

2.3 PROGRAM PLAN

a. PROGRAM ADMINISTRATION

Program Director's Qualifications

Marcos Bamman, PhD, will serve as Program Director (PD). Dr. Bamman joined the UAB faculty in 1996 after conducting space flight and bed rest exercise rehabilitation research at NASA Johnson Space Center in Houston, Texas. As PD ultimately responsible for day-to-day leadership and oversight, he will devote 10% effort to the program (see letter of commitment from Dr. Benveniste, Chair). **Dr. Bamman is strongly committed to this program, and will ensure that adequate time is available for the mentoring and management that the program will require.** He is a tenured Professor in the Department of Cell, Developmental, and Integrative Biology with secondary appointments in the Departments of Medicine (Geriatrics) and Nutrition Sciences. He is Director of the UAB Center for Exercise Medicine and Associate Director of the Center for Aging. He also directs the Core Muscle Research Laboratory and Clinical Exercise Facility in UAB Hospital. In addition, Dr. Bamman holds center appointments in the CCTS, Center for Metabolic Bone Disease, Comprehensive Cardiovascular Center (steering committee), Nutrition Obesity Research Center, Comprehensive Diabetes Center, and Center for Biophysical Sciences and Engineering. **Research Training and Teaching.** Dr. Bamman has maintained a strong commitment to research training and mentoring throughout his 16-year tenure at UAB. He has been a faculty member of the: Graduate School since joining UAB (1996); Steering Committee for the Medical Scientist Training Program (MSTP) (2005-09) with 7 MSTP mentees; Steering Committee for the Cellular and Molecular Physiology Graduate Program (2004-09); and Curriculum Committee Chair for the GBS Pathobiology and Molecular Medicine theme (2009-2011). His laboratory is a popular site for rotating medical and graduate students, having mentored 7 medical students and 15 rotating graduate students. Regarding long-term mentoring, Dr. Bamman has served as primary mentor for 5 masters thesis students, 4 doctoral students, and 5 postdoctoral trainees, and has served on the supervisory committees of 21 doctoral students. He has co-mentored 3 postdoctoral fellows. All of his eligible trainees successfully competed for NIH support (T32, F32, F30, R25, T35). Additionally, he has mentored 19 undergraduates in his laboratory. Dr. Bamman is equally committed to didactic teaching. In 2005, he won the UAB President's Award for Excellence in Teaching, and received the Argus Award for Best Course Director in all four years directing Medical Physiology (2004-07). He also designed and directed the Musculoskeletal and Skin Module for the revamped medical school curriculum (2008-2010). Among several University committee responsibilities, Dr. Bamman served on the School of Medicine Academic Standing Committee, and as Chair of the departmental Academic Promotions and Tenure Committee. **Research.** Dr. Bamman is nationally recognized for his work in resistance training-mediated rehabilitation and muscle adaptation, and the biology of muscle atrophy, having been an invited speaker at 21 universities, 13 national conferences, and 2 international conferences in the past 7 years. His research has been federally funded continuously since 1998. He is a Fellow in the American College of Sports Medicine, the world's premier exercise medicine organization. Dr. Bamman's translational research program takes full advantage of cellular and molecular studies in the Core Muscle Research Laboratory and *in vivo* functional assessments in the Clinical Exercise Facility (please see **Table A** for research aims and collaborations with program faculty). **Professional Service.** Dr. Bamman is currently serving a four-year term on the NIH CSR Skeletal Muscle and Exercise Physiology Study Section. He has served ad hoc on several VA and NIH Study Sections including reviews of P30 and P01 program applications, F32/31/30 applications, and R01/R21/R03/R15 research grant applications. Dr. Bamman regularly reviews manuscripts for numerous peer-reviewed journals and is on the Editorial Board of the *Journal of Applied Physiology*, and Associate Editor of *Frontiers in Striated Muscle Physiology*.

Administrative Structure

The administrative structure is summarized in **Figure 3**. Dr. Bamman will be responsible for the overall scientific and administrative leadership of the program with the assistance and guidance of the Executive Committee. External guidance and critical review of the program will be provided by the Institutional and External Advisory Panels (see **d. Training Program Evaluation**), while continuous monitoring and support will be provided by the UAB Office of Postdoctoral Education, Graduate School, Graduate Biomedical Sciences Program office, and Rehabilitation Science Program office. The PD will be the official spokesperson for the program and serve as representative in matters related to University policy and programs. The PD will be responsible for assuring high standards in the program, including continually evaluating the quality of training experiences, the qualifications of training faculty, and the performance and diversity of trainees. Further, Dr. Bamman will be responsible for monitoring trainees' progress in all aspects of training throughout their experience, and he will assure compliance with all NRSA program policies and requirements. He will have frequent and direct contact with trainees and will be responsible for conveying requirements and expectations.

The PD will also serve as a trainee advocate when personal problems arise and in cases of possible faculty irresponsibility or misconduct. In addition, the PD will regularly communicate with new faculty to review program structure and advise them on special needs of developing trainees. The PD will be ultimately responsible for conducting and overseeing the evaluation plan (**d. Training Program Evaluation**). A member of the Executive Committee will perform these functions on an interim and rotating basis in the absence of the Program Director. All administrative and oversight activities of the PD will be supported by Ms. Stacey Torch, Administrator of the UAB Center for Exercise Medicine, whose office is directly adjacent to the PD's office. This will facilitate regular interactions including a daily briefing. Ms. Torch will be intimately involved in trainee-related activities and will serve as a liaison among the trainees, program faculty, and Executive Committee.

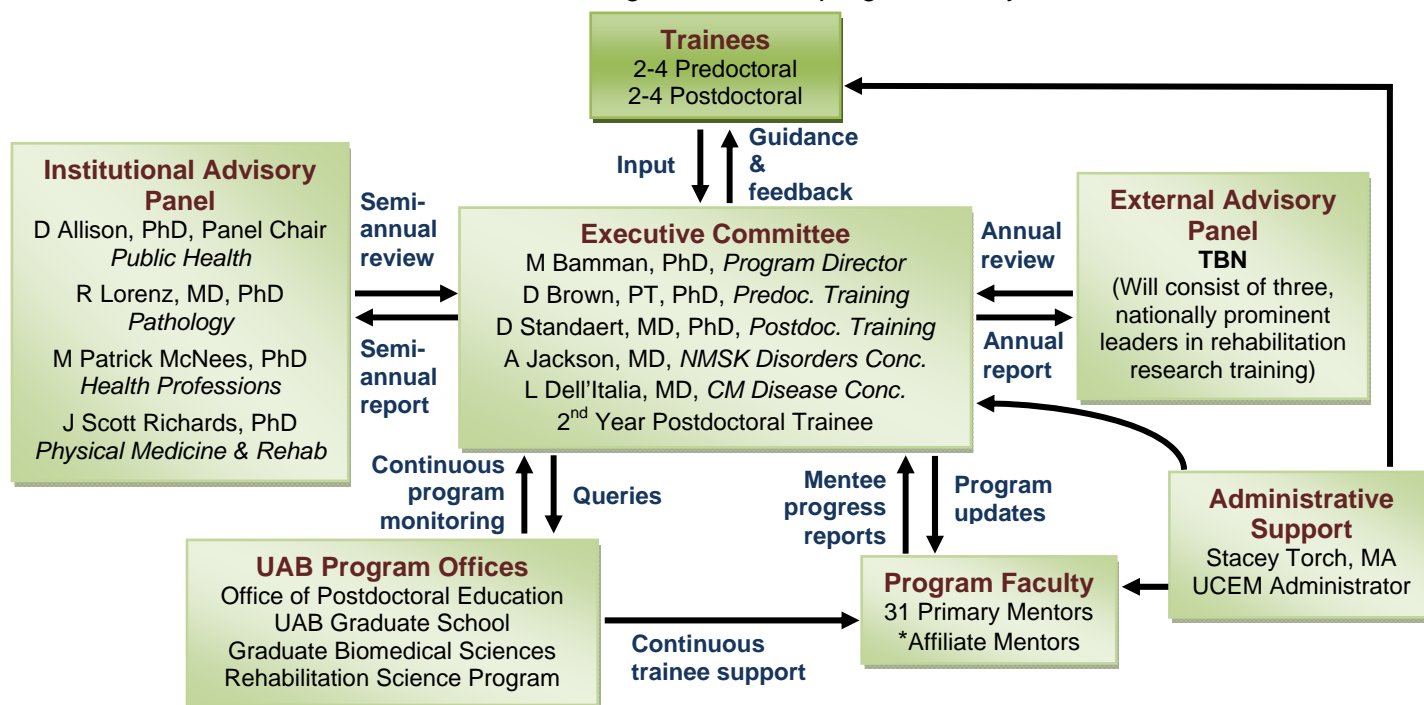


Figure 3. Administrative structure showing the flow of information and program oversight. NMSK, Neuromusculoskeletal Disorders Concentration; CM, Cardiometabolic Disease Concentration. *Affiliate mentors will be appointed by the Executive Committee on a case-by-case basis when deemed optimal to enhance the training experience of particular trainees.

Executive Committee. The P&RMP will be led by a six-member Executive Committee comprised of the PD, four program faculty, and one postdoctoral trainee in his/her 2nd year of T32 support. As highlighted in **Table A** and in their biosketches, the four program leaders selected to serve with Dr. Bamman on the Executive Committee (Drs. David Brown, Lou Dell'Italia, Amie Jackson, and David Standaert) are established authorities in their respective fields (physical therapy, cardiology, physical medicine and rehabilitation, and neurology), and each has a rich history of mentoring and research training. The composition of the panel was carefully designed to ensure balance across the program's areas of concentration. For continuity and integration of the predoctoral and postdoctoral programs, as well as the two research concentrations, each committee member will take on leadership responsibilities as follows: Dr. Brown, Predoctoral Training Leader; Dr. Standaert, Postdoctoral Training Leader; Dr. Jackson, Leader of the Neuromusculoskeletal Disorders concentration; and Dr. Dell'Italia, Leader of the Cardiometabolic Diseases concentration. Semi-annual meetings (or more if necessary) of this committee will be used to review the program with respect to trainee selection and progress, effectiveness of the curriculum, and attainment of individual trainee goals and overall program goals. The committee will also be responsible for: (i) Collecting and reviewing trainee progress reports every six months; (ii) Submitting program progress reports to the Institutional Advisory Panel every six months; (iii) Submitting an annual report to the External Advisory Panel; and (iv) Communicating regularly with appropriate UAB offices regarding updates to Institutional policies or procedures training. While the PD will be primarily responsible for collecting and drafting reports, Committee members will review all reports generated and received. In our view, trainee representation on the Executive Committee is critically important in order to maintain a direct line of communication between trainees and program leadership. The 2nd year postdoctoral trainee who takes on this role (beginning in the program's 2nd year) will be an important contributor to most all functions of the committee, with the exception of reviewing current trainee progress reports or addressing sensitive issues that directly involve a current trainee or mentor (e.g., charges of scientific misconduct).

