

Research and Clinical Trials

At Providence Health & Services and our family of partners



Improving the health of our communities through research

As the third largest not-for-profit health system in the United States, Providence is committed to providing for the needs of our communities in our five-state system and beyond. Our work in clinical, patient-centered, translational and outcomes research supports the mission of Providence and our affiliates by advancing knowledge essential to improving care for all – especially the poor and the vulnerable.

It's an exciting time in research. At Providence and our affiliates, which includes Swedish, Kadlec, Pacific Medical Centers, and Facey, physicians and scientists work together to create solutions and ensure that patients benefit from the latest advancements in prevention, diagnosis and treatment. And with more than 2,500 clinical trials and research studies ongoing throughout the organization, we have the breadth and depth to not only position ourselves as a research leader, but to make an impact on human health.

We have 30,000 new cancer patients a year, more than the larger cancer centers in the country. Each year more than 35,000 cardiovascular patients are coming to us for care, which dwarfs the volume at other high profile centers. Because of our sheer size and collective volume of patients, we are able to learn how we can better care for different patient populations using statistics from our electronic health record and the data registries we're building. We have the ability to change the care of our patients through new discoveries.

Because we're an integrated delivery system, we take a community patient-centered point of view and prioritize what's most meaningful to patients. As a system, we're able to deliver

innovative therapies and resources to people close to home. Thanks to the dedicated efforts of researchers across our organizations, communities in outlying areas will now have access to the latest advances in medical research, therapies and clinical trials without having to travel long distances. Our translation research efforts also provide our patients the opportunity to be part of the process to discover innovative cures for future generations.

Building the future together

Like the pioneering spirit of the Sisters before us who answered a call for help 160 years ago, Providence is pioneering a new future for health care to improve the quality of life for everyone. Building the future together requires a strong research foundation, and this report highlights just a few of the great works our physicians, clinicians and teams are doing to build on the caring legacy of our founders.

We're proud of our ministries and affiliates for transforming how research is done, how care is delivered, and providing advanced medical expertise and compassionate care to everyone we serve.



Delphine Lee, M.D., Ph.D.
Co-Chair, Research Leadership Council
Providence Health & Services



Philip Gold, M.D.
Co-Chair, Research Leadership Council
Swedish Health System



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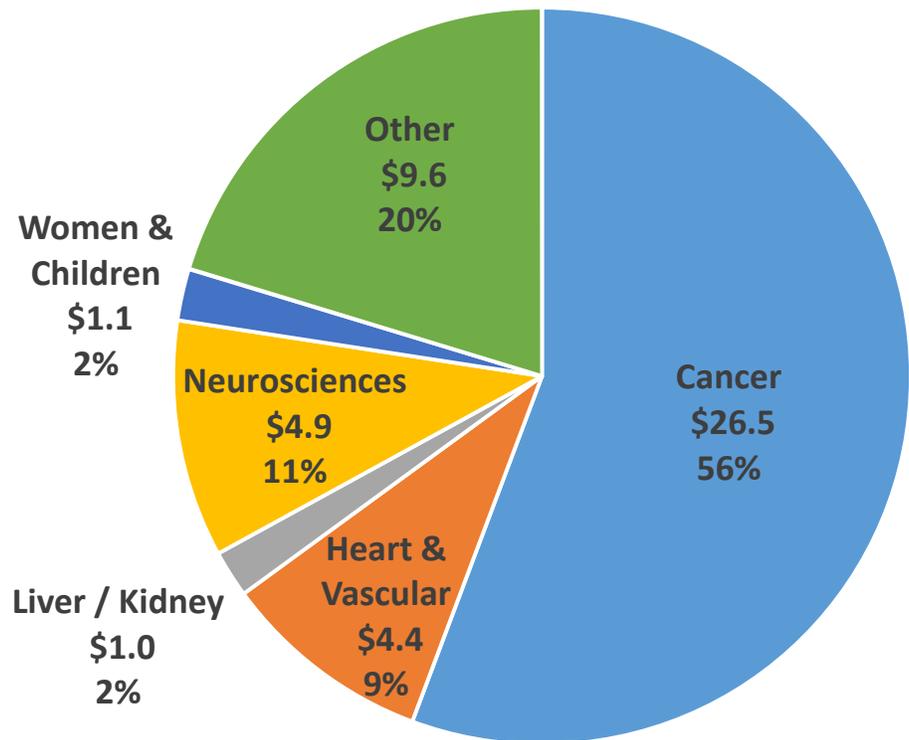


Our research by the numbers

Providence and our affiliates have more than 2,500 active clinical trials and studies.

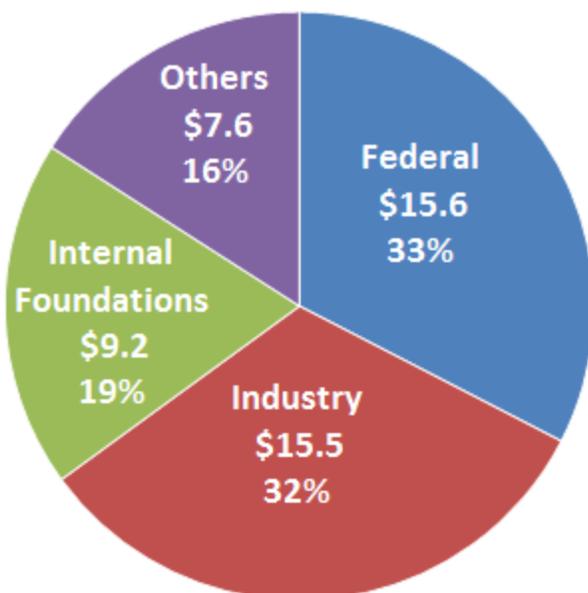
Our research encompasses a wide variety of health topics and is comprised of several different medical specialties.

2015 Research Financial Support (in millions)



Funding for research comes from several different sources.

2015 Research Support (in millions)



Publications

Our researchers appeared in more than 800 publications in 2015.

Research Highlights by program

At Providence and our affiliates, we are working together to create solutions and ensure that patients benefit from the latest advancements in prevention, diagnosis and treatment. In the following highlights from our major programs, you'll find out about some of the key publications of our researchers, learn about ongoing research from 2015, see some of the grants and funding sources for research activities, and find out about notable leadership positions Providence researchers have been elected to across the country. You'll also learn a little about the people behind and participating in the research. These showcase only a portion of the great work our physicians and clinicians are doing to provide advanced medical expertise and compassionate care to everyone we serve.



For most people—and their loved ones—a cancer diagnosis can be overwhelming. It's an experience no one wishes to have in their lifetime. During this time, there is a need for trustworthy information, resources and caregivers. At Providence, we work together to give patients and families the best care on the West Coast. We partner with them from diagnosis and treatment through all the stages of life, ensuring an excellent patient experience and seeking the best outcomes through research and innovation. Our skilled and experienced team members are devoted to helping patients and families navigate through each individual cancer journey. Besides helping patients understand medical treatment options, Providence connects them with other people who understand what they are going through, and matches patients with resources and support that fit each one's particular needs, personality and circumstances.

Learn how Providence Cancer Center is advancing cancer immunotherapy through state-of-the-art translational research

The Earle A. Chiles Research Institute is a world-class research facility located within Providence Cancer Center in Portland, Oregon. Home to a team of internationally-recognized scientists and physicians, the main area of investigation is cancer immunotherapy. The best example of their novel immunotherapy research is the OX40 translational research project led by Andrew D. Weinberg, Ph.D., and Brendan D. Curti, M.D. OX40 began as a scientific discovery at the Institute, was fueled by local philanthropy to initiate the first-in-human OX40 trial at Providence Cancer Center, and led to the creation of a biotechnology company, AgonOx, who sublicensed OX40 to one of the largest pharmaceutical companies in the world. What started as a 30-patient trial in Portland, Oregon, is now being tested in hundreds of patients around the world. The Institute also contributed to the development of ipilimumab – the first immunotherapy drug to improve survival in patients with advanced melanoma. Dr. Walter

Urba served as the principal investigator for the international clinical trial that led to ipilimumab's FDA approval in 2011, distinguishing the Earle A. Chiles Research Institute as a leader in cancer immunotherapy.

Meet Julie Randall, aka patient 71 who traveled from Australia to seek treatment at Providence Cancer Center in Oregon

When Julie Randall was diagnosed with stage 4 metastatic melanoma, she was told her outcome was bleak and to get her affairs in order. Julie ignored that advice and began a search for clinical trials, which eventually brought her to Oregon and the Providence Cancer Center. Julie was a patient from Sydney, Australia who had metastatic melanoma with disease in her liver and lung. She and her husband's search to learn more led them to a developing drug known as anti-PD-1. It was not available in Australia, so she sought treatment in the U.S., where it was only available via clinical trials.

Julie found a sponsored biomarker trial at Providence Portland Medical Center. All patients had to have a tumor biopsy before therapy and again after a few doses of anti-PD-1, which was given intravenously every two weeks for 24 months. The only problem was the study had already filled its approved 70 patients. Julie's persistence and belief that Providence was the place for her to be paid off. She was accepted into the trial and affectionately became known as "patient 71." She underwent her two biopsies and lived in Portland, Oregon, while getting therapy and returning Down Under for an occasional family visit. She responded to therapy with tumor shrinkage and it became a real hardship for her to live so far away from her family. After months of negotiation, the study sponsor arranged for Julie to receive her care by an expert in Australia. The drug was approved in the U.S. and Australia as nivolumab, or Opdivo, and Julie continues to receive therapy and remains in remission from her melanoma. Julie spoke at the 2015 Cancer Luncheon supporting the Providence Cancer Center in Portland, Oregon. Hear her tell her story in her own words ([watch video online](#) or search YouTube for "2015 Cancer Luncheon: Julie Randall, cancer survivor").

