Kaiser Permanente Los Angeles Medical Center provides an exceptional Vascular and Interventional Radiology (VIR) training experience. We established a VIR pathway for training in 2008 and our graduates have gone on to perform exceptionally well, developing robust clinical VIR practices. We currently have a total of 10 faculty members which include 7 peripheral interventionalists and 3 neuro-interventionalists.

From a clinical non-procedural standpoint our IR division averages 2000 inpatient consultations, 500 hospital admissions and see approximately 5000 patients in our outpatient clinic annually. Each IR attending has between 1 to 2 days of clinic with between 100 to 150 patients visits a week.

Our VIR department provides the opportunity to gain hands-on experience in a wide range of advanced interventional procedures including aortic, peripheral arterial disease, interventional oncology, pain, neuro-, pediatric, women’s health, and GI/GU interventions.

**Scope of Practice**

**Vascular treatments:** We have a busy aortic division in which we evaluate and manage complex abdominal and thoracic aortic pathology. We also have a robust peripheral vascular disease practice that treats both claudicants with medical optimization/revascularization and critical limb ischemia patients with revascularization and wound care. Our division is also involved in the treatment of various venous disorders such as PE and DVT thrombolysis/thrombectomy, complex IVC filter retrieval, and varicose vein therapy. Our department is also directly involved in a busy multidisciplinary vascular malformation center that treats complex venous malformations and AVMs. Our trainees each log over 50 aortic repairs, 100 lower extremity revascularizations and numerous DVT/PE/varicose vein interventions.

**Oncology treatments:** Kaiser LA medical center has a very busy interventional oncology program and perform about 500 trans arterial chemoembolization procedures a year. We also perform over 100 ablations a year, which include but are not limited to liver, lung, kidney and bone tumors.
Pain treatments: The IR division also provides pain interventions including vertebroplasty, kyphoplasty, rhizotomy as well as various nerve blocks.

Pediatric treatments: We also perform a large number of pediatric interventions as we have a busy tertiary pediatric center.

Gastrointestinal and Genitourinary treatments: Outside of the standard gastrostomy tubes, cholecystostomy tubes, biliary drains and nephrostomy tubes, our division is heavily involved in the novel treatment of BPH with prostate artery embolization as well as fibroids with uterine artery embolization. We also treat fertility disorders with varicocele embolizations for males and fallopian tube recanalization for females.

Neuro-interventional treatments: The three neuro-interventionalists in our group have a very robust practice treating over 100 cerebral aneurysms a year and performing a fair number of carotid stents, intracranial stents as well as AVM treatments. We are also a comprehensive stroke center and perform a high volume of acute stroke thrombectomy cases. Our integrated IR residents will do a minimum of 3 months of neuro-interventional during their residency and will also assist in stroke call resulting in an extensive hands on experience in cerebral circulation.

Integrated Resident training experience

Internship: Our Integrated IR resident will do their general surgery internship here at LAMC. During that year you will have one month of interventional radiology, one month of Vascular surgery, two months of Surgical Oncology, one month of Thoracic surgery, one month of Pediatric surgery, one month of colorectal surgery, two months of acute care surgery, a month of minimally invasive surgery and one month of medical intensive care unit (MICU).

PGY 2–4: We feel that early integration of VIR rotations as well as dedicated clinic time and a variety of other rotations are paramount to becoming a comprehensive clinical interventional physician. During their PGY2 year residents will rotate in the medical intensive care unit as well as participate in weekend interventional radiology call so that they may expand their clinical and technical experience. We feel that the ICU is the best environment to learn as you will be dealing with the most ill and acute medical conditions. At the end of PGY 2 year residents will do 2 months of back to back interventional radiology. During the PGY3 year residents will have 1 month of intensive care in the cardiac unit (CCU) and 2 months of interventional radiology. At the very beginning of PGY4, the VIR integrated residents do 1 month of interventional radiology and 1 month of neuro-interventional radiology. Thus they will complete a total of 7.5 months of interventional radiology and clinical rotations during the PGY2 through 4 years.

PGY 5 year: Residents will get 2 more months of neuro-interventional radiology, 1 to 2 months of vascular surgery and 2 more months of intensive care medicine. The remainder of the year will be interventional radiology intermixed with one month of mammography and one month of nuclear medicine.

PGY 6 year: The final year will be primarily on the interventional radiology service with some options for elective time on clinical rotations.

Highlights

ICU/CCU experience

At Kaiser Permanente, we feel that the clinical integration is critical to being a solid interventional physician who can comprehensively manage their patients. Many of our patients have multiple comorbid conditions and so we feel that the highest yield clinical rotation is intensive care training. Residents will have extensive intensive care (ICU) training throughout the integrated VIR residency experience including:

- A month of ICU during intern year
- 80 hrs in the MICU during PGY2
- Month of Cardiac Intensive Care Unit (CICU) during PGY3
- 2 months of CICU during PGY4 and 5.

We also have an ICU lecture series built into the VIR curriculum that is given by the Intensive care faculty during the course of their integrated IR residency. During the intensive care months, residents will gain experience in running codes and dealing with higher acuity cardiac patients who require ventilator support, Intra-aortic balloon pumps, or Pulmonary artery invasive monitoring.