Trainees and Mentors. The trainees themselves are invaluable to our administrative structure and we will welcome and encourage their input on research training experiences or overall programmatic issues. Trainees will be encouraged to provide input to the PD directly, or to the entire Executive Committee via their peer (trainee) member of the Executive Committee. Likewise, input from mentors is encouraged. Any mentor with concerns, suggestions, or other programmatic issues will be encouraged to communicate directly with the PD or other Executive Committee member. If either the mentor or PD thinks the issue should be vetted by the full Executive Committee, it will be the PD's responsibility to convene a meeting.

UAB Program Offices. The Office of Postdoctoral Education (OPE) will continuously monitor the postdoctoral training components of the program, and offer continuous support to postdoctoral trainees. Trainees will take advantage of courses sponsored by the office (see **c. Proposed Training**), and the office will provide information on training enhancement funds and awards, campus resources, career resources, extramural and intramural funding opportunities, town hall meetings, position openings, news and events, and policies and procedures. The office also sponsors an annual travel awards competition for postdoctoral trainees, as well as the UAB Postdoctoral Association and Postdoc Research Day (a presentation competition). The offices overseeing the Graduate Biomedical Sciences and Rehabilitation Science Programs will function, for predoctoral trainees, in much the same manner as the OPE.

b. PROGRAM FACULTY

The 31 primary mentors are listed in **Data Table 2** with a brief summary of their research interests. Members of this multidisciplinary mentoring team span 13 Departments and Divisions across the UAB Schools of Medicine (cell, developmental, & integrative biology; physical medicine & rehabilitation; neurology; pathology; medicine; genetics; cardiology; geriatrics), Health Professions (physical therapy; occupational therapy; nutrition sciences), Public Health (epidemiology), and Arts & Sciences (psychology). As shown in **Data Table 4**, the combined funded research portfolio of the Program Faculty is diverse and notably extensive with active awards totaling more than \$38 million in current year direct costs and an equally impressive array of pending applications. Collaborative efforts among the Program Faculty are numerous as highlighted in **Data Tables 4, 6a, and 6b**. Over the duration of their respective careers, each of the mid-level and senior Program Faculty has demonstrated a strong and continuous commitment to mentored research training (see **Data Tables 5a and 5b**). The junior faculty (Drs. Bickel, Deluca, Floyd, and Thalacker-Mercer) have accumulated some very important mentoring experience (**Data Tables 5a and 5b**) and are poised to mentor trainees while participating in our *Mentoring on Mentoring Program*. The extensive lists of top quality publications by trainees that are displayed in **Data Tables 6a and 6B** provide clear evidence that the mentors are committed to fostering quality research training, and that top notch candidates are attracted to the mentors' laboratories. Please refer to the **Program Faculty Profiles (Table A)** on the subsequent pages for more detailed descriptions of each mentor's biographical information and research program. Also highlighted in these summaries are past and/or current research and mentoring collaborations among the mentors.

Overall, it must be emphasized that this team of 31 mentors is remarkably productive, collegial, collaborative, and committed to research training. Each mentor has a genuine, vested interest in moving the combined fields of pathobiology and rehabilitation medicine forward by helping to develop burgeoning, translational researchers who can effectively integrate research from molecule to man, and each one plays a unique and integral role in the program's plan to accomplish this goal.

Table A. Program Faculty Profiles


	<p>Marcas Bamman, PhD, Program Director. Dr. Bamman conducted research on disuse muscle atrophy and exercise rehabilitation at NASA Johnson Space Center prior to joining the UAB faculty in 1996, where he is Professor of Cell, Developmental, and Integrative Biology, Director of the UAB Center for Exercise Medicine, and Associate Director of the Center for Aging. He is also a Fellow in the American College of Sports Medicine (ACSM). Dr. Bamman is nationally recognized for his work in resistance training-mediated rehabilitation and muscle adaptation, and the biology of muscle atrophy. He is currently serving a four-year term on the NIH CSR Skeletal Muscle and Exercise Physiology Study Section. He has a long-standing commitment to research training and exercise medicine education, having mentored numerous summer medical students and undergraduates, along with graduate students and postdoctoral fellows. Dr. Bamman was the first to integrate exercise rehabilitation medicine into the medical school curriculum for the UAB School of Medicine. Research Program: Dr. Bamman's research objectives span three, inter-related focus areas: (i) to determine key processes responsible for muscle mass recovery in response to resistance exercise rehabilitation in clinical populations; (ii) to determine the cellular and molecular mechanisms driving muscle regeneration following injury; and (iii) to better understand the primary etiology of muscle atrophy in acute (burn, trauma, disuse) and chronic (sarcopenia, cachexia) conditions. Collaborations (past or current): Drs. Bickel, C. Brown, Dell'Italia, Garvey, Gower, Hunter, McCarthy, Schwiebert, and Thalacker-Mercer.</p>
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Table A. Program Faculty Profiles

Karlene Ball, PhD. Dr. Ball is an established authority in cognition and mobility research in aging humans. She is a University Professor, Chair of the Department of Psychology, Director of the NIH-funded Roybal Center for Translational Research on Aging and Mobility, and Senior Scientist in the UAB Center for Exercise Medicine. **Research Program:** Dr. Ball's current focus is on the impact of exercise rehabilitation on cognitive function and mobility in older adults. There has been substantial recent interest in studying the relationships among aging, cognition, and tasks of daily living. Her current research with Dr. Gary Hunter will determine whether an exercise intervention (aerobic and strength training) can improve cognitive and everyday functioning as well as mobility in the later years of life. Enhancement of both physical mobility and cognitive functions into older age may help individuals maintain their personal autonomy by prolonging their abilities to navigate throughout the environment and successfully perform key instrumental activities of daily living. Results of this study can be used to inform the design of clinic-based and home-based interventions for delaying or reversing the physical and cognitive declines that accompany normal aging. **Collaborations (past or current):** Drs. Bamman, Hunter, and Mark.



Scott Ballinger, PhD. Dr. Ballinger earned a PhD in biochemistry from Emory University School of Medicine. He is a Professor of Pathology (Division of Cellular and Molecular Pathology), and Director of a well-established core facility (BioAnalytical Redox Biology Core) that has the capability for rigorous assessment of mitochondrial structure/function in a variety of tissues, including skeletal muscle and heart. **Research Program:** Dr. Ballinger has broad experience in the fields of cardiovascular and mitochondrial biology, especially regarding the influence of mitochondrial genetics, damage and dysfunction as it relates to disease development and susceptibility. He also has extensive experience in the fields of environmental cardiology with emphasis on mitochondrial genetics, function and damage. **Collaborations (past or current):** Drs. Dell'Italia, Garvey, Gower, Hunter, and Nagy.



C Scott Bickel, PT, PhD, *Junior Mentor*. Dr. Bickel is one of four Junior Mentors who will receive mentorship training ("Mentoring on Mentoring") as an important part of P&RMP. He joined UAB as Assistant Professor of Physical Therapy and Physical Medicine and Rehabilitation in 2006 after holding a similar position at Louisiana State University Health Science Center. Dr. Bickel holds a masters degree in physical therapy (Old Dominion University) and PhD in exercise science (University of Georgia). He is a Scientist in the UAB Center for Exercise Medicine. **Research Program:** Dr. Bickel's research centers on exercise rehabilitation for neurological disorders including spinal cord injury (SCI) and Parkinson's Disease. He has conducted numerous studies in SCI patients using electrical stimulation to simulate resistance exercise training. People confined to wheelchairs are at high risk for all physical inactivity-related diseases such as cardiovascular disease, insulin resistance, frank type II diabetes, and others. Dr. Bickel's current work is focused on understanding differences in muscle contraction-induced insulin receptor signaling and muscle glucose uptake between SCI patients and able-bodied individuals. **Collaborations (past or current):** Drs. Bamman, C. Brown, Ford, Hunter, Jackson, McCarthy, and Thalacker-Mercer.



Molly Bray, PhD. Dr. Bray is an established leader in the field of exercise genetics. She is a Professor in the Department of Epidemiology and Department of Genetics. She directs the Heflin Center for Genomic Sciences Genomics Core Laboratory and she is a Senior Scientist in the UAB Center for Exercise Medicine. **Research Program:** Dr. Bray has considerable interest and experience in research pertaining to obesity and obesity-related interventions, in particular exercise. She specializes in population-based genetic analyses of gene-environment interaction, and her research has included investigations of aerobic fitness, and resting and exercise energy expenditure in children and adolescents, as well as genetic linkage and association studies of obesity in family-based and unrelated subject samples. Her primary research focus includes the investigation of genetic factors that influence response to exercise training in a multi-racial population of over 3200 individuals (R01DK062148). Another area which is actively developing in the laboratory of Dr. Bray is that of whole genome methylation and exercise response. Initial work in this area has identified a total of 3,051 genes with altered methylation patterns following 15 weeks of exercise training. Such findings provide new insight into the potential molecular mechanisms by which exercise reduces risk for chronic disease. The study is one of the largest cohorts of exercise response currently available. **Collaborations (past or current):** Drs. Gower, Hunter, and Nagy.



Cynthia Brown, PT, MD, MSPH. After working as a physical therapist, Dr. Brown earned an MD at UNC-Chapel Hill and completed a geriatric medicine fellowship at Yale University. She is Associate Professor and Director of the Geriatric Medicine Section in the Division of Gerontology, Geriatrics, and Palliative Care. Since joining UAB she also earned an MSPH. Dr. Brown is a Senior Scientist in the UAB Center for Exercise Medicine. **Research Program:** Her research combines the issues of low mobility and falls in the hospitalized older patient. Dr. Brown's work has focused on the impact of bed rest and low mobility during hospitalization. She was the first to demonstrate the association between low mobility and adverse outcomes among older adults, even after controlling for illness severity and co-morbidity. Via accelerometers for 24-hour mobility monitoring, she showed older adults spent an average of 83% of their hospital stay lying in bed, despite having the ability to ambulate independently. Her current research explores potential interventions to increase physical activity during hospitalization in an effort to reduce the frequently observed functional decline. This novel research is changing how physicians think about activity during hospitalization, especially for older adults. **Collaborations (past or current):** Drs. Bamman, Bickel, Burgio, and Thalacker-Mercer.



