The Palmer Center for Chiropractic Research (PCCR) is the largest and most highly funded research effort in the chiropractic academic community. The PCCR encompasses all three Palmer campuses and employs more than 34 professionals including administrators, faculty members, professional and administrative staff and clinical research fellows. The annual budget tops $4 million, with 50 percent coming from external funding sources.

PCCR collaborations – local and national:
Projects are often a collaborative effort between doctors of chiropractic at the PCCR and collaborating investigators who include physicians, chiropractors, and scientists. Over the past five years, the PCCR has collaborated with the following institutions:

- Local and regional entities – Genesis Health System located in the Quad Cities, University of Iowa College of Public Health and Carver College of Medicine located in Iowa City, Iowa
- Specialty hospitals – Crotched Mountain Specialty Hospital
- Universities – University of Iowa, Dartmouth College, Loyola University Stritch School of Medicine, Thomas Jefferson University
- Department of Defense – working with active military at bases in FL, CA, MD, KY
- Veterans Health Administration - Veterans Affairs Medical Center in Iowa City and the VA Connecticut Healthcare System, Hines VA Hospital, VHA in Minneapolis

A message from Christine M. Goertz, D.C., Ph.D.

Vice Chancellor for Research and Health Policy

As we celebrate 20 years, the PCCR has continued to build upon our platform in basic and biomechanical research, expand the reach of our clinical trial capacity, and emphasize the study of chiropractic care delivery. At the heart of these efforts is the desire to study chiropractic as it is practiced in real-world settings, creating evidence-based tools helpful to both clinicians and the patients we serve. This emphasis is reflected in the range of work described in this report – from the Australian Spinal Research Foundation award to study neuronal differentiation by spinal manipulation, to the NCMIC Foundation grant we received to assess chiropractic in an integrated healthcare delivery team, to completing our recruitment goal of 750 patients in one of our Department of Defense studies. As you will see in the list of awards and service for 2015, PCCR faculty and staff are committed to asking questions that are relevant to patient care, and finding answers based on rigorous scientific methods.

A message from Palmer Chancellor Dennis Marchiori, D.C., Ph.D.

Research is a key component of our College Mission, improving and informing both the student learning in our classrooms and the patient care in our clinics. I am incredibly proud of Palmer’s continued commitment to research. A significant portion of our annual budget, people, and other resources are devoted to this essential endeavor. And specifically, on behalf of the full Palmer community, I want to recognize the dedicated work of the faculty, staff, and administrators working in the Palmer Center for Chiropractic Research. Their outstanding work continues to inspire and advance our organization and the entire profession. I hope you enjoy this summary of their work in 2015.
Active Grants

Expanding EBCP and Research across the Palmer College of Chiropractic

Funding Source: NIH/NCCIH  Grant Number: 2-R25-AT003580
Award Amount: $1,600,000  Funding Period: 9/2007–8/2016
Principal Investigator: Cynthia Long, Ph.D.
Collaborators: Kevin Lyons, Ph.D.; Mark Wilson, M.D., M.P.H.; Kristi Ferguson, Ph.D.
Program Manager: Katie Hoyt, M.O.L.

In collaboration with the University of Iowa and Thomas Jefferson University, this grant supports an on-going faculty development program toward enhancing the integration of evidence-based clinical practice (EBCP) and research content into the Doctor of Chiropractic curriculum at all three Palmer campuses.

Assessment of Chiropractic Treatment for Low Back Pain, Military Readiness, and Smoking Cessation in Military Active Duty Personnel (ACT I, II, III)

Funding Source: Department of Defense  Grant Number: W81XWH-10-DHP-CCTA
Award Amount: $7,500,000  (Funding Period: 2/2011–8/2016
($5,100,000 to Palmer)
Principal Investigator: Ian D. Coulter, Ph.D., RAND Corporation
Co-principal Investigators: Christine Goertz, D.C., Ph.D., Joan Walter, J.D., P.A., Samueli Institute
Co-investigators: Cynthia Long, Ph.D.; James DeVocht, D.C., Ph.D.; Ram Gudavalli, Ph.D.; Ting Xia, Ph.D.; Robert Vining, D.C.
Lead Project Managers: Julie Hartman, D.C., M.S.; Amy Minkalis, D.C., M.S.