Learn how the Reid Family Innovative Therapeutics Unit (ITU) at the Swedish Cancer Institute in Washington supports research on advanced innovative therapies

This state-of-the-art clinical project will focus on investigational therapies driven by Swedish Cancer Institute Personalized Medicine Program (the program focuses on biologically targeted therapies such as genomics, transcriptomics, proteomics, metabolomics, micro-biomics, and immunological profiling). Patient and family centered, the unit includes the highest level of space planning and technology to support the administration of novel therapies, and the associated high level monitoring of patients. The unit will eventually become dedicated to administration of investigational therapies, especially phase I and II therapeutics. The Reid Family ITU includes:

- supportive care and nourishment space for patients and families
- 16 treatment chairs
- 5 private rooms, one with positive and negative ambient pressure capabilities
- laboratory to facilitate pharmaco-kinetic and pharmaco-dynamic analyses
- state-of-the-art investigational and general oncologic pharmacy

Learn about research innovations being developed at the John Wayne Cancer Institute in Santa Monica, California

The John Wayne Cancer Institute (JWCI) at Providence Saint John's Health Center has expanded to several world-class disease centers of excellence with the addition of renowned medical oncologists, Dr. Steven O'Day and Dr. Santosh Kesari, and surgical oncologists Dr. Timothy Wilson and Dr. Rob McKenna. Neuro-Oncology and Melanoma are now fully integrated disease centers, and include Medical Oncology, Surgical Oncology, Radiation Oncology, translational science and state-of-the-art clinical trials. The John Wayne Cancer Institute has made seminal contributions to the fields of Surgical Oncology, Immunology and Molecular Oncology.

Dr. David Hoon and his team lead a notable body of pioneering work in the field of Molecular Oncology and Genomics, identifying circulating cancer cells and studying their genomic profiles. In addition, Dr. Hoon has been a leader in the evaluation of the blood for free tumor DNA, an exciting field to develop "liquid biopsies" for cancer diagnosis and monitoring of patients on treatment.

The discovery of CTLA-4 and PD1 checkpoint proteins launched the modern era of targeted Immunology. Dr. Walter Urba (Providence Portland) and Dr. Steven O'Day (JWCI Saint John's) were part of the small team of investigators that led the initial studies that led to FDA approval of Ipilimumab (anti-CTLA-4 Antibody) in metastatic melanoma in 2011. Since then, Dr. O'Day and others continue to conduct research on additional checkpoint inhibitors (anti-PD1 antibodies) which have dramatically improved survival not only in melanoma but also in many other cancers. Due to the progress in checkpoint inhibitors, researchers are now exploring combinations of checkpoint inhibitor drugs and other immunologic drugs including cancer vaccines, oncolytic viruses, IDO inhibitors and molecularly targeted agents. Combination immunotherapies will produce major advances in the near future.



Cancer Highlights

Significant Grant Awards for Cancer Research

- **Center for Lung Research \$3.75 million gift:** Funds will support research infrastructure and collaborations in lung disease. (Swedish Cancer Institute)
- **\$3.4 million in annual grant and other sponsored research funding.** (Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR)
- **Adelson Medical Research Foundation Epigenomic Platform, 2015-2018: \$1.1 Million:** (John Wayne Cancer Institute at Providence St. John's Health Center, Santa Monica, CA)
- **New Guest Housing Center** was completed and opened to patients and their families in Aug 2015. (Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR)
- **The Harder Family Endowed Chair for Cancer Research** was completed and conferred on Dr. Bernard Fox. (Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR)
- **\$1.925 million award from the Adelson Medical Research Foundation** for brain metastasis and epigenomic platform. DSB Hoon, Ph.D. (John Wayne Cancer Institute, California)
- **Center of Hope Campaign raised nearly \$12 million.** (Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR)

Ongoing Cancer Research

System-wide

- *NCI Community Oncology Research Program (NCORP) activation.* Gary Goodman, M.D., Keith Lanier, M.D., and Paul Montgomery, M.D. This program provides access to clinical trials in Alaska, Washington, Oregon, California, and Idaho, and is a collaboration with Providence Portland.

Swedish Cancer Institute, Seattle, WA

- *Personalized Medicine Research Program.* Thomas Brown, M.D. The program grew through new performance sites at Pacific Gynecology Specialists, Providence Southwest Washington, and Minor & James Clinic which added more than 815 registrations. It also added a continuing medical education course (The Cross Cultural Health Care Program), began Phase I of a translational research system, and expanded the NGS panel from 68 to more than 300 genes, which will be reported as two separate panels: solid tumor or hematologic malignancy. In addition, Swedish Cancer Institute and Providence formed an Oncology Precision Network (OPeN) with Intermountain Healthcare, Stanford Cancer Institute and Syapse to advance cancer care through data sharing and increased access to clinical trials. (Swedish Cancer Institute)
- *Innovative breast cancer study.* The “I SPY 2 Trial: Neoadjuvant and Personalized Adaptive Novel Agents to Treat Breast Cancer” continues to enroll patients with a current total of 66. This study will determine whether adding experimental agents to standard neoadjuvant treatment will increase the probability of complete response over standard chemotherapy for each biomarker signature established at trial entry. Swedish Cancer Institute is the only study site in the Pacific NW and one of only 16 sites in the country. (Swedish Cancer Institute)
- *Breast Cancer Research Registry.* This unique registry continues to grow and includes over 15,700 breast cancer cases. The registry is used for evaluating breast cancer care outcomes. There were five presentations/publications in 2015 from evaluation of the registry data. (Swedish Cancer Institute)



- *Hematology Malignancies Research Program.* John Pagel, M.D., and William Bensinger, M.D. New Phase I clinical trials were opened, and the number of studies tripled from 6 to 20 in 2015. (Swedish Cancer Institute)

Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR

- *BMS II-ON.* The Earle A. Chiles Research Institute is one of the leading sites in the fields of domestic and international immuno-oncology research institutions.

- Phase Ib Study of Intratumoral CAVATAK (Coxsackievirus A21) and Ipilimumab in Patients with Advanced Melanoma.
- Collaboration with Ubivac (biotech spin-off) for a Randomized Phase II Trial of Cyclophosphamide with Allogeneic Non-small Cell Lung Cancer (NSCLC) Dribble Vaccine alone or with Granulocyte-Macrophage Colony-Stimulating Factor or Imiquimod for Adjuvant Treatment of Definitively-Treated Stage IIIA or IIIB NSCLC.
- Collaboration with Johns Hopkins University for a Phase II Study for the implementation of PD1 inhibition as a therapeutic for metastatic colorectal cancer with mismatch repair deficiency.

John Wayne Cancer Institute at Providence Saint John's Health Center, Santa Monica, CA



- *Melanoma Program* – Multiple clinical trials led by Dr. Mark Faries (Surgical Oncology) and Dr. Steven O'Day (Medical Oncology) combining Immune Checkpoint Inhibitors (PD1 Inhibitors) with Vaccines, Oncolytic viruses, IDO inhibitors or Molecularly Targeted Agents.
- *CNS Neuro-Oncology Program* – Multiple clinical trials led by Dr. Dan Kelly (Neurosurgeon) and Dr. Santosh Kesari (Neuro-Oncologist) with novel molecular targeted drugs, immunotherapy, chemotherapy, surgery and radiation.
- *Solid Tumor Program* – Clinical trials led by Dr. Steven O'Day and Dr. Tim Wilson (Urology) studying non-invasive bladder cancer and a novel protocol with PD1 Inhibitor, Pembrolizumab.
- *Solid Tumor Immuno-Oncology Program* – Phase I trial led by Dr. Steven O'Day (Medical Oncology) combining PD1 Inhibitor (Pembrolizumab) with molecularly targeted agents JAK 1 Inhibitor or PI3K inhibitor in efforts to augment immune micro-environment synergy.
- *Translational Molecular studies* with circulating tumor cells and free DNA/RNA procurement led by Dr. David Hoon, Molecular Oncology, working with each program above.

Providence Regional Cancer Partnership, Everett, WA

- *Elios-2 Melanoma Vaccine* phase I/IIa trial of a vaccine in combination with a checkpoint inhibitor for metastatic melanoma in patients with stable or slowly progressing disease. Everett is the only site in Washington State to complete this trial.
- *Breast Cancer NeuVax HER2 +3* phase II trial of combination immunotherapy with Herceptin and the HER2 vaccine E75 in high-risk HER2+ breast cancer patients.

National Leadership Appointments

Thomas Brown, M.D., executive director of Swedish Cancer Institute and co-chair of the Providence Personalized Medicine Program, and Lee Hood, M.D., chief scientific officer, represented our system at the National Cancer Moonshot summit in Washington, D.C., where Vice President Biden urged the group to join together to help prevent, detect and treat cancer.

Walter J. Urba, M.D., Ph.D., director of cancer research, Robert W. Franz Cancer Research Center, Earle A. Chiles Research Institute and co-chair of the Providence Personalized Medicine Program, was invited to hold the only community summit in Oregon tied to Vice President Biden's National Cancer Moonshot Summit, in recognition of Providence Cancer Center's work in immunotherapy

Philip Gold, M.D. at the Swedish Cancer Institute serves as Co-Chair of the SWOG Colon Cancer Committee and as a Member of the National Cancer Institute Colon Task Force.

Delphine Lee, M.D., Ph.D., from John Wayne Cancer Institute, California, was nominated to chair the current National Institutes of Health (NIH) AMS study section (grant review panel) for NIAMS (The National Institute of Arthritis and Musculoskeletal and Skin Diseases).