Table A. Program Faculty Profiles

David Brown, PT, PhD, Executive Committee. Dr. Brown was recruited from Northwestern University to UAB in 2011 (since the initial T32 application) to serve as Director of the Rehabilitation Science Predoctoral Program, which is an innovative program designed to train scientists across the ICF spectrum of recovery from disease and/or health conditions that affect quality of life. He is a licensed Physical Therapist and Professor in the Department of Physical Therapy. Dr. Brown has adjunct faculty appointments in the Department of Occupational Therapy, the UAB Center for Exercise Medicine, and the Neuroscience Theme of the Graduate Biomedical Sciences program. Dr. Brown has dedicated the past 10 years of his academic career to fostering the growth of pre-doctoral and post-doctoral trainees as they learn to become new investigators and contribute to the future of rehabilitation science and exercise medicine. He is particularly dedicated to training individuals from under-represented minorities and/or diverse/nontraditional backgrounds. **Research Program:** In addition to his program leadership, Dr. Brown will contribute his many years of experience with testing hypotheses about neuromechanical mechanisms underlying the loss of speed in the control of walking and the factors that help to restore walking speed for people post-stroke. He is also a co-inventor of the overground KineAssist Walking and Balance System and co-founder of KineaDesign, LLC (www.kineadesign.com), an engineering design firm that designs new and innovative tools to improve human-machine interaction in the rehabilitation setting. **Collaborations (past or current):** Dr. Brown is new to UAB but is already forging research collaborations with program mentors including Drs. Bickel, Ford, and Rimmer.



Kathryn Burgio, PhD. Dr. Burgio is a behavioral psychologist and clinical investigator with 30 years of experience in gerontology and geriatric medicine. **Research Program:** Her research agenda in incontinence has included investigations of its prevalence and risk factors and clinical studies of the effectiveness of behavioral and exercise interventions with a variety of populations including recent work in prostate cancer victims after prostatectomy. She is an expert in the behavioral treatment of incontinence, having focused on the use of pelvic floor muscle exercise and biofeedback for teaching improved bladder control. She has completed several clinical trials investigating various interventions for incontinence and other pelvic floor disorders and published extensively in the field of incontinence. For the past 11 years, Dr. Burgio has participated as Co-PI in the 7-site NICHD Pelvic Floor Disorders Network and as a Co-Investigator in the 9-site NIDDK Urinary Incontinence Treatment Network. Beginning in 2001, her research interests have extended to palliative medicine and interventions to improve end-of life care. **Collaborations (past or current):** Drs. Bamman and C. Brown.



Louis J. Dell'Italia, MD, Executive Committee. Dr. Dell'Italia completed his MD at Georgetown University and Fellowship in Cardiology at the UT-Health Science Center in San Antonio, Texas. He joined the UAB faculty in 1989 where he is Professor of Medicine (Cardiology) and Director of the Center for Heart Failure Research. He serves as Associate Director of the UAB Center for Exercise Medicine. Among his numerous accomplishments, Dr. Dell'Italia was awarded the largest single NIH award in UAB history—the NIH Specialized Center of Clinically Oriented Research (SCCOR) in Cardiac Dysfunction and Disease. **Research Program:** Dr. Dell'Italia has a long-standing history of important contributions in heart failure (HF) research. The major goal of the Dell'Italia Laboratory is to unravel mechanisms of left ventricular (LV) myocardial remodeling in three disparate forms of heart disease—volume overload of mitral regurgitation (MR), primary aldosteronism, and diabetic cardiomyopathy—that are resistant to standard medical therapy. In collaboration with Dr. Bamman he also seeks to identify common and unique mechanisms of LV remodeling in endurance-trained athletes vs. HF patients. **Collaborations (past or current):** Drs. Ballinger, Bamman, Garvey, and Nagy.



Stephanie DeLuca, PhD, *Junior Mentor*. Dr. DeLuca is one of four Junior Mentors who will receive mentorship training (“Mentoring on Mentoring”) as an important part of this training program. She is Assistant Professor of Occupational Therapy and directs the Pediatric Neuromotor Research Clinic, which is dedicated to the research and development of new and efficacious treatment techniques for children with neuromotor disorders. She and her colleagues, Drs. Sharon Ramey and Karen Echols have developed a protocol for Pediatric Constraint Induced Therapy (ACQUIREc) which is currently being implemented and is the basis for numerous clinical and research efforts around the country, which has provided her with numerous opportunities to serve as a mentor and trainer for therapists across the U.S. **Research Program:** Dr. DeLuca’s primary research efforts have focused on understanding dosage curves associated with pediatric rehabilitation techniques, with a particular interest in neural plasticity, and the development and/or recovery of functional skills in neuromotor disabilities. **Collaborations (past or current):** Dr. Mark.



Wendy Demark-Wahnefried, RD, PhD. Dr. Demark-Wahnefried joined the UAB faculty in March of 2010 as Professor and Webb Endowed Chair of Nutrition Sciences and Associate Director of the Comprehensive Cancer Center. She is also a Senior Scientist in the UAB Center for Exercise Medicine. She held previous professorships at the University of Texas – M.D. Anderson Cancer Center and Duke University Medical Center. Her work at Duke chronicling the adverse body composition changes and the rapid onset of sarcopenic obesity in breast cancer survivors is considered benchmark. She has played an active role in establishing diet and exercise guidelines for cancer survivors; serving on panels of the Institute of Medicine, American Cancer Society, World Cancer Fund, Australian Think Tank on Breast Cancer, and American College of Sports Medicine. **Research Program:** Dr. Demark-Wahnefried’s research program is directed toward discovering lifestyle factors, e.g., dietary patterns, physical activity and a combination of factors that impact the development of cancer and its progression. She is also developing and testing optimal rehabilitation interventions aimed at promoting healthful lifestyle change in cancer survivors – to hinder recurrence, prevent co-morbidities, or to improve physical function and quality of life. **Collaborations (past or current):** Drs. Burgio, Gower, Hunter, and Nagy.



Table A. Program Faculty Profiles

Candace Floyd, PhD, *Junior Mentor*. Dr. Floyd is one of four Junior Mentors who will receive mentorship training (“Mentoring on Mentoring”) as an important part of P&RMP. Dr. Floyd was recruited to UAB in 2006 from the Department of Neurosurgery at UC-Davis. She is an Assistant Professor in the Department of Physical Medicine and Rehabilitation. **Research Program:** Her work focuses on traumatic brain and spinal cord injury (TBI and SCI). The current clinical repertoire for treating CNS injury is extremely limited. Most previous research in CNS injury has focused on neuroprotection, and has discounted the role of glial cells in injury pathology. The central hypothesis of Dr. Floyd’s research is that understanding of the complex interaction of glial and neuronal cells in the pathophysiology of traumatic CNS injury will lead to novel, effective therapeutic interventions. On-going projects include: a) estrogens, phytoestrogens, and selective estrogen receptor modulators (SERMs) as potential protective agents in SCI and TBI; b) evaluation of glial-neuronal interactions in the development of neuropathic pain following SCI; c) effect of TBI on brain reward circuitry and subsequent response to drugs of abuse; d) understanding the role of adult neurogenesis in the pathophysiology of mild TBI; and e) development of nanomaterial regenerative substrate to promote repair after chronic SCI. **Collaborations (past or current):** Drs. Bickel, Jackson, McMahon, and Ramanadham.



Matthew P. Ford, PT, PhD. Dr. Ford is Associate Professor of Physical Therapy and Scientist in the UAB Center for Exercise Medicine. He is a physical therapy graduate of Quinnipiac University and earned a PhD from Pennsylvania State University. His background is in adult rehabilitation and kinesiology with an emphasis on mobility training in adults with neurologic deficits. Dr. Ford has been a licensed physical therapist for 19 years, practicing in various settings, primarily working with adults with central nervous systems disorders. **Research Program:** Dr. Ford’s research involves investigating rehabilitation, exercise, and health and wellness programs for persons with Parkinson disease. He is examining the use of music during mobility training and community based programs for persons with Parkinson disease. He is also working closely with the Parkinson Association of Alabama and the Lakeshore Foundation in providing a comprehensive health and wellness program for persons with Parkinson disease. He is currently collaborating with Drs. Bamman, Bickel, and Standaert on an intensive exercise rehabilitation trial aimed to improve fatigability, muscle function, and mitochondrial function in stage 2-3 Parkinson’s patients. **Collaborations (past or current):** Drs. Bamman, Bickel, and Standaert.



W Timothy Garvey, MD. Dr. Garvey is Professor of Medicine, Chair of the Department of Nutrition Sciences, and Program Director of the UAB Diabetes Research and Training Center (P60 DK079626). He is a Senior Scientist in the UAB Center for Exercise Medicine. He was Director of the Division of Endocrinology, Diabetes, and Medical Genetics at the Medical University of South Carolina before joining UAB in 2004. **Research Program:** Dr. Garvey has achieved international recognition for his research in the metabolic, molecular, and genetic pathogenesis of insulin resistance, type II diabetes, and obesity. His studies range from cellular and molecular biology in cell and animal models to metabolic investigations of human subjects. He has brought basic technology directly to the study of human patients, and the combined approach of human physiology, genetics, and basic cell and molecular biology has provided the laboratory with a flexible capability for hypothesis testing relevant to human disease. The focus of the laboratory has been on muscle metabolism, and insulin action. Dr. Garvey has been a principle contributor to our understanding of the role of the glucose transport system and glucose transporter proteins in human insulin resistance. Current studies examine the role of adiponectin in cardiometabolic disease; mitochondrial dysfunction in muscle, and the role of several small gene families (TRIB-genes, NR4A orphan nuclear receptors). **Collaborations (past or current):** Drs. Bamman, Gower, Hunter, and Nagy.



Barbara A. Gower, PhD. Dr. Gower is a Professor of Nutrition Sciences and Director of the Metabolism Core for the Center for Clinical and Translational Science, the Nutrition Obesity Research Center, and the Diabetes Research and Training Center. She is also a Senior Scientist in the UAB Center for Exercise Medicine. **Research Program:** The broad aims of Dr. Gower’s research are: 1) to understand the role of the endocrine system in determining body composition and fat distribution throughout the lifespan; and 2) to probe the mechanistic basis for greater prevalence of type 2 diabetes among African Americans vs European Americans, focusing on beta-cell function and insulin action. Dr. Gower’s overall goal is to develop means of using lifestyle-based interventions, specifically nutrition and exercise, to promote metabolic health. One current project (R01DK049779) will determine if intense exercise promotes energy balance and metabolic health by increasing 24-h energy expenditure and augmenting insulin action. **Collaborations (past or current):** Drs. Bamman, Garvey, Hunter, Nagy, and Thalacker-Mercer.



