From the American Venous Forum

# Revision of the CEAP classification for chronic venous disorders: Consensus statement

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**The CEAP classification for chronic venous disorders (CVD) was developed in 1994 by an international ad hoc committee of the American Venous Forum, endorsed by the Society for Vascular Surgery, and incorporated into "Reporting Standards in Venous Disease" in 1995. Today most published clinical papers on CVD use all or portions of CEAP.**

**Rather than have it stand as a static classification system, an ad hoc committee of the American Venous Forum, working with an international liaison committee, has recommended a number of practical changes, detailed in this consensus report. These include refinement of several definitions used in describing CVD; refinement of the C classes of CEAP; addition of the descriptor n (no venous abnormality identified); elaboration of the date of classification and level of investigation; and as a simpler alternative to the full (advanced) CEAP classification, introduction of a basic CEAP version. It is important to stress that CEAP is a descriptive classification, whereas venous severity scoring and quality of life scores are instruments for longitudinal research to assess outcomes. (J Vasc Surg 2004;40:1248-52.)**

The field of chronic venous disorders (CVD) previously suffered from lack of precision in diagnosis. This deficiency led to conflicting reports in studies of management of specific venous problems, at a time when new methods were being offered to improve treatment for both simple and more complicated venous diseases. It was believed that these conflicts could be resolved with precise diagnosis and classification of the underlying venous problem. The CEAP classification[1] (Clinical-Etiology-Anatomy-Pathophysiology) was adopted worldwide to facilitate meaningful communication about CVD and serve as a basis for more scientific analysis of management alternatives. This classification, based on correct diagnosis, was also expected to serve as a systematic guide in the daily clinical investigation of patients as an orderly documentation system and basis for decisions regarding appropriate treatment.

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Competition of interest: none.

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## CREATION OF CEAP CLASSIFICATION

At the Fifth Annual meeting of the American Venous Forum (AVF), in 1993, John Porter suggested using the same approach as the TNM classification (Tumor/Node/Metastasis) for cancer in developing a classification system for venous diseases. After a year of intense discussions a consensus conference was held at the Sixth Annual Meeting of AVF in February 1994, at which an international ad hoc committee, chaired by Andrew Nicolaides and with representatives from Australia, Europe, and the United States, developed the first CEAP consensus document. It contained 2 parts: a classification of CVD and a scoring system of the severity of CVD. The classification was based on clinical manifestations (C), etiologic factors (E), anatomic distribution of disease (A), and underlying pathophysiologic findings (P), or CEAP. The severity scoring system was based on 3 elements: number of anatomic segments affected, grading of symptoms and signs, and disability. The CEAP consensus statement was published in 25 journals and books, in 8 languages (Table I, online only), truly a universal document for CVD. It was endorsed by the joint

**Table II.** Members of American Venous Forum ad hoc committee on revision of CEAP classification

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| John Bergan, MD |
| Bo Eklof, MD, chair |
| Peter Gloviczki, MD |
| Robert Kistner, MD |
| Mark Meissner, MD, secretary |
| Gregory Moneta, MD |
| Frank Padberg, MD |
| Robert Rutherford, MD |
| Thomas Wakefield, MD |

**Table III.** International ad hoc committee on revision of CEAP classification

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|---|
| American Venous Forum ad hoc committee* |
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| Pier Luigi Antignani, MD, Italy |
| Patrick Carpentier, MD, France* |
| Philip Coleridge Smith, MD, United Kingdom* |
| André Cornu-Thenard, MD, France |
| Ermenegildo Enrici, MD, Argentina |
| Jean Jerome Guex, MD, France |
| Shunichi Hoshino, MD, Japan |
| Arkadiusz Jawien, MD, Poland |
| Nicos Labropoulos, MD, United States |
| Fedor Lurie, MD, United States |
| Mark Malouf, MD, Australia |
| Nick Morrison, MD, United States |
| Kenneth Myers, MD, Australia* |
| Peter Neglén, MD, United States |
| Andrew Nicolaides, MD, Cyprus |
| Tomo Ogawa, MD, Japan |
| Hugo Partsch, MD, Austria |
| Michel Perrin, MD, France* |
| Eberhard Rabe, MD, Germany |
| Seshadri Raju, MD, United States |
| Vaughan Ruckley, MD, United Kingdom* |
| Ulrich Schultz-Ehrenburg, MD, Germany |
| Jean Francois Uhl, MD, France |
| Martin Veller, MD, South Africa |
| Yuqi Wang, MD, China |
| Zhong Gao Wang, MD, China |

*Editorial committee

councils of the Society for Vascular Surgery and the North American Chapter of the International Society for Cardiovascular Surgery, and its basic elements were incorporated into venous reporting standards.[2] Today most published clinical papers on CVD use all or portions of the CEAP classification.