Bernard A. Fox, Ph.D., is the current Chair of the World Immunotherapy Council (WIC); a member of the Executive Council for the Society of Immunotherapy of Cancer (SITC) and a member of the External Advisory Board of the Vaccine Branch, Center for Cancer Research, NCI, NIH (Providence Cancer Center, Oregon)

Marka Crittenden, M.D., Ph.D., is the current Co-Chair of the Immunotherapy Group, NRG Oncology (Providence Cancer Center, Oregon)

Alison Conlin, M.D., is a member of the Breast Cancer Committee, Alliance, and a member of the Breast Cancer Working Group, SWOG (Providence Cancer Center, Oregon)

A Few Highlighted Publications from Cancer

Publication: New England Journal of Medicine, June 25, 2015

Title: PD-1 Blockade in Tumors with Mismatch-Repair Deficiency

Researcher: TS Crocenzi

Our Location: Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR

Publication: Journal of Clinical Oncology, 2015

Title: Improves Durable Response Rate in Patients with Advanced Melanoma

Researcher: BD Curti

Our Location: Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR

Publication: Epigenomics, 2015

Title: Epigenomic Landscape of Melanoma Progression to Brain Metastasis: Unexplored Therapeutic Alternatives

Researcher: DSB Hoon

Our Location: John Wayne Cancer Institute, Santa Monica, CA

Publication: Cell, 2015

Title: Genomic Classification of Cutaneous Melanoma

Researcher: DSB Hoon

Our Location: John Wayne Cancer Institute, Santa Monica, CA

Publication: Cancer, 2015

Title: What does Medicaid expansion mean for cancer screening and prevention? Results from a randomized trial on the impacts of acquiring Medicaid coverage

Researcher: AK Conlin

Our Location: Earle A. Chiles Research Institute, Providence Cancer Center, Portland, OR

Publication: Oncotarget, 2016

Title: Cross-platform comparison of independent datasets identifies an immune signature associated with improved survival in metastatic melanoma

Researcher: Delphine Lee, M.D., Ph.D.

Our Location: John Wayne Cancer Institute, Santa Monica, CA

Publication: Journal of Gastrointestinal Surgery, 2015

Title: The durability of endoscopic therapy for treatment of Barrett's metaplasia, dysplasia and mucosal cancer after Nissen Fundoplication

Researcher: C Johnson, B Louie, A Wille, C Dunst, S Worrell, S DeMeester, J Reynolds, J Dixon, J Lipham, M Lada, J Peters, T Watson, A Farivar, R Aye

Our Location: Swedish Cancer Institute, Seattle, WA

Publication: Cancer, 2015

Title: Effect of treatment and mammography detection on breast cancer survival over time: 1990 - 2011

Researcher: H Kaplan, M Atwood, G Calip

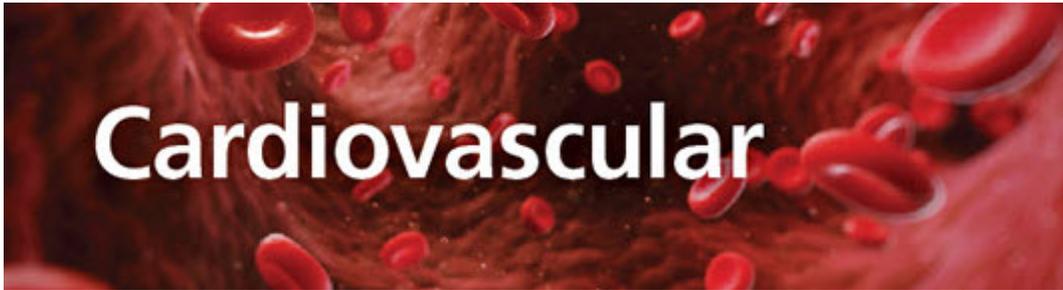
Our Location: Swedish Cancer Institute, Seattle, WA

Publication: British Journal of Haematology, 2015

Title: An anti-CD37 monospecific ADAPTIR therapeutic protein, for relapsed or refractory NHL patients

Researcher: JM Pagel, SE Surgeons, JC Byrd, FT Awan, IW Flinn, MC Lanasa, AJ Eisenfeld, SC Stromatt, AK Gopal

Our Location: Swedish Cancer Institute, Seattle, WA



Heart and Vascular research at Providence helps patients benefit from the latest advances in diagnosis, treatment and cardiac surgery. Through clinical research trials, patients have access to many new therapies before they become widely available. Providence research is bringing innovative and comprehensive cardiovascular care to patients all across the West Coast.

Meet Bill Pike, who is in a clinical trial to study the world's smallest pacemaker

Bill became the first Providence patient to take part in a clinical trial investigating the world's smallest pacemaker when he received the device at Providence St. Vincent Medical Center in Oregon at the end of 2014. The Medtronic Micra Transcatheter Pacing System is one-tenth the size of traditional pacemakers – about the size of a large vitamin – and while the trial continues, Bill is doing great.

“When they first showed this little thing to me, they said we could do this if I was willing,” said Bill. “Who wouldn't be willing?”

The miniature device is placed directly into the heart using a common minimally invasive procedure – a catheter that is inserted into a vein in the patient's leg. Once the Micra is pushed into place, small tines are used to attach it to the heart wall. The Micra then delivers electrical impulses through a tiny electrode on the end of the device, which help the heart beat at a normal rhythm. [Learn more online](#) about this device and Providence's participation as one of 35 centers across the country investigating this innovative way to treat patients needing a single chamber ventricular pacemaker.

Learn how centers in Providence and Swedish are contributing to research on innovative heart and vascular therapies

The Providence Valve Center at Providence St Vincent in Portland, OR is one of the highest volume transcatheter aortic valve replacement centers in the Pacific Northwest. Through our clinical trial program we are able to offer aortic valve replacement without the need for open heart surgery to the broadest set of patient groups, including patients at low risk for traditional surgery. St. Vincent is the only PARTNER clinical trial site for the Edwards SAPIEN 3 valve in Oregon and throughout the Providence system. Nationally we were a top 10 enroller for the PARTNER II SAPIEN 3 intermediate risk trial, with publication in the New England Journal of Medicine.

Active leading valve studies at multiple sites in Providence and Swedish include the PARTNER II SAPIEN 3 intermediate risk registry, the PARTNER III low risk trial, the REPRISE trial for the Boston Scientific Lotus valve, and the CoAPT trial of MitraClip percutaneous mitral valve repair.

In addition, we have over 20 actively enrolling clinical trials in coronary artery disease, structural heart disease, peripheral vascular disease, heart failure, and cardiac electrophysiology. Highlights include the ABSORB bioabsorbable coronary artery stent, the Cardio-MEMS implantable heart failure monitor (a first-of-its-kind monitoring system that Swedish helped to pioneer), leadless implantable pacemakers, and drug coated angioplasty balloons for peripheral vascular disease.

Swedish Heart & Vascular Institute, Seattle, WA was the only center in the Pacific Northwest to enroll in the CHAMPION trial in which a microelectromechanical circuit (a small computer chip) is placed in the lungs to alert physicians if a patient's heart failure is worsening. This trial demonstrated a 37 percent reduction in heart failure admissions. Currently, Swedish is the only center in Washington to offer this device, successfully helping patients manage their heart failure without frequent readmissions.

Swedish was also the only center in Washington to enroll patients in the ground-breaking PARADIGM trial, the first trial in 15 years to introduce a novel medication to reduce death from systolic heart failure. In addition to evaluating new products coming to market, novel applications, we also conduct investigator-initiated work to study novel questions to improve patient care. For example, new approaches like pre-operative physical therapy exercises to reduce risk of pulmonary complications following cardiac surgery, or practical studies to understand how well patients are able to follow anticoagulant medication protocols for the management of atrial fibrillation.

Cardiovascular Highlights

A Few Highlighted Publications from Cardiovascular

Publication: New England Journal of Medicine, April 9, 2015

Title: Effects of red-cell storage duration on patients undergoing cardiac surgery

Researcher: SF Youssef

Our Location: Swedish Medical Center, Seattle, WA

Publication: North American Journal of Medical Science, July 2015

Title: A Rare Combination of Giant Right Coronary Artery Aneurysm

Researcher: CJ McGann

Our Location: Swedish Medical Center, Seattle, WA

Publication: Journal of Interventional Cardiac Electrophysiology, 2016

Title: Changes in left ventricular filling parameters following catheter ablation of atrial fibrillation.

Researcher: Krezowski JT, Wilson BD, McGann CJ, Marrouche NF, Akoum N.

