to compare the strength of the associations. This exercise will also allow us to compare the sensitivity of these damage indices in detecting the presence of damage. We predict that the range of CDA scores will be larger, and the mean CDA score will be significantly higher, than the VDI scores for the same patients, reflecting a potentially greater ability to detect damage in these patients. Intraobserver reliability will be demonstrated by comparing the damage scores assigned by investigators at 2 different timepoints (i.e., test-retest); discrepancies between the 2 scores may help identify items of damage that are not clearly defined. Interobserver reliability will be demonstrated by the calculation of intraclass correlation coefficients.

Feasibility. Because CDA is significantly more detailed than other damage assessment instruments, demonstrating the practicability of the new instrument will be important. We expect that the use of the electronic forms developed by the VCRC will facilitate data collection, and make CDA no more onerous than the VDI.

Application of CDA to Clinical Trials
The AVID instrument, as it is being used in the RAVE trial, includes a majority of the elements of the draft CDA that are applicable to WG and MPA. The data on AVID in RAVE will therefore provide significant insight into the performance of the full CDA in these diseases. In future clinical trials sponsored by the VCRC and EUVAS, we will use both the CDA and the VDI to compare the ability of these instruments to fulfill the criteria described by the OMERACT filter.

Phase 3: Development of a Weighting Schema
Although the VDI is primarily an outcome measure, the total VDI score has been used as a prognostic measure. Indeed, each item in the VDI was selected as representing a poor outcome, either directly or indirectly. Intuitively, however, not all forms of damage are equal. Hence, it is not clear if a total damage index score is truly meaningful. By default, all items in the VDI are equally weighted. Although the total VDI score has been shown to be predictive of poor outcome[14], it is possible that the meaning of the scores is obscured by the lack of an appropriate weighting system. One would suspect that certain forms of damage are more important than others; proving this and quantifying the differences are challenging.

Crucial to the development of a weighting schema is deciding what the damage index score is trying to represent. A damage index is, at best, a surrogate measure of a real outcome, such as burden of disease, pain, disability, or death. The index's ability to represent a "true" assessment of the burden

Table 1. Draft proposal of the Combined Damage Assessment Index. *(Continued next page)*

Musculoskeletal
  Osteoporosis/vertebral collapse
  Bone fracture
    Due to renal dystrophy
    Due to osteoporosis
    Due to both
  Muscle atrophy due to glucocorticoids
    Normal strength, atrophy on examination
    Weak on examination, normal ADL
    Weak and has difficulty with ADL
  Avascular necrosis
  Deforming/erosive arthritis
  Osteomyelitis

Skin/Mucous membranes
  Alopecia
  Mouth ulcers
  Cutaneous scarring
  Cutaneous ulcers
  Striae
  Gangrene with permanent tissue loss
  Easy bruising

Ocular
  Proptosis
  Pseudotumor
  Scleral thinning
  Scleral perforation
  Optic nerve edema
  Optic nerve atrophy
  Retinal changes
  Retinal artery occlusion
  Retinal vein occlusion
  Low vision
  Diplopia
  Blindness
  Blindness in 2nd eye
  Cataracts
  Glaucoma
  Orbital wall destruction

Ear
  Sensorineural hearing loss
  Conductive hearing loss
  Tympanic membrane perforation or scarring
  Tinnitus
  Eustachian tube dysfunction
  Auricular cartilage deformity
  Cholesteatoma

Nose
  Chronic rhinitis/crusting
  Nasolacrimal duct obstruction
  Nasal bridge collapse/saddle nose
  Nasal septal perforation
  Anosmia
  Ageusia

Sinuses
  Chronic sinusitis
  Neo-ossification of sinuses

Subglottic stenosis
  No intervention required
  Intervention required

Pulmonary
  Irreversible loss of lung function
  Fixed large airway obstruction

  Pulmonary hypertension
  Pulmonary fibrosis
  Pulmonary embolism
  Pulmonary infarction
  Vena caval filter
  Continuous oxygen dependency
  Chronic asthma
  Pleural fibrosis
  Chronic breathlessness

Cardiac
  Hypertension
  Angina
  Myocardial infarction
  Percutaneous coronary intervention
  Coronary artery bypass graft
  Left ventricular dysfunction
    NYHA Class I/II
    NYHA Class III/IV
  Third-degree AV block
  Valvular disease
  Pericarditis or pericardectomy

Vascular disease
  Absent pulses in 1 limb
  2nd episode of absent pulses in 1 limb
  Major vessel stenosis
  Claudication > 3 months
  Minor tissue loss
  Major tissue loss
  Subsequent major tissue loss
  Deep venous thrombosis
  Complicated venous thrombosis
  Carotid artery disease
  Renal artery stenosis
  Arterial thrombosis/occlusion