ACT comprises 3 separate randomized controlled trials, a collaborative effort between Palmer and the Department of Defense. The overarching goal is to assess the effectiveness of chiropractic manipulative therapy for pain management and improved function in active duty service members with low back pain. This study looks at the role of chiropractic care within the military health care system and has applications for a diverse population in a real-world setting.

The total targeted enrollment for all 3 studies is 980 participants, with ACT I starting in the spring of 2013 (enrollment completed December 2015) and ACT II starting in the summer of 2014. A pilot study testing ACT III protocols was completed at the Palmer Research Clinic with community participants; research staff are preparing to launch the ACT III study with active military in early 2016.

ACT I: Assessment of Chiropractic Treatment for Low Back Pain and Smoking Cessation in Military Active Duty Personnel*

Sites: Walter Reed National Military Medical Center, Bethesda, MD
      Naval Medical Center San Diego, San Diego, CA
      Naval Hospital Pensacola, Pensacola, FL

ACT II: Assessment of Chiropractic Treatment Using Reaction and Response Times in Members of the Special Operation Forces

Site: Blanchfield Army Community Hospital, Chiropractic Clinic, Ft. Campbell, KY
Principal Investigator: Thomas Jones, D.C.
Project Manager: Darla Freehardt, B.S., L.P.N., C.C.R.P.

* See Research Spotlight on page 4.
ACTIVE GRANTS, continued

ACT III: ASSESSMENT OF CHIROPRACTIC TREATMENT: STRENGTH AND BALANCE

SITE: Naval Hospital Pensacola, Pensacola, FL
PRINCIPAL INVESTIGATOR: Cmdr. Joseph Penta, M.D.
PROJECT MANAGER: Crystal Franklin, M.P.H.

EPIGENETIC REGULATION OF NEURONAL DIFFERENTIATION BY HVLA AND LVVA FORCES

FUNDING SOURCE: Australian Spinal Research Foundation
AWARD AMOUNT: $40,000  FUNDING PERIOD: 2/1/2015–1/31/2016
PRINCIPAL INVESTIGATOR: Liang Zhang, M.D., Ph.D.

This project examines the cell’s response to variations in mechanical force.

KIERNAN CHIROPRACTIC CARE PROGRAM, A PILOT INITIATIVE OF THE PATIENT-CENTERED INTEGRATED HEALTH PROGRAM

FUNDING SOURCE: Dr. William & Mrs. Mary Kiernan, Kiernan Family Trust
AWARD AMOUNT: $2,000,000 ($1,000,000 to Palmer)  FUNDING PERIOD: 1/1/2015–12/31/2018
CO-PRINCIPAL INVESTIGATORS: Robert Vining, D.C. & W. Carl Cooley, M.D.
CO-INVESTIGATOR: Christine Goertz, D.C., Ph.D.

This project adds chiropractic care to multi-disciplinary care teams at Crotched Mountain Specialty Hospital in Greenfield, NH to study how the addition of chiropractic impacts outcomes for those with brain and spinal cord injury, and other acquired/developmental disabilities.

PROCESS OF INTEGRATING EVIDENCE (PIE) FOR CAM EDUCATORS: 2015 CONFERENCE

FUNDING SOURCE: NIH/NCCIH
AWARD AMOUNT: $29,100  FUNDING PERIOD: 2/1/2015–1/31/2016
PRINCIPAL INVESTIGATOR: Cynthia Long, Ph.D.

This award supported a 3-day conference at Palmer College of Chiropractic designed to provide CAM educators training in the principles, practice and teaching of evidence-based clinical practice.

CENTRAL NEUROIMMUNE MECHANISMS UNDERLYING NERVE GROWTH FACTOR INDUCED LOW BACK MUSCLE PAIN

FUNDING SOURCE: Saint Louis University Center for Neuroscience 2015 Small Grants Program
CO-PRINCIPAL INVESTIGATORS: William Reed, D.C., Ph.D.; Joshua Little, D.C., Ph.D.