Our Location: Swedish Medical Center, Seattle, WA

Publication: Innovations, Jan-Feb 2015

Title: The role of computed tomography angiography in patients undergoing evaluation for minimally invasive cardiac surgery: an early program experience

Researcher: GR Barnhart

Our Location: Swedish Medical Center, Seattle, WA

Publication: New England Journal of Medicine, May 2016

Title: Transcatheter or Surgical Aortic-Valve Replacement in Intermediate-Risk Patients

Researcher: RW Hodson

Location: Providence Heart & Vascular Institute, Portland, OR

Publication: Circulation, 2015

Title: Overuse of Cardiovascular Services: Evidence, Causes, and Opportunities for Reform

Researcher: X Huang

Our Location: Providence Heart & Vascular Institute, Portland, OR

Publication: Annuals of Thoracic Surgery, March 2015

Title: A primer on using shrinkage to compare in-hospital mortality between centers

Researcher: GL Grunkemeier

Our Location: Providence Heart & Vascular Institute, Portland, OR

Ongoing Cardiovascular Research - Major clinical trials:

- *PARTNER II SAPIEN 3 intermediate risk registry* (Providence Valve Center at Providence St Vincent)
- *PARTNER III low risk trial* (Providence Valve Center at Providence St Vincent)
- *REPRISE III study*. REpositionable Percutaneous Replacement of Stenotic Aortic Valve through Implantation of Lotus™ Valve System – Randomized Clinical Evaluation. The objective is to evaluate the safety and effectiveness of the Lotus™ Valve System for transcatheter aortic valve replacement (TAVR) in symptomatic subjects with calcific, severe native aortic stenosis who are considered at extreme or high risk for surgical valve replacement. (Multiple sites in Providence and Swedish)
- *CoAPT trial of MitraClip percutaneous mitral valve repair*. This is a prospective, randomized, parallel-controlled, multicenter clinical evaluation of the MitraClip device for the treatment of clinically significant functional mitral regurgitation in extreme high surgical risk subjects. Eligible subjects will be randomized in a 1:1 ratio to the MitraClip device or to no MitraClip device. (Multiple sites in Providence and Swedish)
- *Allstar - Allogenic Cardiosphere stem cell study for heart failure*
- *Evolve - Short DAPT - 3 months vs 6 months dual antiplatelet therapy for high risk bleeding patients after PCI*
- *PARAGON HF - LCZ696 for heart failure with preserved ejection fraction*
- *RELAX HF - US Pivotal Use of serelaxin to treat acute heart failure*
- *SALUS - US Pivotal Study of the Direct Flow TAVR system*
- *SHIELD II - US Pivotal - Use of the Heart Mate PHP device for facilitated PCI among high risk patients*
- *DEEP - AF - Early investigational study of dual epicardial and endocardial ablation procedure for Atrial fibrillation*
- *TRANSFORM Study - US pivotal for Edwards Intuity Valve in Aortic Stenosis*
- *CREST 2 NIH study of Carotid vs Medical management for asymptomatic Carotid Stenosis*
- *LIFE - 14 French Ovation Prime abdominal stent graft system for AAA*
- *Cabana - NIH study of catheter based ablation of atrial fibrillation for clinical endpoints*

Other key studies:

- *CHIP Lifestyle Classes Comparison.* Kevin Clay, M.D. Cohort 1: Complete Health Improvement Program (CHIP): Comparison Study of Providence Employees Enrolled in CHIP vs Patients Not Enrolled in CHIP. (Providence Regional Medical Center Everett, WA)
- *Community-based walking exercise enhanced by orthoses to improve walking ability in patients with peripheral artery disease.* Highlights of the program thus far indicates potential benefit of novel walking assistive devices called ankle-foot orthoses to treat patients with peripheral artery disease. (Providence St. Patrick's Hospital, Montana)
- *Rural Options at Discharge Model of Active Planning (ROADMAP).* The International Heart Institute of Montana Foundation and Providence St. Patrick Hospital have partnered with the University of Montana on a Patient Centered Outcomes Research Institute (PCORI) project titled Rural Options at Discharge Model of Active Planning (ROADMAP). Researchers are investigating what patients from rural counties need for recovery following discharge from Providence St. Patrick Hospital. (Providence St. Patrick's Hospital, Montana)
- *Inpatient smoking cessation program.* This program is using inpatient pharmacists to support hospitalized patients who use tobacco to make a quit attempt supported by nicotine replacement therapy and counseling. The project is funded by Pfizer Pharmaceuticals, and is a collaborative project with University of Washington. (St. Luke's Rehabilitation Institute, Spokane, WA)



Providence is committed to improving the health of our community through research, bringing together scientists and physicians to work together and ensure that patients benefit from the latest advancements in prevention, diagnosis and treatment for disorders of the digestive tract, which includes the esophagus, stomach, small intestine, colon and rectum, pancreas, liver, gallbladder and biliary system. Through our commitment to research, Providence partners with patients in their treatment and recovery, providing advanced medical expertise and compassionate care.

Many of our gastrointestinal physicians do both clinical work and research, allowing us to bring the newest treatments to patients, often for the first time anywhere, and are instrumental in the research and development of new surgical technologies and procedures.

Meet Jordan Block, a typical high school kid and athlete, whose potentially serious condition was discovered somewhat by chance

Like a lot of kids his age, Jordan got tired and complained of joint pains, but nothing that couldn't be explained away as normal for an active teen playing sports. His father, Richard, took him to an internal medicine physician for a full blood work-up. He never imagined the doctor telling them that Jordan has hemochromatosis, a disease characterized by excess accumulation of iron in the liver. If left uncontrolled, hemochromatosis can lead to organ failure and chronic diseases, such as cirrhosis, diabetes and heart disease, in later life.

After thoroughly considering the leading experts in liver disease, Jordan's parents, Richard and JoAnn, contacted hepatologist Kris V. Kowdley, M.D., director of the Liver Care Network and Organ Care Research at Swedish Organ Transplant and Liver Center. One of Dr. Kowdley's core research interests is in discovering how iron affects the liver and the relationship of this type of iron overload to liver disease.

Jordan now has periodic blood draws to remove a portion of his blood volume. Reducing the amount of blood triggers his body into using existing iron to make new blood. This process helps deplete the amount of iron that can accumulate in his liver. Over time, however, iron begins to build up again and Jordan must repeat the blood draw. This ongoing treatment eliminates the fatigue, weakness and abdominal and joint pain associated with hemochromatosis. Jordan ended the basketball season by being named to the first team in the Emerald City League 1A. He is now getting ready for college, knowing that on Dr. Kowdley's treatment plan, hemochromatosis won't slow him down.

Richard and JoAnn hope that Jordan's story and their support of liver research and patient education will help other families and will spur research that may find a cure for hemochromatosis and other liver diseases.

The Swedish Organ Care Research program is an integral part of the Organ Transplant Program and Liver Center at Swedish Medical Center and is focused on curing and improving liver disease, and kidney and pancreas transplant health for patients throughout the Pacific Northwest. Our research is patient-focused and embedded into our clinical program with both a basic research laboratory and active clinical trials unit. The liver research program at SMC includes almost 40 Phase 2-3 clinical trials in many liver diseases and we have contributed to several major publications in *Lancet* and the *New England Journal of Medicine* in the areas of hepatitis C, nonalcoholic fatty liver disease and cholestatic liver disease. We are part of the Centers for Disease Control (CDC) hepatitis C Test-and Cure Coalition, which is aimed at screening and treatment of patients with chronic hepatitis C, which affects over 5 million people in the USA. Our basic and translational research is focused on the pathophysiology of nonalcoholic steatohepatitis (NASH), which is now the most common liver disease and contributes to end-stage cirrhosis and liver cancer. We are studying the mechanism by which iron in the liver may lead to worsening of liver disease in NASH using cell-based methods, animal models, patient samples in a large biorepository and longitudinal databases. Our translational research program in bench-to-bedside research in NASH has been continuously funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) since 2002. Finally, we are interested in identifying novel plasma biomarkers such microRNA to predict disease severity and prognosis in liver diseases.

[Digestive Health/Transplant Highlights](#)

A Few Highlighted Publications from Digestive Health/Transplant

Publication: Hepatology, 2015

Title: Treatment with ledipasvir and sofosbuvir improves patient-reported outcomes: Results from the Ion-1, 2 and 3 clinical trials

Researcher: KV Kowdley, M.D.

Our location: Swedish Medical Center, Seattle, WA

Publication: Open Forum Infectious Disease, 2015

Title: Analysis of Subgroup Differences in the ION-3 Trial of Ledipasvir-Sofosbuvir in Chronic Hepatitis C Infection

Researcher: KV Kowdley, M.D.

Our location: Swedish Medical Center, Seattle, WA

Publication: Lancet, 2015

Title: Farnesoid X nuclear receptor ligand obeticholic acid for non-cirrhotic, non-alcoholic steatohepatitis (FLINT): a multicentre, randomised, placebo-controlled trial

Researcher: Neuschwander-Tetri BA, Loomba R, Sanyal AJ, Lavine JE, Van Natta ML, Abdelmalek MF, Chalasani N, Dasarathy S, Diehl AM, Hameed B, Kowdley KV, McCullough A, Terrault N, Clark JM, Tonascia J, Brunt EM, Kleiner DE, Doo E; NASH Clinical Research Network;

Our location: Swedish Medical Center, Seattle, WA

Significant grant activities

- **Transferred 3 grants to Swedish Medical Center.** U01: Research Network in Non-alcoholic Steatohepatitis; R21: Novel prognostic microRNA biomarkers for primary sclerosing cholangitis; R01: The Role of Iron in the Pathogenesis of NAFLD. (Swedish Health System, WA)

In the News

In Jan 2015, the Seattle Times broke the news that Virginia Mason experienced an outbreak of antibiotic-resistant infections in ERCP (Endoscopic retrograde cholangiopancreatography) patients. Thirty-two (32) patients contracted carbapenem-resistant Enterobacteriaceae (CRE), a deadly bacteria, often called a “superbug,” that kills almost half of those infected. Between 2012 and spring 2015, duodenoscopes were linked to at least 25 different instances of antibiotic resistant infections that sickened at least 250 patients worldwide.

Across PHS 21 facilities perform over 4500 ERCP procedures annually. Recent reports of ERCP-related CRE infections raised serious questions regarding the adequacy of existing guidelines for Scope reprocessing and High Level Disinfection (HLD).

To determine the adequacy of current endoscope cleaning and reprocessing practices used across PHS, Clinical Program Services immediately assembled experts in Digestive Health, Infectious Disease, Infection Prevention, and Microbiology to investigate current practices and make system wide recommendations to ensure patient safety.