Gastrointestinal
  Gut infarction/resection
  Hepatic fibrosis
  Mesenteric insufficiency/pancreatitis
  Esophageal stricture/surgery
  Chronic peritonitis

Renal
  Estimated/measured GFR<50%
  Chronic kidney disease
  Endstage renal disease
  Dialysis
  Renal transplant
  Proteinuria
    < 3 g/24 h
    >3 g/24 h

Neurologic
  Seizures
  Transverse myelitis
  Sensory polyneuropathy
  Mild
  Moderate
  Severe
  Motor neuropathy (mononeuritis)
  Neuropathic pain
  Cerebrovascular accident
  2nd Cerebrovascular accident
  Cranial nerve lesion

Table 1. Continued

Psychiatric	Hematopoetic malignancy
Cognitive impairment	Solid tumor malignancy
Anxiety disorder due to vasculitis	Refractory cytopenia
Mood disorder due to vasculitis	Myelodysplastic syndrome
Major psychosis	**Other**
Endocrine	Weight gain > 10 lbs/4.4 kg
Diabetes insipidus	Fibromyalgia
Premature ovarian failure	Drug-induced cystitis
Azoospermia	With microscopic hematuria
Impaired fasting glucose	With gross hematuria
Diabetes mellitus	Requiring transfusion
Hematology/Oncology	Requiring cystectomy
Bladder cancer	Damage requiring surgical intervention
Cervical cancer	Medications to manage side effects of immunosuppressive agents

of disease due to damage experienced by a patient is crucial to its validity; the intent of weighting, therefore, would be to bring the index closer to an accurate representation of the "truth." The validity of a weighted index could be determined by comparing it to the unweighted index in terms of the strength of correlation with several endpoints, including mortality, longterm disability, the SF-36, physician global assessment, and comorbid conditions of interest. This would be the start of an iterative process that may require multiple attempts to yield an appropriate set of weights.

How to best achieve a meaningful system of weights for the CDA is not clear. There are a number of nonexclusive approaches to this important question, each of which has inherent advantages and disadvantages, as follows.

(1) Data-Driven Approach Based on Predictive Power in Longitudinal Cohorts
We could select defined outcomes such as death, work disability, dialysis dependence, oxygen dependence, malignancy, cardiovascular events, need for new medications as a consequence of damage, need for surgical intervention as a consequence of damage, other organ failure, or other critical defined events. These could serve as the hard outcome measures against which a weighting schema could be tested. We could use logistic regression modeling of the data accumulated by EUVAS to determine odds ratios for individual items of damage (either at baseline or at 1 year) based on their relationship with each outcome of interest. This method would result in a set of weightings for CDA items that predict risk of future untoward events. The additional availability of similar longitudinal data from the WGET cohort would provide either more initial power for prediction rules or a validation data set. The advantage of this approach is that it would make use of the wealth of information already accumulated by trials regarding the longterm outcomes of patients with AAV. The disadvantage is that given the number of variables involved, it could potentially take even more data to determine an odds ratio for each item of damage for each outcome of interest; further, a purely mathematical approach has the potential to

yield conclusions that lack face validity. Finally, this approach requires expert consensus for the selection of the outcomes on which this analysis would be based.

(2) Expert Consensus on Relative Ranks
Because the damage index is an artificial construct, there is not a true "gold standard" that can be used to judge the validity of a given set of weights. The judgment of those with expertise in the diseases of interest (including physicians, nurses, physician assistants, and other care providers) may be as close as we can come to having an authoritative estimate of the true impact of individual forms of damage on patients. Using this approach, individual forms of damage would be rated by experts from a scale of 1 to 5 (where "1" means the item of damage exerts minimal impact; and "5" means that the item of damage exerts a serious impact on quality of life or mortality); these ratings could be used to develop the basis of a weighting schema. The advantage of using expert consensus is that the resulting index has inherent face validity, which would increase its acceptance by the community; the disadvantage is that using expert consensus runs the risk of calcifying old, unproven prejudices into dogma (although these conclusions will be subjected to testing and retesting during this process).

(3) Patient Assessments
The goal of damage assessment is to measure the influence of the disease on patients. While physicians may have expertise and knowledge of poor medical outcomes and have a generally good sense of the concerns of patients, unless patients are directly involved in the process of determining the effect of the disease, any measure will risk missing crucial information. Therefore, it seems logical to seek patient input regarding the effect of individual items of damage, in addition to the weighting exercises noted above. As outlined earlier, the OMERACT group is launching a separate research project involving patient-derived outcomes. Input from patients with vasculitis will be important to ensure that the full spectrum of damage is measured, and to develop a meaningful system of weights for a new damage assessment instrument.