The purpose of this project is to: 1) to determine if the central effects of NGF-induced muscle pain occur through inflammatory processes within the spinal cord, and 2) begin to examine if commonly used non-pharmacological treatments for LBP such as manual therapy can prevent and/or limit the extent of spinal cord neuronal hyperexcitability and inflammation.
Effect of Lumbar Hypo & Hypermobility on Sensory Response to Spinal Manipulation

Funding source: NIH/NCCIH  
Grant number: 5-K01-AT005935  
Award amount: $646,000  
Principal Investigator: William Reed, D.C., Ph.D.  
Mentor: Joel Pickar, D.C., Ph.D.

This study is directed toward understanding the consequences of restricted or excessive spinal joint mobility on neural responses to spinal manipulation for back pain.

Collaborative Care for Veterans with Spine Pain and Mental Health Conditions (COCOV)

Funding source: NIH/NCCIH  
Grant number: 1-R34-AT008427  
Award amount: $718,000  
Funding period: 9/1/2014 – 6/30/2017  
Principal Investigator: Christine Goertz, D.C., Ph.D.  

This project is a collaboration between the PCCR, Veterans Health Administration (VHA) at the VA Connecticut Healthcare System, the VHA in Minneapolis, MN, the U of Iowa, and the Iowa City VA Health Care System.

Chiropractic Integration into Multidisciplinary Healthcare Systems

Funding source: NCMIC Group  
Award amount: $100,000  
Funding period: 10/1/2014 – 12/31/2015  
Principal Investigator: Christine Goertz, D.C., Ph.D.  
Co-investigators: Anthony Lisi, D.C.; Stacie Salsbury, Ph.D., R.N.  
Project Manager: Elissa Twist, D.C., M.S., C.C.R.P.

This project is a Private Sector Integrated Chiropractic Study with the goal to describe and assess the delivery of chiropractic services in a group of private healthcare facilities using a qualitative case study approach.

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Palmer Center for Chiropractic Research Budget

<table>
<thead>
<tr>
<th>Budget Category</th>
<th>Amount</th>
</tr>
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<tr>
<td>Contributions/Non-federal grants</td>
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<td>Federal grants</td>
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<td>Palmer internal support</td>
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<tr>
<td>Total PCCR Budget FY 2014–15</td>
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Research Spotlight

ACT I: ASSESSMENT OF CHIROPRACTIC TREATMENT FOR LOW BACK PAIN AND SMOKING CESSATION IN MILITARY ACTIVE DUTY PERSONNEL

Low back pain (LBP) is highly prevalent and one of the most common causes of disability in U.S. armed forces personnel. Currently, no single therapeutic method has demonstrated itself as a gold standard treatment for this increasingly prevalent condition. Chiropractic care, delivered within a multidisciplinary framework in military healthcare settings, has the potential to help improve clinical outcomes for military personnel with LBP. The PCCR is collaborating with RAND and the Samueli Institute to conduct three chiropractic studies within the department of defense. One of these studies, Assessment of Chiropractic Treatment or ACT 1, is the largest study of chiropractic that has ever been conducted, involving 750 patients at three sites. These military personnel were provided active treatment and followed for 12 months.

**Purpose/Specific Aims:** To assess the effectiveness of chiropractic manipulative therapy (CMT) for pain management and improved function in active duty service members with orthopedic injuries or disorders of the low back that do not require surgery.

**Participants:** At the end of 2015, recruitment of 750 active duty military personnel was successfully completed with 250 participants each in Bethesda, Pensacola, and San Diego.

**Results/Implications:** Data are being analyzed and the findings will be shared in peer-reviewed scientific journals and at scientific meetings. This study has the potential to guide future studies and to inform military practice, particularly insofar as how chiropractic care is incorporated into the military health care delivery system.

Celebrate 20 years of chiropractic research at Palmer by joining other supporters of chiropractic who are willing to donate $20 or more each year toward key research efforts at the PCCR. Your generosity will:

› Help the PCCR to initiate pilot studies in new areas of research that could lead to federal funding opportunities, such as studies on chiropractic for headaches in adolescents.