In March 2016, PHS published the results of this work in Gastrointestinal Endoscopy (GIE). The results of the published PHS study showed that despite cleaning and reprocessing according to 2014 U.S. guidelines and manufacturers’ recommendations, 5% of the cultures showed growth of environmental microbes and 0.6% of the cultures showed growth of enteric bacterial flora that survived the cleaning and HLD process.

These findings resulted in PHS implementing several proactive measures to enhance the margin of safety for our patients and provide patients and caregivers with confidence that Providence is a high reliability organization. These measures included 1) weekly surveillance cultures 2) system wide quality metric 3) double HLD 4) HLD audits and 5) development of a high reliability reprocessing learning module. This work has also led to a prospective study with the CDC and FDA that launched in Feb of 2016.



Chronic Kidney Disease has become an enormous public health problem throughout the world and new knowledge is essential to reduce the impact of this international chronic disease epidemic. The kidneys are the body's "master chemists," which play a vital role in health by precisely balancing the amount and composition of body fluids and eliminating metabolic waste products. Many other organ systems in the body are impacted by the kidney. For example, hypertension, or high blood pressure, has its origins in kidney dysfunction. Chronic kidney disease markedly increases risk of cardiovascular disease and life-threatening cardiovascular events. It also often progresses to end-stage kidney disease requiring dialysis or kidney transplant to sustain life.

Diabetes, the most common cause of kidney disease, is now responsible for half of all cases of end-stage kidney disease in the United States and the rest of the world. Notably, kidney disease is one of most common and serious complications of diabetes. Diabetic kidney disease occurs in approximately 40 % of patients with type 2 diabetes and 30 % of those with type 1 diabetes.

Meet Tom Vasseur, diabetic kidney disease patient

Tom Vasseur, a person with diabetes from Spokane, Washington, was frightened when first told he had diabetic kidney disease. He knew treatment options for diabetes – watching his diet and exercising more – could help control his diabetes. But with diabetic kidney disease, treatment options were limited. The research team at Providence Health Care in Spokane view their efforts as a way to give people hope. For Tom, that meant joining a clinical trial of novel treatment that improved his kidney function. Some of the discoveries being made in the laboratory are transformative, but now they need to be translated into clinical trials, and most importantly made available as new care to patients. Hear Tom and the Providence Health Care research team talk about diabetic kidney disease research (watch video online or search for "Spokane Medical Research | Kidney Disease" on YouTube).

Providence's research in kidney health and diseases is on the cutting edge of identifying molecular signatures of diabetic kidney disease and development of new biomarkers and treatment targets. Our work is broadly translational from cellular and molecular biology to studies in mouse models to translational studies in humans and clinical trials of novel therapies. We also conduct research in a broad spectrum of other types of kidney diseases and treatments: glomerular diseases, hypertension and kidney vascular disease, nutritional approaches, patient-centered outcomes, and health services research. Importantly, Providence has funded a major initiative to establish a system-wide Chronic Kidney Disease registry that will greatly amplify both the quality-of-care we deliver and the research we conduct in our communities. We truly are at a tipping point... Astounding scientific breakthroughs will change the landscape toward kidney health and better life for people with kidney diseases.

Kidney Health Research and Diabetes Highlights

A Few Highlighted Publications from Kidney Health and Diabetes

Publication: Laboratory Investigation, 2015

Title: Serum amyloid A and inflammation in diabetic kidney disease and podocytes

Researcher: Anderberg RJ, Meek RL, Hudkins KL, Cooney SK, Alpers CE, Leboeuf RC, KR Tuttle

Location: Providence Health Care, Spokane, WA

Publication: Diabetes Spectrum, 2015

Title: Novel therapies for diabetic kidney disease: Storied past and forward paths: Storied past and forward paths

Researcher: BP Dieter, RZ Alicic, RL Meek, RJ Anderberg, SK Cooney, KR Tuttle

Location: Providence Health Care, Spokane, WA

Publication: American Journal of Kidney Disease, 2015

Title: Effect of ruboxistaurin on estimated GFR in people with diabetic peripheral neuropathy: Results from a randomized trial

Researcher: KR Tuttle

Location: Providence Health Care, Spokane, WA

Publication: Inflammation and Cell Signaling, 2015

Title: An inflammatory nexus: Serum amyloid A in diabetic kidney disease.

Researcher: RJ Anderberg, BP Dieter BP, RL Meek, KR Tuttle.

Location: Providence Health Care, Spokane, WA

Current Kidney & Diabetes Research

Multiple studies (selected list):

Serum Amyloid A as a New Biomarker of Diabetic Kidney Disease. National Institute of Diabetes, Digestive, and Kidney Diseases/National Institutes of Health. Katherine Tuttle, M.D., Rick Meek, Ph.D., Brad Dieter, Ph.D., Sterling McPherson, Ph.D., (Providence Health Care, Spokane, WA)

Medication Intervention in Transitional Care to Optimize Chronic Kidney Disease Outcomes and Costs. National Institute of Diabetes, Digestive, and Kidney Diseases/National Institutes of Health. Katherine Tuttle, M.D. (Providence Health Care, Spokane, WA)

Assessing the Prevalence and Management of Chronic Kidney Disease in Two Health Systems

Providence Health & Services and University of California, Los Angeles (UCLA)

Katherine Tuttle, M.D., Radica Alicic, M.D., Sterling McPherson, Ph.D., Robert Short, Ph.D. (Providence Health Care, Spokane, WA)

Prevalence Trends in Prescription Opioid Use and Chronic Kidney Disease. Katherine Tuttle, M.D., Radica Alicic, M.D., Sterling McPherson, Ph.D., Robert Short, Ph.D. (Providence Health Care, Spokane, WA)

National Leadership Appointments and Recognition

Katherine R. Tuttle, M.D., FASN, FACP (Providence Health Care)

Multiple appointments and recognitions (selected list):

1. Board of Directors, Kidney Health Initiative, United States Food & Drug Administration and American Society of Nephrology
2. Associate Editor, *Clinical Journal of the American Society of Nephrology*
3. Co-Chair, Scientific Program Committee for World Congress of Nephrology, International Society of Nephrology
4. National Kidney Foundation, Co-Chair Diabetes and Chronic Kidney Disease, Kidney Disease Outcomes Quality Initiative
5. Chair, American Diabetes Association, Consensus Conference on Diabetic Kidney Disease
6. Regional Principal Investigator, Institute of Translational Health Sciences, NIH Clinical and Translational Science Award, University of Washington
7. Robert & Elaine Collins Distinguished Lectureship at University of Colorado School of Medicine



Providence is committed to improving the health of our community through research, bringing together scientists and physicians to work together and ensure that patients benefit from the latest advancements in prevention, diagnosis and treatment for disorders of the musculoskeletal system, which includes back and neck pain, arthritis, tendonitis, electro-diagnostic studies and neuromuscular medicine. Through our commitment to research, Providence partners with patients in their treatment and recovery, providing advanced medical expertise and compassionate care.

Musculoskeletal Highlights

A Few Highlighted Publications from Musculoskeletal

Publication: New England Journal of Medicine, 2015

Title: Secukinumab inhibition of interleukin-17A in patients with psoriatic arthritis

Researcher: PJ Mease, IB McGinnis, B Kirkham

Our Location: Swedish Medical Center, Seattle, WA

Publication: Lancet, 2015

Title: Secukinumab, a human anti-interleukin-17A monoclonal antibody, in patients with psoriatic arthritis (FUTURE 2): a randomised, double-blind, placebo-controlled, phase 3 trial.

Researcher: McGinnis IB, Mease PJ, Kirkham A, et al.

Our Location: Swedish Medical Center, Seattle, WA

Publication: The Journal of Arthroplasty, 2016

Title: Hip Resurfacing Using Highly Cross-linked Polyethylene: Prospective Study Results at 8.5 Years.

Researcher: Pritchett, JW

Our Location: Swedish Medical Center, Seattle, WA

Publication: The Journal of Arthroplasty, 2015

Title: Standardizing care and improving quality under a bundled payment initiative for total joint arthroplasty

Researcher: C Froemke, P Duwelius, L Wang, M DeHart, R Williamson

Our Location: Providence Orthopedic Institute, OR

Publication: The Journal of Arthroplasty, 2015

Title: Impact of Anterior Versus Posterior Approach for Total Hip Arthroplasty on Post-Acute Care Service Utilization

Researcher: Coles L'Hommedieu, MD, Jim Gera, MBA, Gerald Rupp, PhD, Jeffery Salin, DO, John Cox, MD, Paul J. Duwelius, MD

Our Location: Providence Orthopedic Institute, OR

Publication: American Academy of Orthopedic Surgeons, 2015 national conference

Title: Relationship between patient expectations, patient satisfaction, and patient reported outcomes in total knee arthroplasty patients: a prospective multi-center study

Researcher: D Jain, L-C Nguyen, I Bendich, L Nguyen, C Lewis, J Huddleston, P Duwelius, MD, B Feeley, K Bozic

Our Location: Providence Orthopedic Institute, OR

Ongoing Musculoskeletal Research

- Developing new drugs to treat psoriatic arthritis and ankylosing spondylitis, as well as psoriasis, by inhibiting key cytokines in the TH17 cell pathway such as interleukin-17.
 - *Inhibition of interleukin-17, interleukin-23 and the TH17 cell pathway in the treatment of psoriatic arthritis and psoriasis.* PJ Mease, M.D. (Swedish Health System)
 - *A Randomized, Double-Blind, Active- and Placebo-Controlled Phase 3 Study of Efficacy and Safety of Ixekizumab, Adalimumab, and Placebo Therapy in Patients Naïve to Biologic Disease Modifying Anti-Rheumatic Drugs with Active Psoriatic Arthritis.* PJ Mease, M.D., D van der Heijde, CT Ritchlin. (Swedish Health System)
 - *Biologic Therapy for Psoriatic Arthritis.* PJ Mease, M.D. (Swedish Health System)

- Disease registry research
 - *Clinical characteristics and disease outcomes in psoriatic arthritis patients by extent of body surface area affected by psoriasis: results from Corrona registry.* PJ Mease, M.D. (Swedish Health System)
 - *Frequency of axial spondyloarthritis diagnosis among patients seen by United States rheumatologists for evaluation of chronic back pain.* PJ Mease, M.D. (Swedish Health System)
 - *Changes in Treatment Patterns in Psoriatic Arthritis Patients Newly Initiated on Biologic and Non-Biologic Therapy Enrolled in a North American Clinical Registry.* PJ Mease, M.D. (Swedish Health System)
 - *All-Cause Mortality and Malignancies in Psoriasis Patients with Psoriatic Arthritis in the Psoriasis Longitudinal Assessment and Registry Study.* PJ Mease, M.D. (Swedish Health System)
 - American Joint Replacement Registry provides our surgeons, administrators, and research experts with comprehensive orthopedic information to improve patient outcomes and help patients make the best choices about their total joint procedures, devices and rehabilitation.