Phase 4: Validation of the CDA

Although the CDA is envisioned primarily to be an outcome measure, the face and construct validity of the damage index is partially derived from the sense that it can predict poor outcome. If damage is to be used as an endpoint for clinical trials, it is important to demonstrate that a damage index is sufficiently sensitive to detect the accumulation of new damage in individual patients over time and that these data are useful. It is also important to demonstrate the correlation of damage index results with other disease outcomes. The prognostic significance of the CDA score can be explored in future therapeutic trials in systemic vasculitis by determining the ability of the new score at 0, 6, 12, or 18 or more months after enrollment and to predict a poor outcome (e.g., mortality, endstage renal failure, functional score, malignancy, or cardiovascular events).

Paper-Case Validation Exercise

Thirty investigators with expertise in the assessment of AAV will be asked to apply the final form of the CDA to the 30 paper cases described in Phase 2. This will help determine content validity, face validity, and feasibility of the CDA for patient assessment, and will provide us with the opportunity to determine whether the weighted index has a stronger correlation with mortality than the unweighted index. Intraobserver reliability will be tested via test-retest exercise and interobserver reliability by comparing scores among investigators.

Clinic-Based Validation Exercise

Prior to, or in parallel with, full implementation of the CDA to a new trial, we plan to perform a clinic-based exercise that will provide further support of the practicability and validity of the new index, demonstrate the ability of the new index to detect damage at a given timepoint, and measure the change in damage over time. Thirty investigators will be asked to apply the VDI and CDA to 10 consecutive patients with either WG or MPA at 2 visits, 1 year apart. At both timepoints, investigators will be asked to record a physician global assessment of damage using a 10-point Likert scale and to collect other key outcome measures such as activity scores, quality of life measurements, and vital status.

Like the paper-case exercise, this exercise will allow us to demonstrate the ability of the CDA to represent truth, by allowing us to explore both face and content validity of the new instrument using patients well known to the individual investigators. This will also provide an opportunity to record and to analyze forms of damage noted by investigators, but not specifically recorded by either instrument. Unlike the paper cases, this exercise will allow us to address the issue of discrimination, by examining the ability of the 2 instruments to detect changes in levels of damage in individual patients over time. This exercise will also allow us to examine the feasibility of the CDA instrument in a setting that more closely mimics a clinical trial.

Following this exercise, the CDA will be applied to a set of patients with other forms of small-vessel systemic vasculitis (including the Churg-Strauss syndrome, Behçet's disease, cryoglobulinemic vasculitis, polyarteritis nodosa, Henoch-Schönlein purpura, and secondary vasculitis). We expect that the scores will be significantly different between the different forms of vasculitis and do not intend to compare scores across diseases. However, this exercise will help to define the range of scores expected in patients with different forms of vasculitis, and to validate the use of the combined index in other forms of small- and medium-vessel vasculitis.

Responsiveness will be measured by examining individual items from the CDA assessed at 2 timepoints. Once the CDA has been tested in patients, we can explore the prognostic significance of the CDA score. In future therapeutic trials in systemic vasculitis, the CDA score will be employed to record damage. The ability of the new score at various timepoints to predict a poor outcome (e.g., mortality, endstage renal failure, functional score, malignancy, cardiovascular events) will be determined prospectively. For each patient in whom the CDA is measured, external validation will be recorded by assessment of a series of endpoints that will include externally documented measures of disease severity such as relapse, severe organ failure, endstage renal disease, or development of specific comorbidities (including malignancy, development of fracture or diabetes, cerebral and coronary artery disease, venous thrombosis, infection requiring hospital admission, and death). These external measures will provide additional evidence of content and construct validity, and will allow us to compare the performance of the weighted and unweighted versions of the CDA.

Future Directions

The OMERACT initiative in vasculitis requires a reexploration of some fundamental concepts underlying the measurement of damage in vasculitis. Several issues have not yet been resolved, and remain open for further discussion. These issues include the following:

Need for a disease-specific instrument. The vasculitides consist of a broad spectrum of disorders with heterogeneous manifestations. It is reasonable to ask whether one instrument is sufficient to assess damage for all forms of vasculitis. At minimum, the large-vessel vasculitides probably require a separate damage assessment instrument, distinct from the CDA. Many of these diseases share common features, and it may be possible to develop a core damage index module (based on these common forms of damage) that could be supplemented by disease-specific modules.