Gary Hunter, PhD. Dr. Hunter is an established, leading authority in exercise science, muscle metabolism, and regulation of body composition. He served as Director of Sports Medicine at the University of Wisconsin before joining the faculty at UAB in 1984, where he is currently Professor of Human Studies and Nutrition Sciences, and Senior Scientist in the UAB Center for Exercise Medicine, Center for Aging, Nutrition and Obesity Research Center, and Diabetes Research and Training Center. **Research Program:** Dr. Hunter’s human research portfolio includes more than 250 peer-reviewed publications, with the past 18 years focused primarily on metabolic regulation during exercise, body composition and energy expenditure, exercise and dietary weight loss interventions in premenopausal obese African-American and Caucasian women, and exercise rehabilitation strategies for sarcopenic older adults. Dr. Hunter has a long-standing history of research collaboration with several of the training program mentors. **Collaborations (past or current):** Drs. Ball, Bamman, Bickel, Bray, Garvey, Gower, McCarthy, Nagy, and Thacker-Mercer.



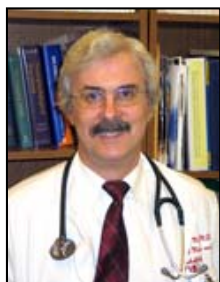
Table A. Program Faculty Profiles

Amie Jackson, MD, Executive Committee. Dr. Jackson is a board-certified physiatrist who has been conducting research and clinical care activities involving spinal cord injured individuals since 1978. She has served as Principal Investigator for an intersystem collaborative research project titled Gynecological and Obstetrical Complications in Females with Spinal Cord Injury. She is the Founder and Director of the nation's first Women's Clinic for the Disabled at the Spain Rehabilitation Center and has served on the NIH Committee for Health of Women with Disabilities. She has published several research studies in peer-reviewed journals and served as Principal Investigator on a Collaborative Respiratory Complication project. **Research Program:** Dr. Jackson is Project Director for the Regional Model UAB Spinal Cord Injury Care System grant (2000-2016) and holds the rank of Senior Scientist in the UAB Center for Exercise Medicine. She continues to pursue research in the field of women's health for individuals with disabilities and has been funded by NIDRR to examine the postmenopausal status in Women with SCI. Until 2009, Dr Jackson held the Directorship of the SCI/D Service at UAB's Spain Rehabilitation Center where she was responsible for establishing all system and medical care policies governing the management of patients with SCI/D. She continues to staff the Women's Clinic for the Disabled and received a grant from the Alabama Coalition for Developmental Disabilities to develop a transition clinic for young adults with spina



bifida. **Collaborations (past or current):** Drs. Bamman, Bickel, and Mark.

Victor Mark, MD. Dr. Mark graduated from Albany Medical Center and then completed a neurology residency at New York University and a behavioral neurology fellowship at the University of Florida. He is an Associate Professor in the Department of Physical Medicine and Rehabilitation and has been the Medical Director for the Constraint-Induced Movement Therapy research and clinical programs at UAB for the past 13 years, as well as Principal Investigator on several NIH and National MS Society clinical trial grants for the CI Therapy laboratory. He is a Board-Certified Neurologist and a Diplomate of the American Society of Neurorehabilitation. **Research Program:** Dr. Mark's principal area of research is in the evaluation and treatment of mobility deficits in adults with MS or stroke. His laboratory also conducts quantitative neuroimaging evaluation of rehabilitation therapy outcomes. Dr. Mark would accommodate a trainee who would be interested in gaining hands-on experience with improving physical function in adults with acquired neurological disabilities. **Collaborations (past or current):** Dr. DeLuca.



John McCarthy, PT, PhD. Dr. McCarthy is an Associate Professor in the Department of Physical Therapy, and Scientist in the UAB Center for Exercise Medicine and Center for Aging. **Research Program:** A major focus of his previous and current research is studying human performance and the underlying neuromuscular, cardiovascular, and tissue adaptations in response to resistance exercise and concurrent resistance and aerobic training interventions. Dr. McCarthy's previous and current research projects with young and older adults have utilized different exercise program design variables such as volume, intensity, frequency, duration, and exercise mode which have advanced our understanding of designing optimal exercise rehabilitation interventions for various populations. Future work will extend the concepts of designing the most optimal exercise interventions for the prevention and treatment of specific health disorders. **Collaborations (past or current):** Drs. Bamman, Bickel, Ford, and Hunter.



Lori McMahon, PhD. Dr. McMahon is Director of the Comprehensive Neuroscience Center, Professor in the Department of Cell, Developmental, and Integrative Biology, Senior Scientist in the UAB Center for Exercise Medicine, Associate Director of the Center for Aging, and Director of the Neuroscience Theme in the Graduate Biomedical Sciences PhD Program. Dr. McMahon has graduated 6 PhD students and 1 co-mentored PhD student, and is currently the mentor of 3 PhD students. One graduate and one current trainee are underrepresented minority students, both of whom have excelled under Dr. McMahon's mentorship as evidenced by their receipt of research awards and independent funding. Currently she is mentoring a minority student in the NIH funded PREP Scholars program. **Research Program:** Research in the McMahon laboratory focuses on the molecular physiology of synaptic function and synaptic plasticity in hippocampus in the context of aging, cognition, and memory. Via animal models, her laboratory has determined key roles of estrogen in hippocampus function, and has demonstrated the importance of estrogen replacement on cognition. Related research seeks to determine how O-linked glycosylation impacts synaptic function required for normal learning and memory in diabetes. **Collaborations (past or current):** Drs. Floyd, Schwiebert, and Standaert.



Tim Nagy, PhD. Dr. Nagy is Professor and Vice Chair for Research in the Department of Nutrition Sciences, and Director of the Cancer Prevention and Control Training Program. He directs the Small Animal Phenotyping Core Laboratory, a resource Core for the Nutrition Obesity Research Center, Center for Metabolic Bone Disease, Diabetes Research and Training Center, and the Alabama Neuroscience Blueprint Core Center. He also holds the rank of Senior Scientist in the UAB Center for Exercise Medicine. **Research Program:** Dr. Nagy's research is focused on three areas: (1) regulation of body weight, (2) development and validation of methods for phenotyping small animals, and (3) the link among body fat, caloric restriction and cancer/aging. His studies on the regulation of body weight have utilized both humans and animal models. Currently, the research is focused on animal models to better understand the mechanisms regulating energy expenditure and thus body weight. **Collaborations (past or current):** Drs. Demark-Wahnefried, Garvey, Gower, and Hunter.



Table A. Program Faculty Profiles

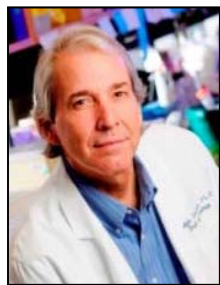


Sasanka Ramanadham, PhD. Dr. Ramanadham was recruited to UAB in 2010 after an illustrious 16-year tenure at Washington University School of Medicine. He is an Associate Professor in the Department of Cell, Developmental, and Integrative Biology and Senior Scientist in the UAB Center for Exercise Medicine and Comprehensive Diabetes Center. **Research Program:** A major focus of his research has been on the molecular pathobiology of diabetes, and particularly on mechanisms of pancreatic islet beta cell apoptosis. He revealed a novel Group VIA Ca^{2+} -independent PLA_2 or $\text{iPLA}_2\beta$ enzyme in the islet beta-cells and is investigating how it participates in islet secretory function and beta-cell death. In addition, he has found that bones from $\text{iPLA}_2\beta$ -null mice have increased fat deposition. Because osteoblasts and adipocytes share a common mesenchymal stem cell origin, the findings suggest that the absence of $\text{iPLA}_2\beta$ favors differentiation toward adipocytes and this is a second area of study in the lab. A third area is exploring mechanisms by which HIV-protease inhibitors cause insulin resistance. **Collaborations (past or current):** Dr. Shalev.

James Rimmer, PhD. Dr. Rimmer, Professor, is the UAB Lakeshore Foundation Endowed Chair in Health Promotion and Rehabilitation Sciences, Director of the Lakeshore Foundation/UAB Research Collaborative, and Senior Scientist in the UAB Center for Exercise Medicine and Center for Aging. **Research Program:** Dr. Rimmer has achieved international recognition for his research in obesity, deconditioning, and disability. His research explores new and emergent technologies in developing biobehavioral and environmental strategies to promote beneficial physical activity and healthful weight management in people with disabilities. He has been a principle contributor to our understanding of the effects of physical inactivity on health trajectories in people with disabilities. He is the Director of two federally funded Centers; the *National Center on Health, Physical Activity and Disability*, and *Rehabilitation Engineering Research Center on Interactive Exercise Technologies and Exercise Physiology for People with Disabilities*. He also directs the NIDRR Project (DRRP) on Obesity and Obesity-Related Secondary Conditions in Youth and Young Adults with Disabilities. Dr. Rimmer is on the advisory board of the NIH National Center for Medical Rehabilitation Research and CDC's Health Disparities Advisory Committee to the Director. **Collaborations (past or current):** Drs. Bamman, Bickel, and Ford.



Ralph Sanderson, PhD. Dr. Sanderson is Professor of Pathology, Division of Cellular and Molecular Pathology. He has a significant record of training postdoctoral fellows and graduate students and is past Director of the Pathobiology and Molecular Medicine Theme in Graduate Biomedical Sciences. His expertise in molecular pathology and cancer biology will provide outstanding training opportunities for trainees with interests in cancer rehabilitation medicine. **Research Program:** The Sanderson lab focuses on the molecular pathobiology of tumor growth. The long-term goal is to determine how heparan sulfate regulates the microenvironment of bone homing tumors and to use that knowledge to design new cancer therapies. Dr. Sanderson recently received a 5 year NIH award with the goal of developing novel inhibitors to heparanase for use in cancer. The work is highly significant as it addresses mechanisms fundamental to the understanding of cancer and bone disease coupled with a focused drive to engineer new inhibitors of heparanase. **Collaborations (past or current):** Dr. Serra.



Lisa Schwiebert, PhD. Dr. Schwiebert is Associate Professor of Cell, Developmental, and Integrative Biology, Associate Dean of the UAB Office of Postdoctoral Education, and Scientist in the Lung Health Center, Gregory Fleming James Cystic Fibrosis Research Center, and UAB Center for Exercise Medicine. **Research Program:** Dr. Schwiebert seeks to understand mechanisms that underlie exercise-mediated attenuation of lung inflammatory diseases. These efforts center upon asthma-related responses, including airway inflammation and hyperresponsiveness (AHR). Because asthma and obesity are linked, additional studies are examining the role of adiponectin in exercise-mediated attenuation of asthma responses in OVA-treated, diet-induced obese mice. Dr. Schwiebert is also conducting a randomized human exercise trial in mild-moderate asthmatic patients. It is anticipated that results from these collective studies will elucidate mechanisms that underlie lung inflammatory diseases and, moreover, will demonstrate the utility of aerobic exercise as a therapeutic approach in the treatment of asthma. **Collaborations (past or current):** Drs. Bamman and McMahon.



