Non-invasive Vascular Diagnostic Laboratories: Organization and Accreditation Within Kaiser Permanente

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“When you can measure what you are speaking about and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager kind.”

Lord William Kelvin (1824–1907)
Non-invasive Vascular Diagnostic Laboratories

- Introduction & History of Vascular Laboratories
- KP San Diego Vascular Diagnostic Laboratory (VDL) – History
- VDL – Organization
- VDL – Equipment / Studies / Procedures
- VDL – Services
- VDL – ICAVL Accreditation
- Other Vascular Laboratories – inside and outside KP
- Conclusions
Physiologic measurements of the circulation began in the late nineteenth century.

The first Vascular Laboratory was established at the Massachusetts General Hospital (MGH) by Dr. Robert Linton in 1946.

A number of Vascular Laboratories started in the US and abroad from the 1950’s to the 1970’s, mostly in academic centers.

Early 1970’s: Vascular Laboratory established at UCSD by Arnost Fronek MD PhD and Eugene Bernstein MD PhD.


1990: Intersocietal Commission for the Accreditation of Vascular Laboratories (ICAVL) founded.
VDL - History of Vascular Laboratories
I completed my General and Vascular Surgical training at UCSD in 1979, and joined the Department of Surgery KP San Diego. “Where is our Vascular Lab?”

In 1986, we established our Vascular Diagnostic Laboratory (VDL), with a single Vascular Technologist and a physiologic machine that did segmental arterial BP’s and venous strain gauge plethysmography.

In 1987, we bought our first Duplex scan machine and began to do carotid studies.
In 1994, we took over all of the venous diagnostic studies for acute DVT from Radiology.

Our VDL slowly grew over the next decade as did the KP San Diego membership. We added Registered Vascular Technologists (RVT’s) and machines.

By 1998, we stopped doing routine arch and carotid arteriograms for carotid artery disease, and began to perform carotid endarterectomies based upon Carotid Duplex scans alone.
We outgrew our original Vascular Diagnostic Laboratory space and remodeled in 2000 (now ~ 900 sq. ft.).

In 2002, we applied for and were granted our first ICAVL accreditation, the second in KP SCal (the Panorama City Vascular Lab was the first, but let their accreditation lapse). We were re-accredited in 2005 & again in 2008.

We also became a CREST-certified VDL in 2005.

Today, we perform ~ 9000 VDL studies per year.
KP San Diego VDL - Studies

San Diego VDL Studies

Year


0 1000 2000 3000 4000

Arterial Venous Carotid

Peter M. Taft MD FACS
KP 4th Annual National Surgical Symposium
April 2-4, 2008
KP San Diego VDL - Organization

● Context
  ● Kaiser Permanente is a pre-paid Group-model HMO, mostly employer-based insurance with individual and Medicare Advantage plans. There is a growing component of high deductible membership as well.
  ● Medical care is provided by Permanente Physicians.
  ● Facilities are owned and operated by KFHP & KFH.

● San Diego Medical Service Area
  ● In 1979, we had 175,000 members. Today we serve a population of nearly 500,000 KP members throughout San Diego County.
  ● The San Diego Vascular Diagnostic Laboratory (VDL) is located in the San Diego Medical Center, situated within the Department of General Surgery.
Organizationally, Vascular Surgery and the VDL are part of the General Surgery Department. We are fully independent of the Department of Radiology.

VDL Personnel / Staffing

- Medical Director / Vascular Surgeon
- Four other full-time Vascular Surgeons
- Lead / Senior Registered Vascular Technologist (RVT)
- Five other full-time RVT’s (RVT required for employment)
KP San Diego VDL – Equipment

Equipment:
- 4 Duplex Scanners Siemens – 3 Sequoia and 1 Aspen
- 2 Parks Flo-lab 2100sx Arterial Machines
- Viasys / Nicolet Transcranial Doppler (TCD) machine
- Novametrix TCO₂M Transcutaneous O₂ Monitor
- 2 Portable Duplex Scanners (Zonare and Sonosite)
- Multiple Park hand-held Dopplers
- 4 networked PC computers
- VascuBase™ software
- No direct interface to KP HealthConnect™
Studies:

- Cerebrovascular Studies
  - Carotid Duplex scans
  - Transcranial Doppler (TCD) studies

- Arterial Studies
  - Segmental Arterial BP’s & Indices (LE & UE)
  - Digital Pressure (LE & UE)
  - Cold Immersion studies
  - TCPO₂ studies
  - Postoperative Graft surveillance studies
  - Arterial Duplex scan for peripheral artery aneurysms
  - Penile BP’s are done by Urology
Studies (continued):

- Venous Studies
  - Compression Ultrasound to R/O DVT (LE & UE)
  - We use a d-Dimer Protocol (Wells Criteria)
  - Venous Reflux studies

- Special Studies
  - Preoperative Vein Mapping (LE & UE)
  - Deep abdominal Duplex scans of the Mesenteric and Renal arteries

Procedures

- Foam Sclerotherapy of Varicose Veins with Duplex imaging (last 5 years)
- Thrombosis of pseudoaneurysms with Duplex imaging
Referrals