## OTHER DEVELOPMENTS RELATED TO CEAP

In 1998, at an international consensus meeting in Paris, Perrin et al[3] established a classification for recurrent varicose veins (Recurrent Varices After Surgery [REVAS]), the evaluation of which is ongoing. In 2000 Rutherford et al[4] and the ad hoc Outcomes committee of AVF published an upgraded version of the original venous severity scoring system. The validity of the new severity score has been evaluated by Meissner et al[5] and Kakkos et al.[6] An evaluation of the system by 398 French angiologists was reported by Perrin et al.[7]

Uhl et al[8] established a European Venous Registry based on CEAP, and reported studies on intraobserver and interobserver variability that showed significant discrepancies in the clinical classification of CEAP, which prompted improved definitions of clinical classes $C_0$ to $C_6$.

An international consensus meeting in Rome in 2001 suggested definitions and refinements of the clinical classification, the C in CEAP,[9] which were published with a commentary by the first author of the current revision of the venous reporting standards.[10] These not only contributed to CEAP, but formed the basis for its ultimate modification, as recommended below.

## REVISION OF CEAP

Diagnosis and treatment of CVD is developing rapidly, and the need for an update of the classification logically follows. It is important to stress that CEAP is a descriptive classification. Venous severity scoring [4] was developed to enable longitudinal outcomes assessment, but it became apparent that CEAP itself required updating and modification. In April 2002 an ad hoc committee on CEAP was appointed by AVF to review the classification and make recommendations for change by 2004, 10 years after its introduction (Table II). An international ad hoc committee was also established to ensure continued universal use (Table III). The 2 committees held 4 joint meetings, with key members contributing in the interim to the revised document. The following passages summarize the results of these deliberations by describing the new aspects of the revised CEAP.

The recommended changes, detailed below, include additions to or refinements of several definitions used in describing CVD; refinement of the C classification of CEAP; addition of the descriptor n (no venous abnormality identified); incorporation of the date of classification and level of clinical investigation; and the description of "basic CEAP," introduced as a simpler alternative to the full (advanced) CEAP classification.

## TERMINOLOGY AND NEW DEFINITIONS

The CEAP classification deals with all forms of CVDs. The term "chronic venous disorder" includes the full spectrum of morphologic and functional abnormalities of the venous system, from telangiectasies to venous ulcers. Some of these, such as telangiectasies, are highly prevalent in the healthy adult population, and in many cases use of the term "disease" is not appropriate. The term "chronic venous insufficiency" implies a functional abnormality of the venous system, and is usually reserved for more advanced disease, including edema ($C_3$), skin changes ($C_4$), or venous ulcers ($C_{5-6}$).

It was agreed to maintain the present overall structure of the CEAP classification, but to add more precise definitions. The following recommended definitions apply to the clinical (C) classes of CEAP:

**atrophie blanche (white atrophy)** Localized, often circular whitish and atrophic skin areas surrounded by dilated capillaries and sometimes hyperpigmentation. Sign of severe CVD, and not to be confused with healed ulcer scars. Scars of healed ulceration may also exhibit atrophic skin with pigmentary changes, but are distinguishable by history of ulceration and appearance from atrophie blanche, and are excluded from this definition.

**corona phlebectatica** Fan-shaped pattern of numerous small intradermal veins on medial or lateral aspects of ankle and foot. Commonly thought to be an early sign of advanced venous disease. Synonyms include malleolar flare and ankle flare.

**eczema** Erythematous dermatitis, which may progress to blistering, weeping, or scaling eruption of skin of leg. Most often located near varicose veins, but may be located anywhere in the leg. Usually seen in uncontrolled CVD, but may reflect sensitization to local therapy.