Rosa Serra, PhD. Dr. Serra is Professor of Cell, Developmental, and Integrative Biology and Director of the Cancer Biology Theme in Graduate Biomedical Sciences. Training graduate students and postdoctoral fellows has always been an integral part of her research program. **Research Program:** The overall goal of the laboratory is to understand the mechanisms of normal mammary gland development and to apply this knowledge to the understanding and treatment of breast cancer. Understanding how specific cellular differentiation pathways occur during development will provide a basis for prevention and treatment strategies in the adult. For example, the existence of cells that meet the definition of an adult stem cell in the mammary gland, that is self-renewing and multipotent, has been known for many years. These cells are required for normal development of the mammary gland through puberty and the cycle of pregnancy. Stem cells have also been identified in breast cancers. Since stem cells may be target for carcinogens and the tumor stem cell may be derived from normal stem or progenitor populations within the mammary gland, understanding how the stem cell population is regulated will lead to rational targets for prevention and treatment of breast cancer. **Collaborations (past or current):** Dr. Sanderson.



Table A. Program Faculty Profiles

Anath Shalev, MD. Dr. Shalev completed a research fellowship in molecular biology at Harvard Medical School and endocrinology fellowship at the NIH. After eight years on the faculty at the University of Wisconsin-Madison, she was recruited to UAB in 2010 as Director of the UAB Comprehensive Diabetes Center. She is a Professor in the Department of Medicine, Division of Endocrinology, Diabetes, and Metabolism and Senior Scientist in the UAB Center for Exercise Medicine. As a physician-scientist, Dr. Shalev has been integrally involved in the training and mentoring of several graduate students, postdoctoral fellows, and MD/PhD candidates in medical research and molecular aspects of diabetes. **Research Program:** Dr. Shalev's laboratory has pioneered the role of thioredoxin-interacting protein (TXNIP) in pancreatic beta cell biology, diabetic complications, and as a novel therapeutic target for diabetes and continues to work on the molecular biology of TXNIP signaling and beta cell apoptosis. As Center Director, Dr. Shalev leads and fosters interdisciplinary research and training related to diabetes across the entire translational spectrum. **Collaborations (past or current):** Drs. Garvey and Ramanadham.



David Standaert, MD, PhD, Executive Committee. Dr. Standaert is Professor and Chair of the Department of Neurology and Senior Scientist in the Comprehensive Neuroscience Center and UAB Center for Exercise Medicine. He is a clinician-scientist with a longstanding commitment to research in Parkinson disease and neurodegenerative disorders. Dr. Standaert has a substantial track record of mentoring neuroscientists. He has trained more than 20 postdoctoral fellows, which include both basic and clinical scientists, and has served as primary mentor for a total of 5 NIH K awards. His predoctoral training experience is more recent, but he is currently mentoring 3 graduate students, including one supported on an F30 award. Dr. Standaert has also served on NIH study sections responsible for review of T32, R25, and F30/31 applications. **Research Program:** Dr. Standaert is an international leader in Parkinson disease research and currently serves on the Scientific Advisory Boards of the American Parkinson Disease Association and Michael J. Fox Foundation. His laboratory is engaged in a variety of studies relevant to this program, including evaluation of novel therapeutics in animal model systems, genetic and genomic studies, and human clinical trials. **Collaborations (past or current):** Drs. Bamman, Ford, and McMahon.



Anna Thalacker-Mercer, PhD, *Junior Mentor*. Dr. Thalacker-Mercer is one of four Junior Mentors who will receive mentorship training ("Mentoring on Mentoring") as an important part of P&RMP. She is in her 2nd year as Assistant Professor in the Department of Cell, Developmental, and Integrative Biology. She was recruited to UAB from Purdue University in 2007 as postdoctoral trainee on the T32 Obesity Training Program. **Research Program:** Dr. Thalacker-Mercer has a strong research background in transcriptomics and protein metabolism, particularly in skeletal muscle. Her research focuses on mechanisms underlying skeletal muscle metabolic and inflammatory dysfunction in disease [e.g., sarcopenia, polycystic ovary syndrome (PCOS)] and the efficacy of nutrition and exercise interventions for the treatment of metabolic dysfunction and chronic inflammation. She is studying linkages between circulating amino acids, metabolites, and the development of insulin resistance in aging and PCOS models. Dr. Thalacker-Mercer's research is in the areas of dietary and exercise interventions for skeletal muscle rehabilitation in disease will foster integration with a number of senior mentors in the training of students and fellows. **Collaborations (past or current):** Drs. Bamman, Bickel, C. Brown, Gower, and Hunter.



Hon Yuen, PhD. Dr. Yuen is a Professor in the Department of Occupational Therapy, as well as Director of Research in the department. He joined UAB in 2010 after 10 years on faculty at the Medical University of South Carolina. **Research Program:** His research interest in the area of exercise rehabilitation is on using exercise (aerobic and resistance) for fatigue management among people with connective tissue disorders and cancer survivors, therapeutic use of exercise (strengthening) in oral rehabilitation for people with microstomia, and strategies to improve exercise adherence which involves the use of an interactive health video game, and home exercise via live online videoconferencing. Overall, Dr. Yuen has a strong interest in the use of therapeutic exercise to improve quality of life of people with various chronic conditions and disability. **Collaborations (past or current):** Drs. Bickel and Schwiebert.



Majd Zayzafoon, MD, PhD. Dr. Zayzafoon is an Associate Professor in the Department of Pathology and Director of the UAB Center for Metabolic Bone Disease. **Research Program:** Dr. Zayzafoon's studies include understanding the transcriptional regulation of osteoblast differentiation and the role of calcium signaling in this process. He particularly examines the roles of calmodulin dependent protein kinase II and the nuclear factor of activated T-cells in the regulation of osteoblast proliferation and differentiation in response to high fat diet and obesity. He also studies the mechanisms involved in the development and growth of bone tumors such as osteosarcoma or bone metastasis from other tumors such as prostate cancer. Specifically, Dr. Zayzafoon examines how progressive changes in prostate cancer bone metastasis are acquired through tumor-stroma interaction in the bone and prostate microenvironment. He is interested in the effects of stroma-secreted advanced glycation end products on prostate cancer growth and metastasis. **Collaborations (past or current):** Dr. Sanderson.



c. PROPOSED TRAINING

Key Ingredients of the Program Common to Both Predoctoral and Postdoctoral Trainees

The overarching goal of this training program is to develop burgeoning scientists into future leaders in translational rehabilitation research who are specifically equipped to test and disseminate novel rehabilitative strategies that will alleviate functional impairment and compromised life quality in the face of chronic disease management. Training such a cohort requires an interdisciplinary program with several critical features: 1) a deep pool of talented and eager trainees; 2) expert faculty at multiple levels of inquiry across numerous disease states; 3) interdisciplinary training in pathobiology, translational research, and rehabilitation science; 4)

mentorship and structured training along a clearly defined pathway to independence; and 5) a rich environment that provides a host of state-of-the-art research facilities and services to facilitate projects ranging from functional genomics to clinical and epidemiological studies. This program possesses these features, and we are confident that the overarching goal will be met in part by taking advantage of an exceptionally rich institutional environment that offers myriad resources and a complementary and collaborative team of 31 basic, clinical, and translational research mentors committed to training and career development. Predoctoral trainees will be selected from a highly competitive and diverse national pool of students admitted to either the GBS program or Rehabilitation Science program. Postdoctoral trainees will also be recruited nationally, and will gain invaluable clinical and translational research training and career development via structured programs and courses sponsored by the OPE and CCTS. The research training program has been carefully designed with the following key components:

Core Levels of Inquiry. A truly interdisciplinary and translational research training program must offer clear avenues for bidirectional research—taking bench discoveries to clinical application and, of equal importance, understanding the mechanistic underpinnings of clinical findings. In this program, predoctoral and postdoctoral trainees will benefit from two years of interdisciplinary training that carefully meld three core levels of scientific inquiry: (i) cellular and molecular pathobiology of disease; (ii) rehabilitation science and exercise physiology; and (iii) rehabilitation medicine (i.e. clinical trials). Most trainees will be actively engaged in research across two or more core levels, and many trainees will gain practical research experiences across all three levels. Training will occur in one of two areas of concentrated strength: (1) Neuromusculoskeletal Disorders; or (2) Cardiometabolic Diseases. Cross-cutting themes with training opportunities include cancer and aging. The fundamental design of our interdisciplinary training program is perhaps best exemplified in **Table B**, which shows that each mentor conducts funded research in one or both areas of strength, and at one or more levels of scientific inquiry.

Translational Mentoring Team. The trainee, primary mentor, and Executive Committee will work together to identify two additional members that will form this team with the mentor. The most important consideration is how each mentoring team member will enhance the mentee's training experience. Typically each trainee's primary mentor and mentoring team members will be drawn from the diverse group of 31 expert faculty in the program; however, in some cases the participation of a faculty member not affiliated with the program may be deemed most beneficial for the trainee. This faculty member would first apply to the Executive Committee for affiliate status. The Executive Committee will ensure that the team is constructed such that the trainee will be exposed to all three levels of inquiry. We recognize that the trainee's scientific pursuits may take shape primarily at one of the three levels, but having a diverse mentoring team will ensure translational training. Mentoring teams will be expected to meet at least quarterly, and the trainee will submit minutes of each meeting to the PD. As their research progresses, predoctoral trainees will work with their mentoring team to recruit two additional faculty to form a 5-member dissertation Supervisory Committee as required by the two participating predoctoral programs. These two additional team members need not necessarily be affiliated with the training program, and will more importantly be identified based on pertinent scientific expertise.

Table B. Interdisciplinary faculty expertise across three core levels of scientific inquiry in the two areas of concentrated strength.

	<i>Neuromusculoskeletal Disorders</i>	<i>Cardiometabolic Diseases</i>
<i>Cellular & Molecular Pathobiology, & Animal Models</i>	Bamman [‡] , Floyd, McMahon [‡] , Ramanadham, Serra*, Standaert, Thalacker-Mercer [‡] , Zayzafoon*	Ballinger, Bray, Dell'Italia [‡] , Garvey, Nagy*, Ramanadham, Sanderson*, Schwiebert, Serra*, Shalev
<i>Rehabilitation Science & Exercise Physiology</i>	Ball [‡] , Bamman [‡] , Bickel [‡] , C. Brown [‡] , D. Brown, DeLuca, Floyd, Ford, Hunter [‡] , Jackson, Mark, McCarthy [‡] , Rimmer, Standaert, Thalacker-Mercer [‡]	Bickel [‡] , Bray, Dell'Italia [‡] , Demark-Wahnefried*, Garvey, Gower, Hunter [‡] , Nagy*, Schwiebert, Thalacker-Mercer [‡] , Yuen*
<i>Rehabilitation Medicine (clinical trials)</i>	Ball [‡] , Bamman [‡] , Bickel [‡] , C. Brown [‡] , D. Brown, Burgio [‡] , DeLuca, Ford, Hunter [‡] , Jackson, Mark, McCarthy [‡] , Standaert, Thalacker-Mercer [‡] , Yuen*	Bamman [‡] , Bray, C. Brown [‡] , Demark-Wahnefried*, Garvey, Hunter [‡] , Schwiebert, Thalacker-Mercer [‡] , Yuen*
*Mentors in cross-cutting cancer theme. ‡Mentors in cross-cutting aging theme.		