Attribution. Excluding items of damage based on attribution may limit our ability to identify causal relationships that have not yet been recognized; the systematic inclusion of coincidental forms of damage, however, may make the total damage index scores less meaningful.

Gradation. Damage is not always a binary event. Many forms

of damage may occur in degrees, which can be difficult to identify in a damage assessment instrument. Moreover, it is difficult to determine how important it is to record this level of detail, and in particular, if the extra level of complexity is worth the additional information accrued.

Ideal number of items of damage. It is possible that a short version with the most prognostically significant items will emerge in addition to the complete index, which might be more useful for tracking the natural history of treated vasculitis.

Intended use of damage assessment instruments. Damage indices have been developed primarily for use in clinical trials. How these instruments might be used in routine clinical practice by clinicians who are not expert in the assessment of vasculitis has not been explored.

Acceptability of damage assessment in drug development. Since many clinical trials of new agents will be industry sponsored, it would be useful to solicit feedback from attendees from the US Food and Drug Administration, the European Medicines Agency, and industry during the development of these new instruments.

Ultimately, the goal of this initiative will be to develop a new index of vasculitis for the assessment of patients, potentially both in clinical trials and in clinical practice. This project will take advantage of the cumulative knowledge gained in recent years from clinical trials of WG and MPA to further our understanding of the concept of damage as it applies to vasculitis, and to improve our ability to assess a patient's response to therapy.

International consensus is crucial to the VCRC-EUVAS-OMERACT initiative. We agree that clinical investigation would be hampered by the existence of multiple disparate approaches to the assessment of disease activity and damage in vasculitis. Unless clinical trials are judged using similar criteria, it will be impossible to determine the optimal approach to these diseases. The projects outlined above have an enormous potential for synergy, and will undoubtedly benefit from the pooling of data and resources, including the complementary expertise of investigators in the US and Europe. Our patients are best served by the development of a uniform approach to the assessment of vasculitis; our ability to work together toward this common goal will be an important measure of our success.

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Articles presented at the OMERACT 8 Conference St. Julian's Bay, Malta, May 10–14, 2006

1. Biomarkers and Surrogate Endpoints   2. Imaging
3. Outcome Measures   4. Workshops and Special Interest Groups

Parts 1, 2, and 3 appeared in the March, April, and May issues of *The Journal*.

APPENDIX 1. The Vasculitis Damage Index

1. Musculoskeletal	No	Yes
None	☐	
Significant muscle atrophy or weakness		O
Deforming/erosive arthritis		O
Osteoporosis/vertebral collapse		O
Avascular necrosis		O
Osteomyelitis		O

2. Skin/Mucous membranes	No	Yes
None	☐	
Alopecia		O
Cutaneous ulcers		O
Mouth ulcers		O

3. Ocular	No	Yes
None	☐	
Cataract		O
Retinal change		O
Optic atrophy		O
Visual impairment/diplopia		O
Blindness in one eye		O
Blindness in second eye		O
Orbital wall destruction		O

4. ENT	No	Yes
None	☐	
Hearing loss		O
Nasal blockage/chronic discharge/crusting		O
Nasal bridge collapse/septal perforation		O
Chronic sinusitis/radiological damage		O
Subglottic stenosis (no surgery)		O
Subglottic stenosis (with surgery)		O

5. Pulmonary	No	Yes
None	☐	
Pulmonary hypertension		O
Pulmonary fibrosis		O
Pulmonary infarction		O
Pleural fibrosis		O
Chronic asthma		O
Chronic breathlessness		O
Impaired lung function		O

6. Cardiovascular	No	Yes
None	☐	
Angina/angioplasty		O
Myocardial infarction		O
Subsequent myocardial infarction		O
Cardiomyopathy		O
Valvular disease		O
Pericarditis ≥ 3 months or pericardectomy		O
Diastolic BP ≥ 95 or requiring antihypertensives		O

Name
Trial Number
Date
Centre

7. Peripheral vascular disease	No	Yes
None	☐	
Absent pulses in one limb		O
2nd episode of absent pulses in one limb		O
Major vessel stenosis		O
Claudication >3 months		O
Minor tissue loss		O
Major tissue loss		O
Subsequent major tissue loss		O
Complicated venous thrombosis		O

8. Gastrointestinal	No	Yes
None	☐	
Gut infarction/resection		O
Mesenteric insufficiency/pancreatitis		O
Chronic peritonitis		O
Oesophageal stricture/surgery		O

9. Renal	No	Yes
None	☐	
Estimated/measured GFR ≤ 50%		O
Proteinuria ≥ 0.5g/24hr		O
End stage renal disease		O

10. Neuropsychiatric	No	Yes
None	☐	
Cognitive impairment		O
Major psychosis		O
Seizures		O
Cerebrovascular accident		O
2nd cerebrovascular accident		O
Cranial nerve lesion		O
Peripheral neuropathy		O
Transverse myelitis		O

11. Other	No	Yes
None	☐	
Gonadal failure		O
Marrow failure		O
Diabetes		O
Chemical cystitis		O
Malignancy		O
Other		O

Total VDI Score. Record the number of positive Items (1 point for each). The VDI score can either increase or remain the same over time. Remember to carry forward any previous items of damage.