**edema** Perceptible increase in volume of fluid in skin and subcutaneous tissue, characteristically indented with pressure. Venous edema usually occurs in ankle region, but may extend to leg and foot.

**lipodermatosclerosis** (LDS) Localized chronic inflammation and fibrosis of skin and subcutaneous tissues of lower leg, sometimes associated with scarring or contracture of Achilles tendon. LDS is sometimes preceded by diffuse inflammatory edema of the skin, which may be painful and which often is referred to as hypodermitis. LDS must be differentiated from lymphangitis, erysipelas, or cellulitis by their characteristically different local signs and systemic features. LDS is a sign of severe CVD.

**pigmentation** Brownish darkening of skin, resulting from extravasated blood. Usually occurs in ankle region, but may extend to leg and foot.

**reticular vein** Dilated bluish subdermal vein, usually 1 mm to less than 3 mm in diameter. Usually tortuous. Excludes normal visible veins in persons with thin, transparent skin. Synonyms include blue veins, subdermal varices, and venulectasies.

**telangiectasia** Confluence of dilated intradermal venules less than 1 mm in caliber. Synonyms include spider veins, hyphen webs, and thread veins.

**varicose vein** Subcutaneous dilated vein 3 mm in diameter or larger, measured in upright position. May involve saphenous veins, saphenous tributaries, or nonsaphenous superficial leg veins. Varicose veins are usually tortuous, but tubular saphenous veins with demonstrated reflux may be classified as varicose veins. Synonyms include varix, varices, and varicosities.

**venous ulcer** Full-thickness defect of skin, most frequently in ankle region, that fails to heal spontaneously and is sustained by CVD.

## REFINEMENT OF C CLASSES IN CEAP

The essential change here is the division of class $C_4$ into 2 subgroups that reflect severity of disease and carry a different prognosis in terms of risk for ulceration:

$\mathbf{C_0}$ No visible or palpable signs of venous disease.
$\mathbf{C_1}$ Telangiectasies or reticular veins.
$\mathbf{C_2}$ Varicose veins; distinguished from reticular veins by a diameter of 3 mm or more.
$\mathbf{C_3}$ Edema.
$\mathbf{C_4}$ Changes in skin and subcutaneous tissue secondary to CVD, now divided into 2 subclasses to better define the differing severity of venous disease:

$\mathbf{C_{4a}}$ Pigmentation or eczema.
$\mathbf{C_{4b}}$ Lipodermatosclerosis or atrophie blanche.

$\mathbf{C_5}$ Healed venous ulcer.
$\mathbf{C_6}$ Active venous ulcer.

Each clinical class is further characterized by a subscript for the presence of symptoms (S, symptomatic) or absence of symptoms (A, asymptomatic), for example, $C_{2A}$ or $C_{5S}$. Symptoms include aching, pain, tightness, skin irritation, heaviness, muscle cramps, and other complaints attributable to venous dysfunction.

## REFINEMENT OF E, A, AND P CLASSES IN CEAP

To improve the assignment of designations under E, A, and P a new descriptor, n, is now recommended for use where no venous abnormality is identified. This n could be added to E ($E_n$, no venous cause identified), A ($A_n$, no venous location identified), and P ($P_n$, no venous pathophysiology identified). Observer variability in assigning designations may have been contributed to by lack of a normal option. Further definition of the A and P has also been afforded by the new venous severity scoring system,[4] which was developed by the ad hoc committee on Outcomes of the AVF to complement CEAP. It includes not only a clinical severity score but a venous segmental score. The venous segmental score is based on imaging studies of the leg veins, such as duplex scans, and the degree of obstruction or reflux (P) in each major segment (A), and forms the basis for the overall score.

This same committee is also pursuing a prospective multicenter investigation of variability in vascular diagnostic laboratory assessment of venous hemodynamics in patients with CVD. The last revision of the venous reporting standards[2] still cites changes in ambulatory venous pressure or plethysmographically measured venous return time as objective measures of change. The current multicenter study aims to establish the variability of, and thus limits of, "normal" for venous return time and the newer noninvasive venous tests as an objective basis for claiming significant improvement as a result of therapy, and it is hoped will provide improved reporting standards for definitive diagnosis and results of competitive treatments in patients with CVD.