› Help the PCCR to conduct research on how to improve access to chiropractic care within patient centered medical homes and accountable care organizations.

› Help the PCCR provide training grants to help chiropractic students and professionals to become skilled chiropractic researchers.

› Support PCCR researchers in developing studies focused on chiropractic co-management for conditions for which antibiotics are no longer considered the first line of defense, such as chiropractic/pediatric co-management of otitis media in children, or chiropractic/primary care co-management of chronic bronchitis.

We can be part of a small effort that will have a big impact. We can use research to help children with headaches or middle ear infections. We can improve access to chiropractic care nationwide. We can help train the chiropractic researchers of the future.
Research faculty and professional staff

**Administrators**

**Christine M. Goertz, D.C., Ph.D.**
Vice Chancellor for Research and Health Policy

**Education:**
D.C. – Chiropractic, Northwestern Health Sciences University
Ph.D. – Health Services Research, University of Minnesota School of Public Health
Post-doctoral – Public Health Administration and Policy, University of Minnesota School of Public Health (ARQH National Research Service Award)

**Cynthia R. Long, Ph.D.**
Professor, Director of Research, Davenport Campus

**Education:**
M.S. – Statistics, Iowa State University
Pre-doctoral – University of Iowa College of Public Health (NIH National Research Service Award)
Ph.D. – Biostatistics, University of Iowa

**Liang Zhang, M.D., Ph.D.**
Director of Research, Florida Campus

**Education:**
M.D. – Clinical Medicine, Hengyang Medical College (now University of South China)
Ph.D. – Neuroscience, University of Geneva, Switzerland
Post-doctoral – Laboratory of Clinical Sciences, NIMH; Laboratory of Cell and Molecular Biology, National Institutes of Health

**Robert Cooperstein, M.A., D.C.**
Professor, Director of Technique and Research, West Campus

**Education:**
M.A. – Economics, University of California at Berkeley
D.C. – Chiropractic, Life Chiropractic College West
**James W. DeVocht, D.C., Ph.D.**
Associate Professor

**Education:**
- D.C. – Chiropractic, Palmer College of Chiropractic
- M.S. – Mechanical Engineering, Michigan Technological University
- Ph.D. – Biomedical Engineering, University of Iowa
- Post-doctoral – Iowa Spine Research Center, University of Iowa

---

**Maruti Ram Gudavalli, Ph.D.**
Professor, Director of Biomechanics Core
Adjunct Associate Professor, Department of Biomedical Engineering, University of Iowa

**Education:**
- M.Tech. – Mechanical Engineering, Indian Institute of Technology
- M.Eng. – Mechanical Engineering, McMaster University
- Ph.D. – Biomechanics, University of Cincinnati

---

**Stephen M. Onifer, Ph.D.**
Associate Professor

**Education:**
- Ph.D. – Physiology & Biophysics, Indiana University
- Post-doctoral – The Miami Project to Cure Paralysis & Department of Neurological Surgery, University of Miami

---

**Joel G. Pickar, D.C., Ph.D.**
Professor Emeritus

**Education:**
- D.C. – Chiropractic, Palmer College of Chiropractic
- Ph.D. – Physiology, University of California at Davis
- Post-doctoral – Division of Cardiovascular Medicine, School of Medicine at University of California at Davis (NIH National Research Service Award)
Research faculty and professional staff

**Faculty, continued**

**William R. Reed, D.C., Ph.D.**
Associate Professor

**Education:**
D.C. – Chiropractic, Palmer College of Chiropractic
Ph.D. – Anatomy/Neurobiology, University of Louisville

**Post-doctoral** – Department of Anatomical Science and Neurobiology, School of Medicine, University of Louisville

**Stacie Salsbury, Ph.D., R.N.**
Assistant Professor

**Education:**
M.S.N. – Nursing, Gerontology, University of Iowa
Ph.D. – Nursing, Gerontology, University of Iowa

**Post-doctoral** – University of North Carolina, Chapel Hill

**Robert D. Vining, D.C.**
Associate Professor, Research Clinic Director

**Education:**
D.C. – Chiropractic, Logan College of Chiropractic

**Ting Xia, Ph.D.**
Assistant Professor, Adjunct Assistant Professor, Department of Biomedical Engineering, University of Iowa