APPENDIX 2. ANCA-associated Vasculitis Index of Damage (AVID)

AVID Worksheet Investigator _____ Patient Name _____
Version 0.4 **Date** _____ **Site** _____ **ID #** _____

For every patient, please record the following information: **Gender   M / F**
Age (in years) _____ **Weight (in kg)** _____ **Race: White / Black / Hispanic**
Serum Creatinine (mg/dL) _____ Asian / Other

Musculoskeletal
- Osteoporosis
- Bone fracture
  - Due to renal dystrophy
  - Due to osteoporosis
  - Due to both
- Significant muscle atrophy or weakness due to glucocorticoids
  - Normal strength, but evidence of atrophy present
  - Weakness on examination, but normal ADLs
  - Weak and has difficulty with ADLs
- Avascular necrosis

Skin/Mucous membranes
- Cutaneous scarring
- Cutaneous ulcers
- Striae
- Gangrene with permanent tissue loss, specify:_____
  _____
- Easy bruising

Ocular (Left, right, or both: L, R, or B)
Does the patient have any of the following?
Orbital disease
- L R B **Proptosis**
- L R B **Pseudotumor**
Scleral disease
- L R B **Scleral thinning**
- L R B **Scleral perforation**
Optic nerve disease
- L R B **Optic nerve edema**
- L R B **Optic nerve atrophy**
Retinal vascular disease
- L R B **Retinal vein occlusion**
- L R B **Retinal artery occlusion**
Visual impairment
- L R B **Low vision**
- L R B **Blindness**
- Cataracts
- Glaucoma

Ear (Left, right, or both: L, R, or B)
- L R B **Sensorineural hearing loss**
- L R B **Conductive hearing loss**
- L R B **Tympanic membrane perforation or scarring**
- L R B **Tinnitus**
- L R B **Eustachian tube dysfunction**
- L R B **Auricular cartilage deformity**
- L R B **Cholesteatoma**

Nose
- Chronic rhinitis/crusting
- Nasolacrimal duct obstruction
- Nasal bridge collapse/saddle nose deformity
- Nasal septal perforation
- Anosmia
- Ageusia

Sinuses
- Chronic sinusitis
- Bony erosion of sinuses
- Neo-ossification of the sinuses
- Anosmia
- Ageusia

Subglottic stenosis
- No intervention required
- Intervention required, specify:
  _____

Pulmonary
- Irreversible loss of lung function
  - FEV1 ___ ___ . ___
  - FVC ___ ___ . ___
- Fixed large airway obstruction
  - FEV1 ___ ___ . ___
  - FVC ___ ___ . ___
- Pulmonary hypertension
  - NYHA class I or II
  - NYHA class III or IV
  - RSVP ___ ___
- Pulmonary embolism
  - Vena caval filter
- Continuous oxygen dependency

Cardiovascular
- o **Hypertension**
  - SBP: ___ ___ ___
  - DBP: ___ ___ ___
  - o Antihypertensive medications?
- o **Angina**
- o **Myocardial infarction**
- o **Percutaneous coronary intervention**
- o **Coronary artery bypass graft**
- o **Carotid artery disease**
- o **Left ventricular dysfunction**
  - o NYHA Class I/II
  - o NYHA Class III/IV
  - EF ___ ___ %
- o **Third degree AV block**
- o **Valvular disease**
  - o Please specify valve(s) and lesion(s):_____
  _____
- o **Deep venous thrombosis**
- o **Renal artery stenosis**
- o **Arterial thrombosis or occlusion** Specify site and describe tissue loss, if any _____
  _____

Gastrointestinal
- o **Gut infarction** more than six months ago
- o **Hepatic fibrosis**

Renal
- o **Chronic kidney disease**
- o **Dialysis**
- o **Renal transplant**
- o **Proteinuria**
  - o < 3.0g/24 h
  - o >3.0g/24h