Cross-Program Cohesion. As summarized in **Table B**, research opportunities in this program are diverse and focus areas will vary among trainees. This was intentional and in our view decidedly advantageous. On the other hand, we have constructed a plan in this A1 application to ensure that P&RMP and its participants maintain a strong sense of cohesion—centered on the program's unique identity as the institution's singular rehabilitation medicine research training program. (i) All pre- and postdoctoral trainees in P&RMP will be required to regularly attend the program's **Translational Rehabilitation Research Roundtable**, which occurs twice monthly and is sponsored by the UAB Center for Exercise Medicine. The format of this roundtable is a nascent projects discussion forum. All trainees will be required to present on a rotation, discussing their own work in progress and/or exciting new findings recently published in the field. Primary mentors will also be expected to participate regularly. This is considered a critical component of the training experience. (ii) Via **Trainee Pairing**, each new predoctoral trainee will be assigned either a postdoctoral trainee in P&RMP, or an

advanced predoctoral trainee as a surrogate “big sibling”. This will provide the junior trainees with a more experienced colleague and confidant to reach for advice, general knowledge, etc. related to research training or simply related to life at UAB and in Birmingham. Such structured pairing has worked extremely well over several decades among medical students and in the MSTP. Because our pre- and postdoctoral trainees will remain part of the program for as long as their training at UAB lasts, another advantage of Trainee Pairing will be the continued engagement of all trainees beyond the (typical) two years of T32 funding. We are confident that these two initiatives will establish and maintain trainee unity and a sense of program cohesion that will also facilitate reliable student feedback about the program.

Didactic and Experiential Training. The training plans for pre- and postdoctoral trainees have been carefully designed to help mentors and trainees address scientific deficiencies, teach and encourage the use of state-of-the-art technologies and complex statistical tools, and to prepare trainees for independence. Required coursework in the training program is designed to impart to each trainee a common framework of basic principles in translational rehabilitation research. The program is further enhanced by experiences that permit trainees to use and integrate basic principles. In addition to directly fostering each trainee’s development, exposure of trainees to interdisciplinary and translational experiences is likely to foster collaboration and application of these techniques and approaches among laboratories hosting trainees. The predoctoral curriculum is a balance of rigorous required and elective courses, while postdoctoral trainees will mainly choose from electives mixed with a few key required courses. Clinical and translational research training and career development of both pre- and postdoctoral trainees will be enhanced by CCTS course offerings, some of which will be required. All trainees will complete the *CCTS Vocabulary of Clinical and Translational Science program*, an on-line course that includes fundamental information on hypothesis generation and testing; informatics; biostatistics; epidemiology and population research; clinical trials; ethics; oversight of research; and critical review of clinical and translational literature.

Interdisciplinary Seminars and Workshops. All incoming trainees will attend the UAB Center for Exercise Medicine workshop, *The State of Exercise Science in Rehabilitation Medicine*, which is offered for trainees and faculty alike, and covers fundamentals, the current state of the field in rehabilitation and preventive medicine, and knowledge gaps/future directions (meets 3 h/d for 2 days and is held twice per year). All trainees will attend Physical Medicine and Rehabilitation Grand Rounds at least once monthly, the monthly Exercise Medicine Distinguished Lecture Series, and one additional seminar per month. Each of the 28 University-Wide Interdisciplinary Research Centers (UWIRCs) (see Facilities and Other Resources) holds a regular seminar series and many also have journal clubs. In addition, most departments and divisions hold weekly or bi-weekly seminars. These will provide trainees with numerous opportunities to learn and interact with faculty, external speakers, and fellow trainees from this and other training programs. Workshops offered by the CCTS, OPE, UWIRCs, or Research Core Facilities also provide valuable training opportunities. Trainees will also attend the annual Research Core Day to see the wealth and breadth of state-of-the-art scientific technologies and clinical research resources available at UAB for application in their research and training (see Appendix C). Documentation of attendance at these important activities will be the responsibility of the trainee and mentor, and will be submitted with the trainee’s semi-annual progress report.

Annual Interdisciplinary Rehabilitation Research Symposium. A crown jewel of P&RMP will be our annual symposium. This will be a 1-day event held each year in conjunction with the External Advisory Panel visit. All pre and postdoctoral trainees who are or were previously funded by the T32 program will present research in a combination of poster and oral formats and will compete for awards. This will be a very effective means of giving the external advisors a real flavor for the program. Each year the symposium will feature an invited keynote speaker—a prominent scientist in the field. Certainly external advisors will be among those invited to give the keynote address. Poster and oral presentations by trainees will be judged and awards will be presented. Pre and postdoctoral trainees, along with junior faculty from outside of the P&RMP, will be encouraged to participate in the competitions as well. In support of the P&RMP and its trainees, the UAB Center for Exercise Medicine, School of Medicine, and School of Health Professions have **each committed \$3000/yr (\$9000/yr total)** to this annual symposium to ensure its success.

Presentation at Scientific Meetings. The goal and expectation is for each P&RMP trainee to enrich the training experience by annual attendance and presentation at 1-2 national scientific meetings. In addition to the training-related expenses that have been budgeted for this, we are fortunate to have received a generous contribution from the Nutrition Obesity Research Center (**\$4000/yr**) to support trainee travel for obesity related rehabilitation research. Additionally, both the OPE and Graduate School sponsor travel awards competitions each year, and many of the program faculty’s current and past trainees have competed successfully for these awards.

Research Training Commitment

Predocctoral trainees will be fully committed to their research, coursework, and other required program enrichment opportunities. Each postdoctoral trainee sponsored by this program will devote at minimum 90% effort to research. Supported clinical (e.g., MD, DO, DPT) postdoctoral trainees will be ensured at least 90% effort of protected time for research, and their progress will be closely monitored by the PD to ensure that the research experiences are meaningful with a significant emphasis on more basic research, rather than an extension of clinical responsibilities. While clinical research endeavors are strongly encouraged and will be fostered by the program and mentoring team for both PhD and MD postdoctoral trainees, in our view a major emphasis of the training experience for clinical trainees should be in laboratory-based science to provide a logical avenue toward truly translational, independent research.

Table C. Integration of the two predocctoral programs and sample training plans for one predocctoral trainee recruited from Graduate Biomedical Sciences (GBS) and one recruited from Rehabilitation Science.

Trainee A: GBS	Trainee B: Rehabilitation Sciences
YEAR 1: Fall Term	YEAR 1: Fall Term
<ul style="list-style-type: none"> GBS 700 Core Course: Biochemistry, molecular biology, genetics, biological organization Seminar series (weekly) GBS 796 Laboratory rotation 1 	<ul style="list-style-type: none"> RHB 780 Principles of Rehabilitation Science: Controlling Movement RHB 783 Research Design and Measurement I RHB 789 seminar series (weekly) RHB 790 Laboratory rotation 1
YEAR 1: Spring Term	YEAR 1: Spring Term
<ul style="list-style-type: none"> GBS 750-752 Physiology & Pathobiology: <ul style="list-style-type: none"> GBS 750 (Jan) Nervous, Musculoskeletal GBS 751 (Feb) CV, Pulmonary, Renal GBS 752 (Mar): GI, Endocrine, Immune GBS 753 (Apr) Pharmacology & Molec Med Seminar series (weekly) GBS 796 Laboratory rotations 2-3 	<ul style="list-style-type: none"> RHB 781 Principals of Rehabilitation Science: Taking Care RHB 784 Research Design and Measurement II RHB 789 seminar series (weekly) RHB 790 Laboratory rotations 2-3
YEAR 1: Summer Term	
<ul style="list-style-type: none"> Application and admission to the T32 P&RMP training program GRD 717 Principles of Scientific Integrity and BST 621 Statistical Methods I <ul style="list-style-type: none"> Mentored non-dissertation research 1st Translational Mentoring Team meeting 	
YEAR 2: Fall Term	
<ul style="list-style-type: none"> CCTS Vocabulary of Clinical and Translational Science UCEM Workshop: The State of Exercise Science in Rehabilitation Medicine **P&RMP activities required each semester throughout remainder of training** 	
<ul style="list-style-type: none"> RHB 780 Mentored non-dissertation research 	<ul style="list-style-type: none"> GBS 700 Core Course Mentored non-dissertation research
YEAR 2: Spring Term	
<ul style="list-style-type: none"> GRD 726 Grantsmanship and Scientific Writing 2nd Translational Mentoring Team meeting 	
<ul style="list-style-type: none"> RHB 781 Mentored non-dissertation research 	<ul style="list-style-type: none"> GBS 750, 751, or 752 Mentored non-dissertation research
YEAR 2: Summer Term	
<ul style="list-style-type: none"> *Elective course toward CCTS Certificate in Translational and Molecular Sciences First full dissertation committee meeting (recurring every 6 months) 	
YEAR 3 and Beyond	
<ul style="list-style-type: none"> Targeted elective courses as determined by trainee and mentoring team Qualifying examination in Year 3 with primary focus on dissertation research thereafter <ul style="list-style-type: none"> Continued participation in P&RMP activities 	
P&RMP activities required each semester beginning in the Year 2 Fall Term	
<ul style="list-style-type: none"> Translational Rehabilitation Research Roundtable (2x/mo) Physical Medicine and Rehabilitation Grand Rounds (1x/mo) UAB Center for Exercise Medicine Distinguished Lecture Series (1x/mo) Self-selected interdisciplinary center seminar (approved by mentor) (1x/mo) Journal club (weekly) 	
*Elective courses toward CCTS Certificate in Translational and Molecular Sciences (sample list only): HMG 702 Phenotyping Human Disease; EPI 607 Fundamentals of Clinical Research; BST 625 Design and Conduct of Clinical Trials; HMG 705 Drug Discovery & Development; GBS 738 Experimental Design; GBS 780 Laboratory Methods; GBS 755 Integrative Bioinformatics; GBS 784 Stem Cell Biology; GBS 780 Cell Signaling; GBS 722 Genomic Sciences – Bioinformatics; MGE 725 Advanced Medical Genetics; BST 622 Statistical Methods II; MBA 681 Idea to IPO; GRD 705 Teaching at the College Level. Advanced discipline-specific courses (e.g. neuroscience, obesity, cancer) are also available.	