**Education:**
M.S. – Biomedical Engineering, University of Iowa
Ph.D. – Biomedical Engineering, University of Iowa

**Post-doctoral** – Digital Human Modeling, University of Iowa

**Chair**

**William Weeks, M.D., M.B.A., Ph.D.**
Chair, Clinical and Health Services Research Professor, Geisel School of Medicine at Dartmouth

**Education:**
M.D. – University of Texas, Medical Branch
M.B.A. – Columbia University
Ph.D. – Economics, Aix-Marseille University, France
**Professional Staff**

**Greg Boyer, B.S.**  
Web Programmer

**James Boysen, D.C., M.S.**  
Research Clinician

**Leah Cafer**  
Secretary

**Erin Cesario, B.A., C.C.R.C.**  
Clinical Project Manager

**Lance Corber, M.S.I.T.M.**  
Data Core Manager

**Therese Devlin, R.T.(R.), B.S.**  
Clinical Research Associate

**Danellle DiCarlo, B.S.**  
Animal Technician

**Crystal Franklin, M.P.H.**  
Clinical Project Manager

**Darla Freehardt, B.S., L.P.N., C.C.R.P.**  
Clinical Project Manager

**Wendy Freiberger R.N., C.C.R.C.**  
Clinical Project Manager

**Julie Hartman, D.C., M.S.**  
Clinical Project Manager II

**Ann Hileman, B.Phil.**  
Assistant Director of Research

**Katie Hoyt, M.O.L.**  
Research Program Manager

**Bridget Kane, M.S., C.C.R.C.**  
Clinical Project Manager II

**Qian Li, M.S.**  
Biostatistician

**Amy Minkalis, D.C., M.S.**  
Clinical Project Manager II

**Abigail Roots, B.A., C.C.R.C.**  
Clinical Project Manager

**Virginia Smith, M.S., M.A.T., M.S.**  
Research Program Manager

**Randall Sozio, B.S., L.A.T.G.**  
Animal Care Manager

**Jennifer Toenjes, B.A.**  
Research Participant Coordinator

**Elissa Twist, D.C., M.S., C.C.R.P.**  
Study Coordinator

**Chao Hua Yao, M.D.**  
Cell Biology Laboratory Technician

**Clinical Research Fellows**

**William Alexander, D.C., M.S.**  
**Breanne Bovee, D.C.**  
**Janice Hubbard, D.C., M.S.**  
**Yasmeen Khan, D.C.**  
**Zacariah Shannon, D.C.**
Center Facilities, Cores and Offices

**Biomechanics Core**
- Biomechanical expertise for basic, clinical and translational research projects
- State-of-the-art biomechanics laboratories
- Design and fabricate biomechanics testing equipment

**Clinic Core**
- 2700 square foot dedicated research clinic including a clinical biomechanics laboratory
- Expertise in providing project-specific patient management protocols
- Conducts eligibility determination for all clinical research projects
- Provides clinical interpretation, logistical support, and resource management for clinical research projects

**Laboratory Animal Resource Core**
- Provides animal care services for basic science research
- Licensed and inspected by the USDA and Iowa Department of Agriculture
- Operates with the highest standard of animal care and under the guidance of the Palmer Institutional Animal Care and Use Committee

**Office of Clinical Studies**
- Serves as communication link between project investigators and core resources
- Develops clinical and data protocols
- Communicates with Institutional Review Boards regarding the protection of human participants

**Office of Data Management and Biostatistics**
- Expertise in data coordination, management and analysis
- Serves multiple research projects within and across study sites
- Recognized within chiropractic research and the broader health care arena

The Palmer Center for Chiropractic Research has specialized facilities, cores and offices that provide resources and services for research projects on all three campuses.