VIR resident continuity clinic

As part of the clinical integration, we feel that continuity clinic is critical. The integrated VIR residents will have a half day of clinic a week throughout the PGY2 through 6 years. During that time they will develop long term longitudinal relationships with their patients. The VIR resident will be responsible for monitoring and managing their patient’s comorbid conditions, guiding them on things such as smoking cessation and diabetic control.
Multi-disciplinary conferences
We have numerous multi-disciplinary conferences that the interventional radiology resident is an active participant in including:
• Weekly hepatobiliary/liver tumor board
• Multi-disciplinary vascular conference,
• Lung tumor board
• Pulmonary/critical care conference
• Neuro-interventional radiology conference

Interventional lecture series
In addition to our general diagnostic conferences which are between 12:00 pm and 1:30 pm daily, we also have a specific 7 am to 8 am daily conference schedule for the VIR trainee.
• Monday mornings are a core radiology topic (focused on general radiology boards)
• Tuesdays are multi-disciplinary vascular conference
• Wednesday’s are dedicated clinical topics (atrial fibrillation, Diabetes management, diabetic foot, shock etc)
• Thursdays are general IR concepts
• Fridays are (best VIR case conference/Journal clubs).

Medical student education:
We started one of the earliest medical student rotations for IR in southern California. This results in a robust medical student experience for those who expressed interest in vascular and interventional radiology. We have 3rd and 4th year students who are an integral part of our training program on the VIR service. They are acting sub-interns and see initial consultations, actively participate in clinic, and are also heavily involved in the procedures. Our VIR integrated residents will work closely with medical students both at our institution and nationally.

Summary
In summary, the Kaiser Permanente Integrated Interventional Residency offers the highly motivated trainee an opportunity to become an outstanding interventional physician who will be able to build an interventional practice from scratch and provide comprehensive clinical care. They will be capable of offering a tremendous range of procedures to the patients that they take care of. We offer one of the broadest array of procedural opportunities in a training program which includes nearly every aspect of interventional medicine. They will graduate with the tools necessary to become innovators in the rapidly advancing field of interventional radiology.

We also highly encourage the VIR resident to attend and present at local angio clubs as well as regional and national interventional meetings.
A one-year IR fellowship is simply not enough training. Sure, learning the technical aspects of IR procedures may take a year, but understanding the clinical management of a diverse patient population an Interventionalist will encounter (oncology, hepatology, nephrology, pathology, arterial disease, venous disease, etc.), takes much longer.

Fortunately, this was recently recognized and addressed with the development of the IR residency. This pathway ensures that IR residents will become board certified in diagnostic radiology and have a dedicated IR curriculum with a sufficient amount of time spent on both IR and relevant clinical rotations (vascular surgery, oncology, critical care, etc.). However, this pathway will roll-out slowly over the next 7 years and leaves those IR-interested medical students entering the Traditional IR pathway via Radiology residency and an inconsistent and perhaps deficient IR curriculum.

There are, however, many Radiology residency programs already achieving the goal of the IR residency in terms of the time spent in IR and its relevant clinical specialties. To briefly break it down, the IR residency will include 14 rotation blocks (4-week rotations) of IR and IR-related specialties by the end of the PGY-5 year. If you include the PGY-6 year, it will total to 27 rotations blocks.

As an example of a Radiology residency already achieving the IR residency’s goal of time spent on IR and IR-related specialties, we can take my experience. I was fortunate to have matched at a residency that was liberal enough to allow me to customize my curriculum. By the end of my PGY-5 year, I was able to rotate on 16 blocks of IR and its related specialties. If you add my PGY-6 year (fellowship year), it will total to 29 blocks. Having this much time on IR not only improves my clinical acumen, but also gives me the competitive edge to grow and sustain a clinical IR practice after training.

Finding a Radiology residency that allows this customization depends on a multitude of factors. First and foremost, the Residency program director must be progressive and on board. There are many programs out there that are accustomed to the Traditional IR pathway (3 rotation blocks in IR prior to fellowship) and would rather have your helping hand on the wheel of a mouse.

As a medical student who is interested in IR and interviewing at Radiology residency programs, the first step would be to ask the program’s current residents interested in IR how their curriculum is arranged. Then ask the program directors themselves. I was able to do two IR rotations each of my first three years (PGY 2, 3, 4), followed by 10 IR and IR-related blocks my fourth year (PGY 5). Having an uninterrupted continuous block of IR rotations my final year gave me the opportunity to setup my own clinic, see consults, post-procedure follow-ups, and have a convenient outlet to refer patients when reading diagnostic studies and speaking to fellow services (AAA, PAD, IVC filter retrieval, etc.).

In conclusion, the IR residency is a great step for Interventional Radiology. It will dedicate more time to IR in Radiology residency, provide a more well-rounded clinical curriculum, ultimately improve patient care, and provide a trainee with the tools to sustain and grow a competitive practice. However, the residency program is still years away, and until then the current trainee is at risk of being undertrained and steps behind their future colleagues. Current medical students interested in IR need to seek a Radiology residency that gives them the flexibility to spend more time in IR and its related specialties. Fortunately, they’re out there.