Training Duration. Predocctoral trainees. To be considered for P&RMP, predocctoral trainees must first successfully complete one year of training supported by one of the two entry programs. If accepted into P&RMP, T32 support will be limited to two years (2nd and 3rd years of PhD training) but trainees will be expected to fully participate in program activities throughout training. Support beyond these two years on the T32 grant will be the responsibility of the mentor. Funding status of the proposed mentor will therefore be an important consideration in review of a candidate's application. Certainly predocctoral trainees will be strongly encouraged to seek an individual NRSA fellowship for the latter years, and will be required to complete a grant writing course with this intention. Regardless of source of support, however, all trainees will be considered integral members of the program once admitted until graduation. **Postdoctoral trainees.** All applicants and mentors must be prepared to commit a minimum of two years to the program. While we expect training will be limited to two years in most all cases, postdoctoral trainees may seek a third year of support via a competitive process. However, individuals seeking additional years of training will be strongly encouraged to apply for an individual mentored award (e.g., F32 NRSA). Decisions regarding a possible third year of T32 support rest with the Executive Committee. If a trainee's mentor is a member of the Executive Committee, that member will be removed from the decision-making process regarding a potential third year of support, and replaced by a program mentor.

Training Plan Components Unique to Predoctoral Trainees

Regardless of which program is entered for the first year (GBS or Rehabilitation Science), the first year fall and spring semester requirements of that program must be completed successfully before becoming T32 eligible. Components unique to predoctoral training follow. **(i) Cross-over courses.** For P&RMP to achieve its goal of producing truly translational rehabilitation scientists, a melding of coursework and experiences across the translational spectrum is a must. Thus, once accepted to P&RMP, trainees will be required to complete additional coursework during the 2nd year that is offered by the partnering PhD program (**Table C**). These cross-over courses will satisfy some of the electives required within the individual programs. **(ii)** Additional required coursework unique to predoctoral trainees includes a biostatistics course (BST 621 Statistical Methods I) and GRD 726 Grantsmanship and Scientific Writing. **(iii)** The two participating programs, along with other graduate programs, combine to provide extensive lists of elective courses. Electives will be determined by the trainee, mentor, and Translational Mentoring Team. **(iv) Predoctoral CCTS training.** In addition to the on-line CCTS Vocabulary of Clinical and Translational Science program, by completing one of the select electives* (**Table C**), predoctoral trainees will earn the CCTS Certificate in Translational and Molecular Sciences (expected to be available Fall 2012). This certificate requires 12 credit hr of coursework particularly relevant to translational science, but because many of the required courses apply, the certificate can be earned without undue burden. **(v)** Predoctoral trainees will hone their data organization and presentation skills by presenting regularly in four forums: Translational Rehabilitation Research Roundtable, committee meetings, Graduate Student Research Day (annually), and the P&RMP annual symposium. Trainees will vie for awards at the two annual events. Trainees seeking to strengthen presentation skills will be able to take advantage of GRD 701 Presentation and Discussion Skills, offered by the UAB Professional Development Program.

Training Plan Components Unique to Postdoctoral Trainees

Research training for postdoctoral trainees will be supplemented with focused didactic lectures and

Table D. Didactic training and career development activities for postdoctoral trainees.

YEAR 1 REQUIREMENTS

- GRD 717 Principles of Scientific Integrity
- CCTS Vocabulary of Clinical and Translational Science
- UCEM Workshop: The State of Exercise Science in Rehabilitation Medicine
- OPE Translational Science for Postdoctoral Scholars
- OPE Grant Writing for Postdoctoral Scholars

Postdoctoral trainees admitted to P&RMP who are considered by the Exec. Cmte. to be promising rehabilitation scientists, but deficient in aspects of formal rehabilitation science education, must complete two of the following courses in YEAR 1 as a condition of the Individual Development Plan:

- RHB 780 Principles of Rehab. Science: Controlling Movement
- RHB 781 Principals of Rehabilitation Science: Taking Care
- RHB 783 Research Design and Measurement I
- RHB 784 Research Design and Measurement I

YEAR 2 REQUIREMENTS

- OPE Transition to Independence Monthly Workshop Series
- CCTS Professional Skills Training Program (PSTP)

REQUIRED THROUGHOUT TRAINING PERIOD

- Translational Rehabilitation Research Roundtable (2x/mo)
- Physical Medicine and Rehabilitation Grand Rounds (2x/mo)
- UAB Center for Exercise Medicine Distinguished Lecture Series (1x/mo)
- Self-selected interdisciplinary center seminar (1x/mo)

SAMPLE ELECTIVE TRAINING OPPORTUNITIES

- OPE Laboratory Management for Postdoctoral Scholars
- OPE Job Skills Course
- HMG 702 Phenotyping Human Disease
- EPI 607 Fundamentals of Clinical Research
- BST 625 Design and Conduct of Clinical Trials
- HMG 705 Drug Discovery and Development
- GRD 705 Teaching at the College Level and Beyond
- GRD 712 Research Writing and Style
- GBS 722 Genetic/Genomic Sciences – Bioinformatics
- GBS 755 Integrative Bioinformatics
- MBA 681 Idea to IPO

coursework, some of which are required (**Table D**).

Year 1. The first year postdoctoral curriculum will establish a foundation of knowledge on scientific integrity, translational science, and grant writing skills. The OPE grant writing course introduces every aspect of grant writing, including selecting funding mechanisms, writing individual grant sections, and understanding administrative policies. In addition, each postdoctoral scholar will write a grant application and have it reviewed through a 'mock study section' with faculty who evaluate trainee applications for the NIH. Postdoctoral trainees who, on entry, are considered deficient in aspects of formal rehabilitation science education, will complete two of the four core RHB courses as a condition of the Individual Development Plan. Such decisions will rest with the Executive Committee.

Year 2. The second year curriculum is a natural progression of career development and will thus focus on developing professional skills and transitioning toward independence by exposing trainees to several important topics germane to career planning (e.g., OPE Workshop, **Table E**).

The CCTS Professional Skills Training Program, also held monthly, is a valuable seminars series designed to provide practical assistance in the areas of scientific writing, scientific presentations, career development, and leadership. Postdoctoral

Table E. OPE Transition to Independence Monthly Workshop

July – Teaching at the Undergraduate Level; August – Patent Law and Tech Transfer; September – Careers in Pharmaceutical Safety Assessment; October – Careers at Private Research Foundations; November – Scientific Writing for Industry; December – Careers at the Michael J. Fox Foundation; January – Preparing Job Application Materials and Portfolios; February – Interviewing and Negotiating Skills; March – Balancing Life and Science; April – Career Day / Job Fair; May – Skills Self-Analysis; June – Networking - Summer Picnic.

trainees will be encouraged to take advantage of numerous offerings by the OPE, which are listed in **Table D**. While an agreement with the trainee's mentor must be reached prior to enrollment in elective courses, trainees will be encouraged to take appropriate electives to address any deficiencies and/or to advance the trainee's knowledge of the "cutting edge" in a particular program area. **Teaching Opportunities.** Both PhD and MD trainees will be given opportunities to teach medical and/or graduate students as desired and appropriate, primarily in small group teaching formats. If teaching experience is desired, the PD will arrange such experiences through the School of Medicine curriculum, the Doctor of Physical Therapy program, GBS, or other avenues. Postdoctoral trainees frequently participate in these curricula as instructors and facilitators during small group case conferences. Trainees wishing to hone teaching skills will be encouraged to take GRD 705 (**Table D**). **Progression to Independence.** **Table F** summarizes our plan to progress postdoctoral trainees toward independence. A key component of each postdoctoral trainee's Individual Development Plan (IDP, Appendix A) is submission of an application for individual NIH funding. Trainees will be expected to write and submit an individual F32 NRSA application or a similar type of application to a specific agency (e.g., AHA) within the first 18 months of training. As two years of postdoctoral training comes to a close, P&RMP trainees will be fully prepared to submit junior faculty level applications (e.g., K01, K08, K23, K99/R00).

Table F. Two-year program timeline to transition postdoctoral trainees toward independence.

Months 1-8: Work primarily on mentor's research while learning new tools, taking didactic courses, developing ideas, and discussing them with mentor and mentoring team.

Months 9-15: Progress and begin to solidify own ideas, design and conduct pilot experiments with mentors' guidance, continue to advance laboratory and clinical research skills and submit pilot grant application. Continue didactic training, and work on mentors' project(s) but at reduced effort.

Months 15-18: Shift focus to prepare mentored grant application (F32 or K-award). Continue to collect and interpret own data, and continue work on mentors' projects but at less than 50% effort.

Months 18-24: Focus primarily on independent research and developing ideas for a larger application (R01-type), publish works accomplished, obtain additional key experiences in elective courses and explore new laboratory techniques.

For any trainee, deciding what direction his/her career will take following completion of the P&RMP should arise early to begin careful planning with the help of the PD, Executive Committee, mentors, and program faculty. In addition, the UAB Career Services Center, OPE, and CCTS provide services and programs that empower trainees to identify, refine, and pursue career aspirations. The Career Services Center offers a variety of services including resume and interview assistance, on-campus employer interviews, and individual career counseling.

Mentoring on Mentoring Program

An exciting feature of this training program is the integration of junior faculty mentoring. We have recruited four "rising stars" among UAB's junior faculty to participate as both mentors to trainees and mentees themselves: Drs. Bickel, DeLuca, Floyd, and Thalacker-Mercer. All four have burgeoning independent research programs, and look forward to mentoring students. **How the Program Works.**

When an incoming trainee's interests align with one of them as primary mentor, a senior mentor will be assigned by the PD to "mentor the mentor". The Mentoring on Mentoring Program will consist of frequent (monthly) discussions between the senior and junior mentor, addressing any and all concerns, questions, and unforeseen issues that may arise as the junior mentors begin to adopt their own style of mentoring. We feel strongly that this will be an invaluable training opportunity within the overall program. In subsequent years of support, efforts will be made to recruit additional junior mentors who have scientific interests aligned with the program and have demonstrated sound potential early in their careers.

d. TRAINING PROGRAM EVALUATION

Program quality and efficacy will be evaluated both internally and externally. Ongoing evaluation of training program quality will be the primary responsibility of the Institutional (IAP) and External (EAP) Advisory Panels in conjunction with the Executive Committee. We were extremely pleased to recruit the assistance of esteemed scientists to serve on the IAP and look forward to an equally impressive EAP (not yet named, per application instructions). As shown in **Figure 3**, the IAP will provide guidance and critical programmatic review on a semi-annual basis, reviewing the quality and diversity of the applicant pool each fall and the progress of currently supported trainees each spring. The EAP will convene in Birmingham once each year to provide overall programmatic guidance and review with respect to trainee selection and progress, effectiveness of the didactic curriculum, and attainment of overall program goals. **Trainees and Mentors.** Mentors will be evaluated by trainees every six months, using the evaluation form found in **Appendix B**. The process is designed to assess the mentor-mentee relationship and to correct or improve any problems or lack of communication. Mentors in turn will evaluate progress of trainees based on the **Individual Development Plan (IDP) (Appendix A)**, and both will submit written evaluations to the Executive Committee for review and feedback. The IDP will be prepared through a collaborative effort among the trainee, mentor, and Translational Mentoring Team prior to official admission, and will serve as a benchmark or measuring stick on which to monitor trainee progress. The IDP is also designed to spur second-year goal-setting and measures of achievement.