- Providence Joint Replacement Registry – the first systemwide registry on a common, unified technology platform – facilitates the collection and analysis of data on more than 20,000 hip and knee replacements done across Providence and Swedish each year. It is significant step in advancing data-driven improvement in the quality and value of the care we provide in large joint replacement. The registry provides a platform to ensure quality patient outcomes, to reduce cost, and to support collaboration between the entire multidisciplinary team caring for our patients.
- International Consortium for Health Outcomes Measurement (CHOM) – Hip and Knee Osteoarthritis Outcomes Study
 - Providence Health & Services is one of the first national partners participating in the Global Outcomes Benchmarking (GLOBE) Program, a global multi-site, prospective, non-interventional pilot benchmarking study providing risk-adjusted international benchmarks on hip and knee osteoarthritis outcomes.



Providence researchers at our neurosciences centers of excellence help patients get advanced medical expertise coupled with compassionate care. Researchers evaluate treatments of the future with clinical trials and research in multiple sclerosis, stroke, Alzheimer's disease, ALS, spine disorders and intracranial hemorrhage. Through clinical trials, patients have access to new drugs and procedures that may improve their care and quality of life.

Learn how research at the Providence Autism Center is helping parents improve the quality of life for all affected by autism

Through collaboration between Providence Regional Medical Center Everett and the University of Maryland Baltimore, Dr. Sarah Dababnah, Assistant Professor in the UM School of Social Work, and Dr. Erin Olson, Providence Autism Center Psychologist and Parent Training Coordinator, secured a grant to study the effectiveness of the Incredible Years Autism Spectrum and Language Delays Parenting Program (IY-ASD). This multi-site pilot study focuses on parents' response to and the outcomes of the new IY-ASD program, which emphasizes building positive parent-child relationships and has been modified from the original programs to incorporate video examples of parents with their children with ASD and address the core deficits of ASD.

Preliminary results indicate an overall trend of positive change. Pre- and post-testing revealed decreased parent stress. Additionally, the parents reported improved coping strategies, with some increases reaching statistical significance even in the small sample enrolled. Parents also reported decreased maladaptive behaviors in their children. Program satisfaction surveys revealed that parents would recommend the program to other parents and found the approach and materials useful. They reported that the main benefits of the program were increased communication with their children, improved self-regulation, and increased understanding of Autism Spectrum Disorders. Our "take-home message" from parents is that we are providing a service they need, value, and find effective.

Learn how groundbreaking research at the Ivy Center is developing new treatments for brain cancer patients

The Ben and Catherine Ivy Center for Advanced Brain Tumor Treatment (Ivy Center) is dedicated exclusively to the treatment of brain tumors. In addition to world-class medical care and clinical trials, the Ivy Center has an established research laboratory focused on identifying new therapies for brain cancer patients. Current research efforts include studying the role of cytomegalovirus (CMV) in promoting tumor progression, developing prognostic blood tests, high-throughput drug screening and immunotherapy, all of which are aimed at developing personalized treatments for brain cancer patients.

Learn how research at the Providence Multiple Sclerosis Center and Swedish Multiple Sclerosis Center is helping support patients and bring forward new therapies

The Multiple Sclerosis Registry was developed through collaboration between the Providence MS Center in Oregon and the National Multiple Sclerosis Society-Oregon Chapter in 2007. To date, nearly 4,800 people have registered and over 4,000 are still actively participating. Surveys collect a wealth of patient-reported data about the participant's access to care, disease progression, use of medication, comorbid conditions and quality of life. Complementing this patient-centered approach, MS specialists at Swedish and Portland are pioneering the use of electronic medical record-based MS Notewriter to create a real-time database of MS patient care. Providence and Swedish MS centers are also participating in a large-scale collaborative effort by the North American Registry for Care and Research in Multiple Sclerosis to link centers across the U.S. and Canada and to establish a national registry database of clinical and patient-based information. The MS Center at the Swedish Neuroscience Institute is a state-of-the-art facility with one of the most comprehensive MS treatment programs in the nation, providing over 3,000 patients with early access to emerging medications to treat MS and an array of services to help MS patients with the physical, emotional and social needs that arise from this complicated disease. There are 33 research studies ongoing at the Multiple Sclerosis Center at Swedish and 28 research studies active at the Multiple Sclerosis Center in Portland.

Neurosciences Highlights

Significant Neuroscience Grant Awards

- **\$1.6 million grant from the U.S. Food and Drug Administration** to investigate specific cellular biomarkers, such as prostate-specific membrane antigen, to better identify patients that will receive the most therapeutic benefit. Santosh Kesari, M.D. Ph.D., in collaboration with GenSpera. (John Wayne Cancer Institute, California)
- **\$1 million grant from Catherine Ivy Foundation** for Personalized Cancer Stem Cell RNA-Pulsed Dendritic Cell Immunotherapy for Glioblastoma. Charles Cobbs, M.D. (Swedish Health System).
- **\$1 million award from Health Resources and Services Administration (Telehealth Network Grant)** to demonstrate how telehealth programs and networks can improve access to quality health care services in underserved rural and urban communities. (Oregon and Spokane regions).
- **More than \$1 million dollars in philanthropic pledges** to study human Relaxin 2 as a potential therapeutic agent for Multiple Sclerosis (Providence Brain and Spine Institute, Oregon).

Ongoing Research

- *Get with the Guidelines Stroke Registry.* Providence has one of the largest health system registries in the country with more than 60,000 stroke cases from all five states. The registry is used for research and clinical care improvement and has produced 10 publications and presentations in 2015-2016.
- *Stroke and spinal cord injury research.* Development and evaluation of a bilateral upper-extremity robotic device to assist with evaluation and treatment of patients with arm and hand impairment. DL Weeks, Ph.D., GT Carter, M.D. (St. Luke's Rehabilitation Institute, Spokane, WA)

- *Imaging Collaterals in Acute Stroke (iCAS)*. The aim of this study is to determine if special brain imaging, called MRI, can be used to identify which stroke patients are most likely to benefit from attempts to unblock their blood vessel with a special blood clot removal device. Bart Keogh, M.D., Ph.D. and Todd Czartoski, M.D. (Swedish Health System, in collaboration with Stanford University)
- *NeuroNEXT* is a NIH sponsored network of sites for phase II studies and biomarker studies of rare neurology diseases. Swedish Neuroscience Institute is the Pacific NW site for NeuroNEXT, collaborating with all sites in the system. Dr. Bowen is the principal investigator for our site and Dr. Repovic is the co-investigator.
- *The effect of ACTH on measures of fatigue in patients with relapsing multiple sclerosis*. S Cohan, M.D., Ph.D. (Providence Brain and Spine Institute, OR)
- *The Providence MS Center DMF (Dimethyl fumarate) Registry* was established to follow patients who started DMF for the purpose of long-term monitoring of tolerability, efficacy and risk with over 430 patients enrolled. K Smoot, M.D. (Providence Brain and Spine Institute, OR)
- *CIRCLES study of Neuromyelitis Optica (NMO)* is the largest international collaborative effort to understand this rare disease through a longitudinal clinical and biospecimen data collection. Dr. Pavle Repovic (Swedish) is the principal investigator for the northwestern US.
- *The Role of Cidofovir and Structural Analogs as Adjuvant Therapy for Glioblastoma* led by Charles Cobbs, M.D., supported by an National Cancer Institute RO1 grant (Ivy Center for Advanced Brain Tumor Treatment, Swedish Neuroscience Institute, WA).
- *Do transfusions in major spine surgery increase the surgical site infection risk?* Shiv Jeyamohan, M.D., JR Chapman, M.D., D Handscom, M.D., Rod Oskouian, M.D. (Swedish Health System)
- *An assessment of outcomes of surgical treatment of isthmic spondylolistheses*. R Oskouian, M.D., Peter Nora, M.D., D Hanscom, M.D., JR Chapman, M.D. (Swedish Health System)
- *The effect of Riluzole on outcomes of acute spinal cord injury*. Rod Oskouian, M.D., Peter Nora, M.D., David Newell, M.D., Johnny Delashaw, M.D., D Handscom, M.D., JR Chapman, M.D. (Swedish Health System)
- *Spinal cord injury research*. This study is evaluating a structured, evidence-based group treatment for spinal cord injury called Multi-family Group intervention for improving psychosocial outcomes in patients with spinal cord injury and their caregivers. The project is funded by the Craig H. Neilsen Foundation, and is a collaborative project with Washington State University. DL Weeks, Ph.D. (St. Luke's Rehabilitation Institute, Spokane, WA)
- *CASCADE Study* of an investigational product made from a certain type of adult stem cell to treat people with chronic low back pain associated with degenerative changes of a disc. Hyun Bae, M.D. (Providence Saint John's Health Center, Santa Monica, CA)
- *The Epilepsy Patient Registry* was established to assess the quality and efficiency of care provided by the Epilepsy Center and impact of establishing a first seizure clinic. E Fertig, M.D. (Providence Brain and Spine Institute, OR)

National Leadership Appointments and Recognition

Santosh Kesari, M.D. Ph.D. (John Wayne Cancer Institute, California) received two recognitions in 2015.