## DATE OF CLASSIFICATION

CEAP is not a static classification; disease can be reclassified at any time. Classification starts with the patient's initial visit, but can be better defined after further investigations. A final classification may not be complete until

after surgery and histopathologic assessment. We therefore recommend that any CEAP classification be followed by the date, for example, $C_{4bS}$, $E_PA_{s,p}$ $P_r$ (2003-08-21).

## LEVEL OF INVESTIGATION

A precise diagnosis is the basis for correct classification of a venous problem. The diagnostic evaluation of CVD can be logically organized into 1 or more of 3 levels of testing, depending on the severity of the disease:

Level I: office visit, with history and clinical examination, which may include use of a hand-held Doppler scanner.

Level II: noninvasive vascular laboratory testing, which now routinely includes duplex color scanning, with some plethysmographic method added as desired.

Level III: invasive investigations or more complex imaging studies, including ascending and descending venography, venous pressure measurements, computed tomography (CT), venous helical scanning, or magnetic resonance imaging (MRI).

We recommend that the level of investigation (L) should also be added to the classification, for example, $C_{2,4b,S}$, $E_P,A_{s,p}$ Pr (2003-08-21, L II).

## BASIC CEAP

A new basic CEAP is offered here. Use of all components of CEAP is still encouraged. However, many use the C classification only, which is a modest advance beyond the previous classifications based solely on clinical appearance. Venous disease is complex, but can be described with use of well-defined categorical descriptions. For the practicing physician CEAP can be a valuable instrument for correct diagnosis to guide treatment and assess prognosis. In modern phlebologic practice most patients will undergo duplex scanning of the venous system of the leg, which will largely define the E, A, and P categories.

Nevertheless, it is recognized that the merits of using the full (advanced) CEAP classification system hold primarily for the researcher and for standardized reporting in scientific journals. It enables grouping of patients so that those with the same types of disease can be analyzed together, and such subgroup analysis enables their treatments to be more accurately assessed. Furthermore, reports that use CEAP can be compared with each another with much greater certainty. This more complex classification, for example, also allows any of the 18 named venous segments to be identified as the location of venous disease. For example, in a patient with pain, varicose veins, and lipodermatosclerosis in whom duplex scans confirm primary reflux of the greater saphenous vein and incompetent perforators in the calf, the classification would be $C_{2,4b,S}$, $E_p,A_{s,p}$, $P_{r2,3,18}$.

While the detailed elaboration of venous disease in this form may seem unnecessarily complex, even intimidating, to some clinicians, it provides universally understandable descriptions, which may be essential to investigators in the field. To serve the needs of both, the full CEAP classification, as modified, is retained as "advanced CEAP," and the following simplified form is offered as "basic CEAP."

In essence, basic CEAP applies 2 simplifications. First, in basic CEAP the single highest descriptor can be used for clinical classification. For example, in a patient with varicose veins, swelling, and lipodermatosclerosis the classification would be $C_{4b}$. The more comprehensive clinical description, in advanced CEAP, would be $C_{2,3,4b}$. Second, in basic CEAP, when duplex scanning is performed, E, A, and P should also be classified with the multiple descriptors recommended, but the complexity of applying these to the 18 possible anatomic segments is avoided in favor of applying the simple s, p, and d descriptors to denote the superficial, perforator and deep systems. Thus, in basic CEAP the previous example, with painful varicosities, lipodermatosclerosis, and duplex scan–determined reflux involving the superficial and perforator systems would be classified as $C_{4b,S}$, $E_p,A_{s,p}$, $P_r$, rather than $C_{2,4b,S}$, $E_p,A_{s,p}$, $P_{r2,3,18}$.

## REVISION OF CEAP AN ONGOING PROCESS

With improvement in diagnostics and treatment there will be continued demand to adapt the CEAP classification to better serve future developments. There is a need to incorporate appropriate new features without too frequent disturbance of the stability of the classification. As one of the committee members (F. Padberg) stated in our deliberations, "It is critically important that recommendations for change in the CEAP standard be supported by solid research. While there is precious little that we are recommending which meets this standard, we can certainly emphasize it for the future. If we are to progress we should focus on levels of evidence for changes rather than levels of investigation. While a substantial portion of our effort will be developed from consensus opinion, we should still strive to achieve an evidence-based format."