Neurologic
- o **Cranial nerve lesion** Specify:
  _____
- o **Chronic pachymeningitis**
- o **Mass lesion** (*due to the underlying vasculitis*)
- o **Cerebrovascular accident**
- o **Sensory polyneuropathy**
  - o Mild
  - o Moderate
  - o Severe

- o **Motor neuropathy**
  - o Left upper extremity
  - o Left lower extremity
  - o Right upper extremity
  - o Right lower extremity
- o **Neuropathic pain**

Psychiatric
- o **Cognitive impairment**
- o **Anxiety disorder due to vasculitis**
- o **Mood disorder due to vasculitis**

Endocrine
- o **Diabetes insipidus**
- o **Premature ovarian failure**
- o **Azospermia**
- o **Impaired fasting glucose**
- o **Diabetes mellitus**

Hematology/Oncology
- o **Bladder cancer**
- o **Cervical cancer**
- o **Hematopoetic malignancy**
- o **Solid tumor malignancy**
- o **Refractory cytopenia**
- o **Myelodysplastic syndrome**
- o **Hypogammaglobulinemia**

For malignancy, specify _____

Other
- o **Weight gain > 10 lbs or 4.4 kg**
- o **Fibromyalgia**
- o **Drug-induced cystitis**
  - o with microscopic hematuria
  - o with gross hematuria
  - o requiring transfusion
  - o requiring cystectomy
- o **Damage requiring surgical intervention.** Specify:
  _____
  _____
- o **Medications to manage the side-effects of immunosuppressive agents.** Specify: _____
  _____
- o **Other forms of damage due to the vasculitis, therapy, or both** that has not been adequately recorded by this instrument. Specify:_____
  _____
- o **Miscellaneous notes:**_____
  _____

APPENDIX 3. EUVAS Long-Term Follow-Up Questionnaire

Questionnaire

Tick suitable boxes! Please fill in VDI for the last available investigation!

Patient ID number in the previous CRF (study- / site- / patient-number)
[_ _][_ _ _ _][000 _ _ _]   Initials:

Clinical diagnosis	WG ○ MPA ○ RLV ○ CSS ○	Sex
	Other... ○	M ○ F ○
TRIAL	CHUSPAN ○ CYCAZAREM ○ CYCLOPS ○ IMPROVE ○ MEPEX ○	
	MUPIBAC ○ NORAM ○ REMAIN ○	
	Entry date: (dd/mm/yyyy)	

1. Please write down the date on which you are completing this questionnaire (dd/mm/yyyy)   Today's date:

2. Is the patient alive as per today when filling in questionnaire?   Yes ○   No ○   Lost to follow-up ○

Date of death: (dd/mm/yyyy) ....

Date when last known to be alive (mm/yyyy) ....

3. Date of the last available visit providing following information for question 4-9 (mm/yyyy)?   **Date:**

4. Had the patient developed end stage renal failure (start on dialysis, transplantation or terminal renal failure) at the last available visit?   Yes ○   No ○

Date of ESRF (mm/yyyy) ....
Date of renal transplant (mm/yyyy) ....

5a. What was the serum creatinine at the last available visit?   ....µmol/L or ....mg/dL
5b. What was the serum creatinine at 5 years after   ....µmol/L or ....mg/dL

Appendix 3, continued

inclusion in EUVAS-trial; mmm/yyyy?

6. Has a **repeat renal biopsy** been performed?   Yes ○   No ○

7. Any other severe organ failure (e.g. oxygen dependency, blindness)   Yes ○   No ○

Please specify

8. Height of patient (cm)

9. Weight of patient (kg)   (mm/yyyy)? ....

10 a. Was the patient on immunosuppressive drugs at the last available visit?   Yes ○   No ○
10 b. Was the patient on corticosteroids at the last available visit?   Yes ○   No ○

11. Data on immunosuppressive therapy administered after end of EUVAS-trial:
Was the patient prescribed, any of the drugs below, during the time-periods respectively?
Please complete fill in all the cells in the table; indicate "Yes" or ,"NO" or "?"
Indicate "Yes", even if the prescription was only during part of the time period Only if there is no information; sign with a "?"

Months **after start** of EUVAS-trial	13-18 (MEPEX only)	19-24	25-36	37-48	49-60
Corticosteroids	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
Cyclophosphamide	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
Azathioprine	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
Methotrexate	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
Mycophenolate mofetil	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
Trimethoprim-sulphamethoxazole	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
anti TNF - Please specify	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○
Other immunosuppr. Please specify	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○	Y ○ N ○ ? ○

Appendix 3, continued

12. Has the patient had any **relapse** after terminating the EUVAS-trial?   Yes ○   No ○
If YES, how many relapses? ....
How many of those involved the kidneys? ....