- Selected as one of *Newsweek's* Top Cancer Doctors of 2015 by Castle Connolly.
- Received the inaugural GBM Hero Award at the 20th Annual Society for Neuro-Oncology (SNO) Annual Scientific Meeting in San Antonio, TX.

Stan Cohan, M.D., Ph.D. (Multiple Sclerosis Center, Providence Brain and Spine Institute, Oregon) was appointed to the editorial board of the Journal of Neurology, Neurosurgery and Spine.

James, Bowen, M.D. (Multiple Sclerosis Center, Swedish Neuroscience Institute, EA). Dr. Bowen's work on High-dose immunosuppressive therapy and autologous hematopoietic cell transplantation for relapsing-remitting multiple sclerosis (HALT-MS) was recognized by the NIH National Institute of Allergy and Infectious Diseases as one of their most notable scientific advances in 2015. [To learn more - click on Scientific Advances #15.](#)

A Few Highlighted Publications from Neurosciences

Publication: Telemed Telecare, 2015

Title: The cost-effectiveness of telestroke in the Pacific Northwest region of the USA

Researcher: R Okon, A Lesko, J Marjersik, A Bhatt, E Baraban

Our Location: Providence Brain and Spine Institute, OR

Publication: National Institute of Allergy and Infectious Diseases

Title: High-dose immunosuppressive therapy and autologous hematopoietic cell transplantation for relapsing-remitting multiple sclerosis (HALT-MS): a 3-year interim report.

Researcher: Nash RA, Hutton GJ, Racke MK, Popat U, Devine SM, Griffith LM, Muraro PA, Openshaw H, Sayre PH, Stüve O, Arnold DL, Szychala ME, McConville KC, Harris KM, Phippard D, Georges GE, Wundes A, Kraft GH, Bowen JD.

Our Location: Multiple Sclerosis Center, Swedish Neuroscience Institute, WA

Publication: Multiple Sclerosis and Related Disorders, 2015

Title: Mortality and comorbidities in patients with multiple sclerosis compared with a population without multiple sclerosis: An observational study using the US department of defense administrative claims database

Researcher: G Capkun, F Kahlke, R Lahoz, HH Tilson, G Bischof, A Moore, J Simeone, K Fraeman, F Bancken, Y Geissbühler, M Wagner, S Cohan

Our Location: Providence Brain and Spine Institute, Portland, OR

Publication: Stem Cells, 2016

Title: TGFβ-Responsive HMOX1 Expression Is Associated with Stemness and Invasion in Glioblastoma Multiforme.

Researcher: Ghosh D, Ulasov IV, Chen L, Harkins LE, Wallenborg K, Hothi P, Rostad S, Hood L, Cobbs CS

Our Location: Ivy Center for Advanced Brain Tumor Treatment, Swedish Neuroscience Institute, WA

Publication: Cancer Research, 2015

Title: Cytomegalovirus Immediate-Early Proteins Promote Stemness Properties in Glioblastoma.

Researcher: Soroceanu L, Matlaf L, Khan S, Akhavan A, Singer E, Bezrookove V, Decker S, Ghanny S, Hadaczek P, Bengtsson H, Ohlfest J, Luciani-Torres MG, Harkins L, Perry A, Guo H, Soteropoulos P, Cobbs CS

Our Location: Ivy Center for Advanced Brain Tumor Treatment, Swedish Neuroscience Institute, WA

Publication: Oncotarget, 2015

Title: Identification of SLC17A7 as a bivalent tumor suppressor gene.

Researcher: Lin B, Lee H, Yoon JG, Madan A, Wayner E, Tønning S, Hothi P, Schroeder B, Ulasov I, Foltz G, Hood L, Cobbs C.

Our Location: Ivy Center for Advanced Brain Tumor Treatment, Swedish Neuroscience Institute, WA

Publication: Oncotarget, 2015

Title: Multiple spatially related pharmacophores define small molecule inhibitors of OLIG2 in glioblastoma.

Researcher: Tsigelny IF, Mukthavaram R, Kouznetsova VL, Chao Y, Babic I, Nurmemmedov E, Pastorino S, Jiang P, Calligaris D, Agar N, Scadeng M, Pingle SC, Wrasidlo W, Makale MT, Kesari S.

Our Location: John Wayne Cancer Institute at Providence Saint John's Health Center, Santa Monica, CA

Publication: American Journal of Physical Medicine and Rehabilitation, 2015

Title: A pilot randomized trial comparing inter-session scheduling of biofeedback results to individuals with chronic pain: Influence on psychological function and pain intensity

Researcher: DL Weeks

Our Location: St. Luke's Rehabilitation Institute, Spokane, WA

Publication: Undersea and Hyperbaric Medicine Journal, 2015

Title: Spontaneous cerebral gas embolism and pulmonary arteriovenous malformation

Researcher: N Harlan, L Yanase

Our Location: Providence Brain and Spine Institute, OR

Publication: IEEE Access, 2015

Title: Predicting functional independence measure scores during rehabilitation with wearable inertial sensors

Researcher: DL Weeks

Our Location: St. Luke's Rehabilitation Institute, Spokane, WA



To meet the health needs of women and children throughout their lifetime, Providence Health & Services is active in research for Women and Children's health. The research is done by physicians and scientists currently engaged in building the infrastructure and resources to support a comprehensive program of research in health care issues that most affect women and children. New treatments must prove to be safe and effective in scientific studies before they can be made widely available to patients. By performing clinical trials, we learn which treatments are more effective than others. These trials help find new and better treatments for our patients.

Learn how research at the Swedish Center for Perinatal Studies is contributing to international standards in fetal and newborn care

Researchers at the Swedish Center for Perinatal Studies completed data collection for the Neonatal Cross Section Study (NCSS) project of the INTERGROWTH-21st Project, an international collaboration with University of Oxford, UK funded by the Gates Foundation. The study was designed to use pooled data from eight regions of the world to develop new more accurate international fetal growth standards for clinical use and new international standards for newborn growth for use in population-based assessment worldwide. Swedish Medical Center was one of only two North American sites for this international collaboration. Site-specific data was returned to our researchers, which has allowed important site-specific secondary analysis, supported by the Swedish Foundation.

Learn how research at the Neonatal Intensive Care Unit at Providence St. Vincent is paving the way for care advancements for our youngest patients

The Neonatal Intensive Care Unit (NICU) and high-risk obstetric services at Providence St. Vincent Medical Center have been innovators within several high impact challenges: a) development of nationally recognized periviability counseling guidelines to facilitate the care of extremely premature births, b) a randomized controlled trial examining the first aerosolized surfactant, c) creation of the first user friendly web-based composite morbidity score and resource utilization tool available to all NICUs worldwide, and d) principal investigators in a major randomized controlled trial studying management of the congenital heart defect PDA. We have been a long time participant in a unique clinical quality improvement collaborative based within the Vermont Oxford Network in which 10 high performing NICUs meet regularly to develop, refine, and share potentially better practices. It is our vision to leverage this incredible source of knowledge and experience within these high performing NICUs to

share with (and learn from) all our Providence NICUs. Providence can be a model for true innovation, proficient clinical quality improvement, value improvement, and real progress toward the Triple Aim goals with excellence and compassion.

Women's & Children's Highlights

A Few Highlighted Publications from Women's & Children's

Publication: JAMA Pediatrics, Published online March 16, 2015

Title: A Risk-Adjusted, Composite Outcomes Score and Resource Utilization Metrics for Very Low-Birth-Weight Infants

Researcher: JW Kaempf

Our Location: Providence St. Vincent Medical Center, Portland, OR

Publication: Journal of Perinatology

Title: Extremely premature birth and the choice of neonatal intensive care versus palliative comfort care: an 18-year single-center experience

Researcher: JW Kaempf

Our Location: Providence St. Vincent Medical Center, Portland, OR

Publication: American Journal of Obstetric Gynecology

Title: A prospective investigation of fluorescence imaging to detect sentinel lymph nodes at robotic-assisted endometrial cancer staging

Researcher: PJ Paley, DS Veljovich

Our Location: Swedish Medical Center, Seattle, WA

Ongoing Women's & Children's Research

Swedish Medical Center, Seattle, WA

- *Intergrowth 21st Century Consortium – SMC Site Data Analysis Project.* Involved anthropometric measurement of over 4,000 babies born at First Hill Campus over a period of 12 months. (Swedish Medical Center)
- *Progenity Study.* A prospective clinical study to evaluate a novel, non-invasive prenatal screening method for characterizing fetal whole chromosome aberrations and other major defects and deletions found in the maternal blood. (Swedish Medical Center)
- *Optimal Management of Vasa Previa: Screening, Diagnosis and Management-retrospective Study.* A study to describe techniques utilized to screen for and diagnose vasa previa. (Swedish Medical Center)
- *CAPE: A Long-Term Non-Interventional Registry to Assess Safety and Effectiveness of Humira® (Adalimumab) in Pediatric Patients with Moderately to Severely Active Crohn's Disease.* Uma Pisharody, M.D., and Allison Everett. (Swedish Medical Center)
- *Neonatal flexible bronchoscopy for children with Tracheoesophageal Fistula: a safe option.* Rob Weinsheimer, M.D. This is a review of TEF patients evaluated at the time of surgery with flexible

bronchoscopy via an LMA to propose this as a reasonable alternative to rigid bronchoscopy.
(Swedish Medical Center)