## REVISION OF CEAP: SUMMARY

### Clinical classification

$C_0$: no visible or palpable signs of venous disease
$C_1$: telangiectasies or reticular veins
$C_2$: varicose veins
$C_3$: edema
$C_{4a}$: pigmentation or eczema
$C_{4b}$: lipodermatosclerosis or atrophie blanche
$C_5$: healed venous ulcer
$C_6$: active venous ulcer
S: symptomatic, including ache, pain, tightness, skin irritation, heaviness, and muscle cramps, and other complaints attributable to venous dysfunction
A: asymptomatic

### Etiologic classification

Ec: congenital
Ep: primary
Es: secondary (postthrombotic)
En: no venous cause identified

**Anatomic classification**

As: superficial veins
Ap: perforator veins
Ad: deep veins
An: no venous location identified

**Pathophysiologic classification**

Basic CEAP
Pr: reflux
Po: obstruction
Pr,o: reflux and obstruction
Pn: no venous pathophysiology identifiable

Advanced CEAP: Same as basic CEAP, with addition that any of 18 named venous segments can be used as locators for venous pathology

Superficial veins
Telangiectasies or reticular veins
Great saphenous vein above knee
Great saphenous vein below knee
Small saphenous vein
Nonsaphenous veins

Deep veins
Inferior vena cava
Common iliac vein
Internal iliac vein
External iliac vein
Pelvic: gonadal, broad ligament veins, other
Common femoral vein
Deep femoral vein
Femoral vein
Popliteal vein
Crural: anterior tibial, posterior tibial, peroneal veins (all paired)
Muscular: gastrocnemial, soleal veins, other

Perforating veins:
Thigh
Calf

**Example**

A patient has painful swelling of the leg, and varicose veins, lipodermatosclerosis, and active ulceration. Duplex scanning on May 17, 2004, showed axial reflux of the great saphenous vein above and below the knee, incompetent calf perforator veins, and axial reflux in the femoral and popliteal veins. There are no signs of postthrombotic obstruction.

Classification according to basic CEAP: $C_{6,S,}$ $E_p$,$A_{s,p,d}$, $P_r$.
Classification according to advanced CEAP: $C_{2,3,4b,6,S}$, $E_p$,$A_{s,p,d}$, $P_{r2,3,18,13,14}$ (2004-05-17, L II).

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*Additional material for this article may be found online at www.mosby.com/jvs.*

**Table I, online only.** Journals and books in which CEAP classification has been published

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| Actualités Vasculaires Internationales 1995;31:19-22 |
| Angiologie 1995;47:9-16 |
| Angiology News 1996; 9:4-6 |
| Australia and New Zealand Journal of Surgery 1995;65:769-72 |
| Clinica Terapeutica 1997;148:521-6 |
| Dermatologic Surgery 1995;21:642-6 |
| Elleniki Angiochirurgiki 1996;5:12-9 |
| European Journal of Vascular and Endovascular Surgery 1996; 12:487-91 |
| Forum de Flebologia y Limphologia 1997;2:67-74 |
| Handbook of Venous Disorders 1996;652-60 |
| International Angiology 1995;2:197-201 |
| Japanese Journal of Phlebology 1995;1:103-8 |
| Journal of Cardiovascular Surgery 1997;38:437-41 |
| Journal of Vascular Surgery 1995;21:635-45 |
| Journal des Maladies Vasculaires 1995;20:78-83 |
| Mayo Clinic Proceedings 1996;71:338-45 |
| Minerva Cardioangiologica 1997;45:31-6 |
| Myakkangaku 1995;31:1-6 |
| Phlébologie – Annales Vasculaires 1995;48:275-81 |
| Phlebologie [German version] 1995;24:125-9 |
| Phlebology 1995;10:42-5 |
| Przeglad Flebologiczny 1996;4:63-73 |
| Scope on Phlebology and Lymphology 1996;3:4-7 |
| VASA 1995;24:313-8 |
| Vascular Surgery 1996;30:5-11 |