- Neurophysiology Laboratory
- Biomechanics Laboratories
- Laboratory of Cell and Molecular Biology
- Technique Assessment Facility
- Dedicated Research Clinic
Awards and Key Professional Service

**Robert Cooperstein**
Member, Providers of Approved Continuing Education, Federation of Chiropractic Licensing Board

**Lance Corber**
2 Harold R. Bechtel Charitable Trust Publication Awards
Palmer Technology Steering Committee

**James DeVocht**
Member, Thelma Fordyce-Mack Achievement Award Committee
Vice President, Faculty Senate

**Christine Goertz**
2015 Person of the Year, Dynamic Chiropractic
Board Member, Quad City Health Initiative
Chair, Technical Expert Panel, #182 Functional Outcome Assessment Performance Measure
Chair, PCORI Science Oversight Committee (SOC)
Vice Chair, Research Council, World Chiropractic Federation
Chair, American Chiropractic Association QCAA
Member, Measures Advisory Committee, Physician Consortium for Performance Improvement Measurement, American Medical Association
Member, Board of Governors, Patient Centered Outcomes Research Institute (PCORI)
Chair, Selection Committee, PCORI
Member, National Center for Complementary and Integrative Health (NCCIH) Council

**Ram Gudavalli**
Nominee, Palmer Outstanding Faculty of the Year
Invited Member, Medical Devices Special Interest Group, Biomedical Engineering Society
Member, Auburn University College of Engineering M.S. and Ph.D. Committees
Member, NIH Musculoskeletal and Rehabilitation Study Section
Track co-organizer and Session Organizer, International Mechanical Engineering Congress and Exposition 2015
Member, World Federation of Chiropractic committee
Member, Palmer Faculty Enrichment Committee
Member, Palmer Technique Technology Task Force Committee
PhD External Examiner, Macquarie University, Australia
PhD External Examiner, Indian Institute of Technology, India

**Julie Hartman**
Member, Delphi Panel, “Update of the Consensus Project on ‘Best Practices’ for Chiropractic Care of Children”
Member, Palmer Institutional Animal Care and Use Committee

**Katie Hoyt**
Recipient, Palmer Outstanding Staff of the Year

**Cynthia Long**
Member (elected), Board of Directors, American Statistical Association (ASA)
Member, Council of Sections Governing Board, ASA
Member, IRB, Genesis Health Systems
Member, Data and Safety Monitoring Body, NIH Funded Study
Chair, NIH/NCCIH Fellowships, Training and Career Development Special Emphasis Panel

**Amy Minkalis**
Member, Council on Chiropractic Guidelines and Practice Parameters (CCGPP)

**Stephen Onifer**
Member, NIH, Acute Neural Injury and Epilepsy Study Section
Member, Thelma Fordyce-Mack Achievement Award Committee
Member, Library Advisory Committee

**William Reed**
Member National Institutes of Health/Musculoskeletal Rehabilitation Sciences Study Section
Member, Palmer Research Honors Committee
Chair, Palmer Professor Emeritus/Emerita Committee
Grant Reviewer, Natural Sciences and Engineering Research Council of Canada
Grant Reviewer, University of Leuven-KU

**Stacie Salsbury**
2 Harold R. Bechtel Charitable Trust Publication Awards
Member, University of Illinois Department of Kinesiology and Community Health Ph.D. Committee
Member, Nursing Research and Evidence-Based Practice Committee, Genesis Health Systems
Member, Palmer Research Honors Committee

**Randy Sozio**
2 Harold R. Bechtel Charitable Trust Publication Awards
Member, Palmer Institutional Animal Care and Use Committee
Member, Palmer Safety Committee
Twenty-seven articles were published by PCCR Faculty and Staff in 16 peer-reviewed journals in 2015.


Onifer SM, Reed WR, Sozio RS, Long CR. Anti-nociceptive Effects of Spinal Manipulative Therapy on Nociceptive Behavior of Adult Rats during the Formalin Test. Evid-Based Compl Alt Med 2015;Article ID: 520454.


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PHONE: (386) 763-2737

20 FOR 20 IN 20 FUNDRAISING CAMPAIGN
FOR CHIROPRACTIC RESEARCH:
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TO VIEW PCCR RECOMMENDED READS
go to www.palmer.edu/research/press-room