13. Data of **first relapse after termination** in EUVAS-trial
a. Date (mm/yyyy)   ....
b. Organ involvement; tick all that apply   Kidney ○ Lungs ○ ENT ○ CNS ○ Skin ○ Eye ○
Other ○ specify

c. Was the patient on immunosuppressive treatment at time of relapse   Yes ○   No ○
specify:...............................

d. Was the patient on corticosteroid treatment at time of relapse   Yes ○   No ○
e. Were the dosages of immunosuppressive treatment increased to deal with the relapse ?   Yes ○   No ○
f. Were the dosages of corticosteroid treatment increased to deal with the relapse ?   Yes ○   No ○
g. Was the immunosuppressive treatment changed to deal with the relapse?   Yes ○   No ○

14. Has the patient developed any malignancy, including basal cell carcinoma or myelodysplastic syndrome, after inclusion in the EUVAS-trial?   Yes ○   No ○   Missing data ○

If YES
Date of malignancy (yyyy):...........
Type (histology) of malignancy ....
Localization of malignancy ....

If several malignancies, please specify on last page

Appendix 3, continued

Information on comorbidity factors. Please tick all suitable boxes for the problems occurring before inclusion in the EUVAS trial, at five year follow up, and currently, respectively

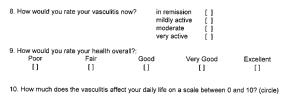| Has/had the patient	Before start / inclusion in EUVAS trial			Up to five years follow-up after inclusion in EUVAS trial			Current follow-up after inclusion in EUVAS trial		
	Yes	No	Not known	Yes	No	Not known	Yes	No	Not known
16. Diabetes mellitus (treated with diet, antidiabetics or insulin)?	○	○	○	○	○	○	○	○	○
17. Coronary heart disease (myocardial infarction, PTCA, coronary artery surgery)?	○	○	○	○	○	○	○	○	○
18. Stroke?	○	○	○	○	○	○	○	○	○
19. Deep venous thrombosis or embolism?	○	○	○	○	○	○	○	○	○
20. Any revascularization in the lower extremities?	○	○	○	○	○	○	○	○	○
21. Skeletal fracture?	○	○	○	○	○	○	○	○	○
22. Infectious disease requiring hospital stay or parenteral antibiotics?	■			○	○	○	○	○	○
23. Smoking history	Current ○	Previous ○		Never ○	Not known ○				

Appendix 3, continued

24. Details of death	What was the cause of death (as indicated on the death certificate)?
	Which other conditions contributed to the death (in your opinion and/or on the death certificate)?
	In your opinion---
	On the death certificate-------------------------------------

We are very interested in your opinion on the relationship of the death to the vasculitis and/ or its treatment. Please circle all that apply:

	0 not related	1 unlikely	2 possible	3 probable	4 highly probable	5 definite
Was the death related to active vasculitis?	O	O	O	O	O	O
Was the death related to current immunosuppression?	O	O	O	O	O	O
Was the death related to sepsis?	O	O	O	O	O	O

| 25. Other malignancies | Date of 2nd malignancy (yyyy):............... | Type (histology) of 2nd malignancy | Localization of 2nd malignancy |
| | Date of 3rd malignancy (yyyy):............... | Type (histology) of 3rd malignancy | Localization of 3rd malignancy |

| Other Remarks | |

PLEASE, COMPLETE THE VDI FORM FOR the time point closest to five year after inclusion!
THANK YOU VERY MUCH FOR YOUR CONTRIBUTION!

Please return the form to the address below. If you have any queries, please don't hesitate to get in touch
Dr R A Luqmani, Rheumatology Department, Nuffield Orthopaedic Centre, Windmill Road, Headington, Oxford OX3 7LD, UK
E-mail   raashidluqmani@hotmail.com   Phone: +44   01865-741155
E-mail   kerstin.westman@skane.se   Phone +46 40 331000

Please answer every question. If you do *not* have vasculitis, please do **NOT** complete this form.