Providence St. Vincent Medical Center, Portland, OR

- *The benefit and value metric composite score: the search for NICU proficiency and effective and continuous quality improvement.* Joe Kaempf, M.D., (Oregon)
- *Multinational, multi-center, masked, randomized, controlled study to assess the safety and efficacy of lucinactant for inhalation in preterm neonates 26 to 32 weeks gestational age with respiratory distress syndrome,* sponsored by Discovery Lab. Joe Kaempf, M.D. (Oregon)
- *Multi-center, randomized, open-label, controlled trial to assess the safety and tolerability of lucinactant for inhalation in preterm neonates 26 to 28 weeks PMA,* sponsored by Discovery Lab. Joe Kaempf, M.D. (Oregon)

Providence Holy Cross Medical Center, Mission Hills, CA

- *The Effects of a Laborist Program on Primary and Repeat Cesarean Sections Rates and Maternity Outcomes.* Sherri Mendelson, PH.D. and Farid Yahapour, M.D. (California)

Providence Health Care, Spokane, WA

- *Treatment of Children with All Stages of Hepatoblastoma with Temsirolimus Added to High Risk Stratum Treatment: A Groupwide Phase III Study* (Washington)
- *A Randomized Phase 3 Study of Vincristine, Dactinomycin, Cyclophosphamide (VAC) Alternating with Vincristine and Irinotecan (VI) Versus VAC/VI Plus Temsirolimus in Patients with Intermediate Risk (IR) Rhabdomyosarcoma (RMS)*
- *The DIVERSITY study:* Open-label, randomized, parallel-group, active-controlled, multi-centre, non-inferiority study of dabigatran etexilate versus standard of care for venous thromboembolism treatment in children from birth to less than 18 years of age

Providence Alaska Medical Center, Anchorage, AK

- *Effect of Meaningful Recognition on Compassion Satisfaction and Compassion Fatigue.* Leslie M. Bagley. A mixed-methods study was used to analyze the effect of meaningful recognition on Compassion Satisfaction and Compassion Fatigue in the ICU setting. A quantitative survey was given to ICU nurses in hospitals that currently use the DAISY recognition program. The primary objectives were to examine relationships between meaningful recognition, compassion satisfaction/fatigue and retention and quality outcomes. (Alaska)



Nursing Research

Nursing Research Council

The Providence/Swedish Nursing Research Council (NRC) includes research leaders from across the system. The team meets monthly to advance knowledge, identify resources, share studies and findings.

- The NRC supports the quarterly Providence Nursing Research Symposium, video live-cast to 25 ministries. Each quarter, three investigators present their findings.
- NRC organized clinical nurses' attendance at the Western Institute of Nursing Research Conference. In 2016 Providence had over 20 posters and 6 podium presentations.
- In September, 2016, the NRC hosts its first system wide Nursing Research Conference in Mission Hills, CA. Sixteen podium and poster presentations are given, with keynote speakers and breakout sessions.
- NRC Regional Research Leads are named in each region, and serve as liaisons to and from nursing leaders and clinical nurses in each region.

Research Studies

Several multi-site studies are underway.

- The Clinical Scholarship Framework Study begins August, 2016.
- The Clinical Academy Transition to Practice Study in September, 2016.
- The Patient Engagement with Reduction of Adverse Events Study has collected data for two years and is now being considered for PCORI funding.



Other Research Strengths

CORE Research Program

Located within Providence Health and Services, the Center for Outcomes Research and Education (CORE) is a non-profit health services research laboratory working to improve population health and reduce health disparities through innovative research that drives health care policy. CORE works with clinicians throughout Providence and our affiliates to improve quality, efficiency, and equity in the provision of health coverage and care. CORE conducts research of national significance through strong partnerships with national research organizations and with partner health systems across the country. Established in 1989, CORE is recognized as a national leader in outcomes research.

Significant grant award

- **\$430,000 research grant from the Robert Wood Johnson Foundation** to study the impact of cumulative life experiences on medical outcomes and utilization patterns. Inspired by recent research on the impact of traumatic events on health care outcomes later in life, the study will rely on survey data and claims data. David Labby, M.D., Ph.D., Lauren Broffman, Bill Wright, Ph.D., Keri Vartanian, Ph.D., Sarah Tran, MPH, JB Rinaldi, Natalie Royal, MPH, and Erica Millan-Juarez. (Center for Outcomes Research and Education, Portland, OR)

A Few Highlighted Publications from CORE

Publication: HealthAffairs, published online 2015

Title: Formerly Homeless People Had Lower Overall Health Care Expenditures After Moving Into Supportive Housing

Researchers: Bill Wright, Ph.D., Keri Vartanian, Ph.D., Hsin Fang Li, Ph.D., Natalie Royal, and Jennifer Matson

Our Location: Portland, OR

Publication: Cancer, published online Dec. 9, 2015

Title: What does Medicaid expansion mean for cancer screening and prevention? Results from a randomized trial on the impacts of acquiring Medicaid coverage

Researchers: Bill Wright, Ph.D. and Hsin Fang Li, Ph.D.

Our Location: Portland, OR



Healthcare Intelligence Informatics Research

With data from more than 10 primary source systems in the hands of talented analysts/architects from all across Providence and our affiliates, Healthcare Intelligence serves up the data products, training and governance that supports research.

Key Healthcare Intelligence Presentation and Publication

Presentation: Epic's eXperts Group Meeting, March 2015

Title: Hospital readmission presentation

Our Location: Renton, WA

Hospital readmission presentation at Epic's eXperts Group Meeting in March 2015. Advanced machine learning techniques were used to analyze the impact of clinical and demographic factors from the chart, as well as public geographic data, geo-tagged social media data, and classical and statistical Natural Language Processing techniques applied to notes. The results from the NLP portion alone were nearly as predictive as the benchmark LACE algorithm, and the overall model was a major improvement over LACE, but the geographic and social media data yielded little predictive ability. This project was done by the Data Science team within Healthcare Intelligence.

Publication: Journal of Postgraduate Medicine, 2015

Title: Web-based disease management system impacts on chronic obstructive pulmonary disease (COPD)

Our Location: Renton, WA

Collaborative effort between Providence Medical Group and the Oregon Clinic Pulmonologists resulted in the successful quality improvement project and the peer-reviewed publication in the Journal of



Postgraduate Medicine. In this quasi-experimental study with the embedded concurrent block, randomized design cluster trial we observed that implementation of a web-based disease management system (CareManager™) along with health system-wide COPD performance improvement efforts was associated with fewer COPD exacerbations and increased adherence to guideline recommendations. The study design, data collection consult, and statistical analysis expertise were provided by the analysts and biostatisticians from the Healthcare Intelligence Division.

Medical Data Research Center (Heart & Vascular Institute, Oregon)

The Medical Data Research Center of biostatisticians provides comprehensive bio statistical services for research studies in several systemwide service lines, including cardiac surgery, interventional cardiology, neonatal care, cancer, neurosciences and digestive health.

They are associated with:

- 50 years of cardiac surgery follow-up
- Nationally recognized expertise in valve reporting and follow up
- Internal analyses and presentations for other Providence non-cardiac centers
- External statistical reporting including work for major valve manufacturers and the FDA



Looking to the Future – Providence partners with the Institute for Systems Biology

With the goal of bringing personalized medicine to every patient, Providence Health & Services and the [Institute for Systems Biology](#) (ISB) signed an affiliation agreement in early 2016. The overarching goal of the affiliation is to connect ISB's pioneering research with Providence's clinical expertise to shift health care delivery from a disease focus to a wellness focus.

ISB has been at the forefront of transforming the global understanding of human diseases and pioneered the emerging sector of scientific wellness. ISB's researchers are generating dense, dynamic and personalized clouds of billions of de-identified data points that will provide unique insights into the wellness and disease of each individual over time.

Providence affiliated clinicians and scientists and ISB will collaborate in exciting new translational research initiatives. The initiatives will build on the leading-edge programs already underway at both institutions and will enable the application of innovations in biomedical research for the direct benefit of patients.

Specifically, Providence and ISB are establishing a number of joint research projects in scientific wellness, employing the approach of dense, dynamic personalized data clouds:

- Following and understanding early transitions from wellness to disease
- Analyzing patient populations longitudinally that are at risk for Alzheimer's
- Helping breast cancer patients recover from illness following debilitating therapies
- Utilizing novel approaches to successfully treat glioblastoma, an inevitably fatal type of brain tumor

These approaches will lead to medicine that is vastly improved in quality and significantly less expensive.

As part of the affiliation, Lee Hood, MD, PhD, was appointed senior vice president and chief science officer of Providence Health & Services and is also continuing as president of the Seattle-based ISB.

Contact us

Looking for more information about the research we are doing? Want to find out if you can be part of a clinical trial? We'd love to hear from you! Check out our research and clinical trials website or call us today.

Visit our website or call us at our Patient Engagement Center:

- **1-844-55-CARE4ME (844-552-2734)**
- Hours: Monday-Friday from 8:00 a.m. to 4:30 p.m. PST