- 75% of our studies are elective. Referral is by Physician request (same as X-ray studies). Minimal screening.
- 10% are urgent, same-day from the Emergency Department and Medical Offices.
- 15% are same-day from the Hospital.
KP San Diego VDL - Services

- Referral is via SCaI e-Referral system for ambulatory / outpatient studies, and by a Nursing Communication order in KP HealthConnect InPatient plus a phone call for inpatients. No drop-ins, no self-referral.
- Hours: 08:00 AM to 10:00 PM, seven days per week, 365 days per year (via Beeper on weekends and holidays). No Beeper call for RVT’s 10:00 PM to 08:00 AM.
Our VDL study workflow is straightforward:

- Referrals are received and prioritized.
- Patients are scheduled, including add-ons.
- Studies are performed by RVT’s.
- RVT’s create preliminary reports including study results and impressions using VascuBase™.
- Reports are printed, then reviewed by the on-call Vascular Surgeon. Reports are signed within 48 hours, and results scanned into KP HealthConnect (Ambulatory) or a preliminary report in KPHC InPatient.
- Planning for all-electronic workflow in the near future.
- With printed criteria, RVT’s will call the on-call Vascular Surgeon about certain patients who will be seen same-day, or booked directly into our Clinics.
Our VDL studies are regularly reviewed at our weekly Vascular Surgery – Interventional Radiology Conference.

Our RVT’s present the Vascular Diagnostic Laboratory reports. The studies are compared to the imaging studies. Differences in results are identified and discussed.

New types of studies are carefully introduced and compared to existing “gold standards.”

New technologists must have their work double-checked to ensure consistent high-quality studies result.
Part of the ICAVL Accreditation process is the correlation of Carotid Duplex scans with imaging and surgical findings. Our experience has been that our results are highly reliable. We continue to do carotid endarterectomies without preoperative conventional or CT angiograms, or MRA’s.

We frequently redo Carotid studies for patients who have had studies at non-accredited labs. The outside studies are often in error.

The ICAVL is the Intersocietal Commission for the Accreditation of Vascular Laboratories.

ICAVL Mission Statement: The ICAVL is dedicated to promoting high quality noninvasive vascular diagnostic testing in the delivery of health care by providing a peer review process of laboratory accreditation.

Founded in 1990. It is the standard by which the quality of Vascular Laboratories is judged.
The ICAVL accreditation process:

- Begins with a comprehensive self-evaluation by Vascular Laboratory staff.
- The Vascular Laboratory must supply information on all aspects of Vascular Lab operations.
- The Vascular Laboratory sends actual case studies for review.
- The submitted application undergoes a confidential peer-review by the ICAVL's trained reviewers, including Physicians, technologists, and sonographers. There may also be a site visit.
- Final decision is made by the ICAVL Board of Directors.
- Accreditation is good for 3 years.
The ICAVL Application fees:
- The one-time fee to purchase the printed version of *The Standards* and the Electronic Application, is $200.
- Base fee of $1000 and an additional $300 for each area of accreditation being sought.
- Vascular Laboratories may apply for accreditation in any combination of the following areas:
  - Intracranial Cerebrovascular
  - Extracranial Cerebrovascular
  - Peripheral Arterial
  - Peripheral Venous
  - Visceral Vascular
KP San Diego VDL – ICAVL Accreditation

- Why did the San Diego Vascular Diagnostic Laboratory seek ICAVL Accreditation?
  - Accreditation demonstrates our commitment to quality patient care.
  - It provides a confidential peer-review of our VDL studies.
  - It attracts high quality RVT’s.
  - It is the national standard of quality assurance for Vascular Laboratories.
  - Reimbursement for Vascular Laboratories in more than 30 states hinges on either laboratory accreditation or technologist certification.
  - It is the right thing to do for our patients.
In California, a National Heritage Insurance Company (a Medicare Carrier) policy states:

The accuracy of noninvasive vascular studies depends on the knowledge, skill and experience of the technologist and interpreter. Consequently, the providers of interpretations must be capable of demonstrating documented training and experience and maintain documentation for post-payment review.

All noninvasive vascular diagnostic studies must be either (1) performed by a trained physician, or (2) performed under the general supervision of a trained physician by a technologist that has demonstrated minimum entry level competency by being credentialed in vascular technology, and/or (3) performed in laboratories accredited in vascular technology.

Appropriate laboratory accreditation includes the Intersocietal Commission for the Accreditation of Vascular Laboratories (ICAVL), or the American College of Radiology (ACR).
There are 8 Vascular Laboratories in 11 KP Southern California Medical Centers, only 2 are ICAVL Accredited. 3 of the 8 are “complete” labs, the others are more limited with Radiology Departments providing Carotid Duplex and/or Venous Studies.

In all of California, there are a total of only 3 KP ICAVL Accredited Vascular Laboratories.

Surprisingly, there are only 40 other Non-KP ICAVL Accredited Vascular Laboratories in all of California (we are the only accredited Vascular Laboratory in San Diego County).
The complete, modern Vascular Diagnostic Laboratory is an essential component of today’s Vascular Surgical care.

Quality in the VDL is achieved by:
- Single-service (VS) control of the VDL.
- Exclusive use of RVT’s
- Monitoring the quality of the studies and reports.
- ICAVL Accreditation

Within KP, this should be the model for Vascular Diagnostic Laboratories at every Medical Center.