Date: __ __ / __ __ __ / __ __ __ __   [example: 04/JUL/2006]

1. What is your gender?   Male [ ]   Female [ ]

2. In what year were you born?   __ __ __ __
    (you **must** be at least 18 years old to complete this form)

3. What type of vasculitis do you have? [ ] Wegener's Granulomatosis
                                          [ ] Microscopic Polyangiitis
                                          [ ] Churg-Strauss Syndrome
                                          [ ] Giant Cell Arteritis (Temporal Arteritis)
                                          [ ] Polyarteritis nodosa
                                          [ ] Henoch-Schönlein Purpura
                                          [ ] Takayasu Arteritis
                                          [ ] Behçet's Disease
                                          [ ] CNS-Vasculitis (Primary)
                                          [ ] Other (please specify):_____

4. Date of diagnosis of vasculitis? __ __ __ / __ __ __ __ (month/year) [example: OCT/1998]

5. Date of first symptoms of vasculitis? __ __ __ /__ __ __ __ (month/year) [example MAY/1998]

6. Has your diagnosis of vasculitis definitely been confirmed
    or is your doctor still trying to decide if you have vasculitis?   [ ] Yes I have vasculitis
                                                                        [ ] We are still not sure

7. We are interested to learn more about the burden of your disease in your daily life activities. Please write down the 5 most important aspects of your disease using the boxes below. PLEASE DO NOT WRITE OUTSIDE THE BOXES. You can list fewer than 5 if you wish.

#1	--
#2	--
#3	--
#4	--
#5	--

Appendix 4, continued

8. How would you rate your vasculitis now?   in remission   [ ]
                                              mildly active   [ ]
                                              moderate   [ ]
                                              very active   [ ]

9. How would you rate your health overall?:
   Poor   Fair   Good   Very Good   Excellent
   [ ]   [ ]   [ ]   [ ]   [ ]

10. How much does the vasculitis affect your daily life on a scale between 0 and 10? (circle)

[0]----[1]-----[2]-----[3]-----[4]-----[5]----[6]-----[7]-----[8]-----[9]-----[10]
Not at all, I can   Has changed everything:
do anything I want   I can not provide for
                                                               my basic needs

11. We are interested in knowing how "bad" **you personally** think different aspects of having vasculitis are. We want to know *your* opinion based on *your* experience and feelings. We ask below that you rate how "bad" each item is in terms of a combination of:
    • Pain
    • Interference with your daily function
    • Discomfort and/or annoyance
    • Anxiety or other psychological impact (such as how you look or feel)
    • Medical importance (per your opinion)
    We only want you to rate those items **you** have experienced since the date of your first symptoms of vasculitis and ask you to average the impact you have felt. For example, if you had nerve damage to your right leg, tell us how bad it has been *on average*, not just at the beginning. If you never were affected by the listed symptom during the course of your vasculitis, please circle "not applicable = 0".

    There are no "right answers", just tell us what you think!

	I never had this (circle)	Not too bad	A little bit bad	Moderately bad	Quite bad	Extremely bad
Joint pain	X	1	2	3	4	5
Muscle pain	X	1	2	3	4	5
Muscle weakness	X	1	2	3	4	5
Tiredness/Fatigue	X	1	2	3	4	5
Loss of energy	X	1	2	3	4	5
Weight gain	X	1	2	3	4	5
Weight loss	X	1	2	3	4	5
Pain (overall)	X	1	2	3	4	5
Bone fractures	X	1	2	3	4	5

Appendix 4, continued

	I never had this (circle)	Not too bad	A little bit bad	Moderately bad	Quite bad	Extremely bad
Skin ulcers	X	1	2	3	4	5
Easy bruising	X	1	2	3	4	5
Limited vision	X	1	2	3	4	5
Blindness	X	1	2	3	4	5
Cataract	X	1	2	3	4	5
Hearing loss	X	1	2	3	4	5
Ringing in one or both ears	X	1	2	3	4	5
Nasal discharge/crusting	X	1	2	3	4	5
Sinusitis	X	1	2	3	4	5
Saddle nose deformity	X	1	2	3	4	5
Perforation of nasal septum	X	1	2	3	4	5
Difficulty breathing	X	1	2	3	4	5
Require oxygen therapy	X	1	2	3	4	5
Asthma	X	1	2	3	4	5
High blood pressure	X	1	2	3	4	5
Angina, Heart disease pain	X	1	2	3	4	5
Heart attack	X	1	2	3	4	5
Thrombosis (blood clot)	X	1	2	3	4	5
Loss of arm, leg, hand, or foot	X	1	2	3	4	5
Abdominal pain	X	1	2	3	4	5
Stomach ulcer	X	1	2	3	4	5
Kidney failure	X	1	2	3	4	5
Dialysis	X	1	2	3	4	5
Depression	X	1	2	3	4	5
Anxiety	X	1	2	3	4	5
Seizures	X	1	2	3	4	5
Foot or wrist drop	X	1	2	3	4	5
Stroke	X	1	2	3	4	5
Numbness or tingling	X	1	2	3	4	5
Cancer	X	1	2	3	4	5
Diabetes mellitus	X	1	2	3	4	5