External Advisory Panel (EAP). This panel will be comprised of three, nationally recognized leaders in translational rehabilitation research and training from outside of UAB. The goal will be to secure a diverse panel of established leaders across the three levels of scientific inquiry built into this training program: i) Cellular and Molecular Pathobiology, and Animal Models; ii) Rehabilitation Science and Exercise Physiology; iii) Rehabilitation Medicine (clinical trials). At least one panel member will have established prominence as a researcher and mentor in molecular pathobiology of disease within one of the two areas of concentration in this program. Likewise, at least one panel member will be an experienced clinical trialist in rehabilitation medicine. Serving as PD of a T32 program in a related area will not be required but strongly considered. Panel member recommendations will be solicited from the P&RMP faculty and from the NCMRR Program. Recommendations will be reviewed and final selections (for invitation) will be made jointly by the Executive Committee in collaboration with the NCMRR Program. Recruitment of EAP members will begin shortly after notice of award, and members will be secured within the first three months of support.

The decided advantage of having an EAP is obtaining objective and unbiased, critical reviews with insights from other institutions that can facilitate improvement in the UAB P&RMP. The EAP will be expected to critically gauge the effectiveness of this program with respect to comparable programs; and to provide overall programmatic guidance and review with respect to trainee selection and progress, effectiveness of the didactic curriculum, and attainment of overall program goals. The EAP will convene in Birmingham annually for 1.5 days. Site visits will be scheduled in October in order to implement any recommendations of the EAP prior to the heavy recruitment season for postdoctoral trainees entering the program in the next academic year. The program's **Annual Interdisciplinary Rehabilitation Research Symposium** will be scheduled during these yearly EAP site visits to enable program trainees to formally present research updates to panel members. The Executive Committee will submit a written summary report of the training program to the EAP four weeks prior to each annual site visit. Evaluation activities during each EAP site visit will include meetings with the Executive Committee, mentors, current trainees, PD, institutional officials including Directors of University-Wide Interdisciplinary Research Centers clearly associated with the program, and the program's four-member IAP. The EAP will submit a written evaluation of the program to the Executive Committee within four weeks following each site visit. The EAP report will be reviewed by the Executive Committee, followed by implementation of the recommendations and program improvements as appropriate. The EAP will likely be consulted via teleconference during this implementation phase.

Institutional Advisory Panel (IAP). This local panel will be composed of four University leaders with particular expertise in targeted areas. Unlike the External Panel members which have not been named in this application (in accordance with PA-11-184 guidelines), we felt strongly that it was important to identify the IAP members in the application; frankly, the individual expertise of each member, as well as their combined enthusiasm to serve the planned program, illustrate the strong institutional environment and commitment to the program. The four panel members were carefully identified by the Executive Committee to ensure that the IAP is representative of the participating Schools and programs. The IAP will be comprised of Drs. David Allison, Robin Lorenz, M Patrick McNees, and J Scott Richards. David Allison, PhD, will chair the Panel. He is a Distinguished Professor and Associate Dean of the School of Public Health, and serves as PD of two T32 programs: one predoctoral (T32HL105349), and one postdoctoral (T32DK062710); and co-director of two others (T32HL079888 and T32NS054584). Robin Lorenz, MD, PhD, is Professor of Pathology (School of Medicine) and Program Director of the Medical Scientist Training Program (5T32GM008361-20) for dual MD/PhD seeking students, as well as the short-term (summer) research training program (5T35HL007473-30; Short Term Training in Health Professional Schools). Patrick McNees, PhD, is Professor and Associate Dean for Research and Enterprise Development in the School of Health Professions, which is the primary School affiliation for the Rehabilitation Science predoctoral program. Scott Richards, PhD, is Professor and Vice Chair of the Department of Physical Medicine and Rehabilitation. The combined expertise of these distinguished campus leaders will be invaluable. Please review the attached letters of support from the IAP members.

The IAP will provide guidance and critical programmatic review on a semi-annual basis, including selection of trainees, trainee progress, and preceptor performance, and offer written recommendations for future program planning and growth, reviewing the quality and diversity of the applicant pool each year and the progress of currently supported trainees each spring. The IAP will be responsible for gauging this program's effectiveness and progress relative to other UAB training programs, and for advising the Program Director and Executive Committee on strategies for continued improvement. Annual meetings bringing together the IAP and EAP will be planned.

Trainees' Career Development and Progression. During the T32 sponsored training period, each trainee's progress will be tracked via semi-annual reports to the Executive Committee that will be reviewed with

the mentor and trainee in conjunction with the trainee's IDP. Strengths and shortcomings will be identified, and any changes to the IDP deemed appropriate will be made at that time. After trainees move on, Dr. Bamman will ultimately be responsible for tracking former trainees. He will, however, have the advantage of working directly with the OPE and the two graduate program offices in doing so. Staff in these offices maintain a database of former trainees to track publications, grants awarded, positions accepted, promotions, etc.

e. TRAINEE CANDIDATES

Admission and Recruitment Strategies

The program will provide comprehensive research training for two predoctoral and two postdoctoral trainees during the first year, three each in the second and third years, and four of each per year thereafter. Formal applications will be accepted each spring for predoctoral applicants and year-round for postdoctoral applicants. Final decisions regarding T32 support rest with the Executive Committee. For postdoctoral trainees, recruitment and training efforts will be geared toward both PhD and MD (or DO) fellows. It is anticipated that most will hold a PhD degree; however, efforts will be made to recruit at least one MD fellow into the program

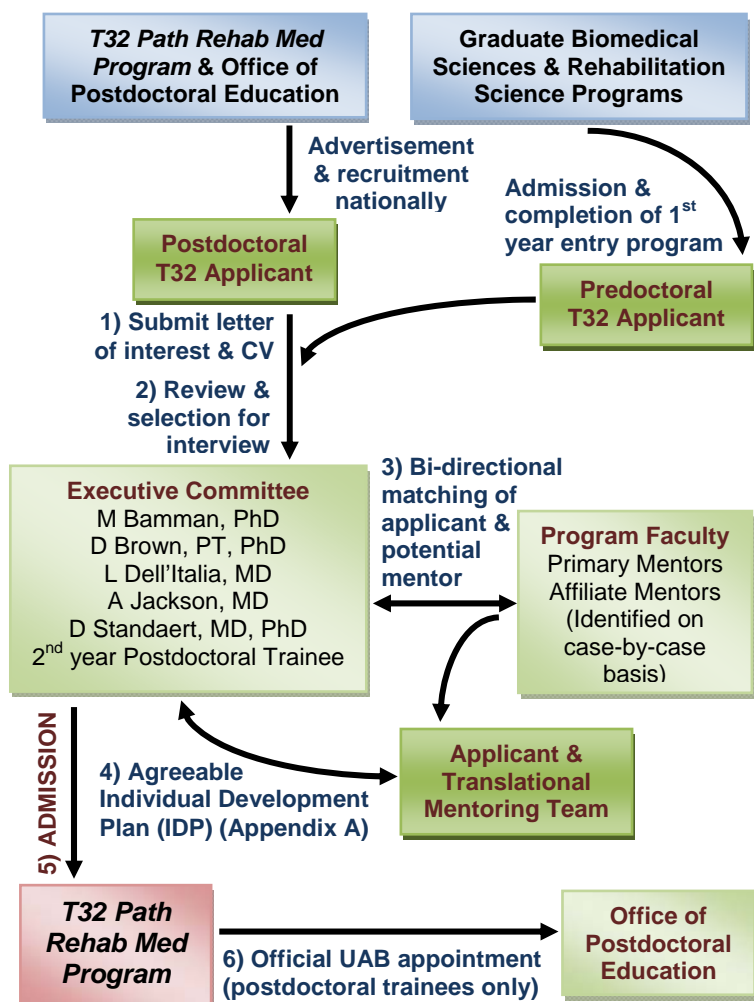


Figure 4. Applicant recruitment, review, & admissions processes.

must hold a PhD or MD (or DO) degree at time of entry. Prior academic or research training in some aspect of the rehabilitation sciences is encouraged but not required. For both pre- and postdoctoral candidates, admission to P&RMP will be dependent on the identification of a capable and willing mentor and Translational Mentoring Team, and on an IDP that meets the goals of the program and will effectively develop the candidate. Faculty members outside of the 31 program faculty may nominate trainee candidates, and may request affiliate faculty status to serve as mentor for a particular candidate. Admissions decisions rest with the Executive Committee. For postdoctoral candidates, following P&RMP admission, official UAB appointment must come from the OPE. Admissions and completion records for the participating departments, divisions, and programs during the past five years are summarized in **Data Tables 7A and 7B**. The percentage of TGE applicants

for a 2-year training experience during the five-year funding period. Clinical research training opportunities in P&RMP are abundant and will be facilitated by the numerous MD faculty mentors, as well as the many PhD faculty mentors who direct human research. **Figure 4** summarizes applicant recruitment, review, and admissions processes. **Recruitment.** Because of the relatively unique focus of this program (on pathobiology and rehabilitation medicine) and the established reputation of UAB as a site for outstanding research training, **recruitment nationally is the goal and expectation.** Postdoctoral trainees will be recruited via mailings, advertisements in scientific publications and at scientific meetings, and through direct contact with PhD training programs and MD residency programs. Recruitment of top notch postdoctoral trainees will be facilitated by the efforts of the OPE (travel to career fairs, national advertisements, etc), targeted advertising by the P&RMP, and funds generously provided by the Schools of Medicine (\$2000/yr) and Health Professions (\$2000/yr) to help support recruiting expenses. Promising postdoctoral candidates will visit UAB for 1.5 day interview including a scientific presentation, and meetings with prospective mentors and Executive Committee members.

Predocutorial recruitment will be handled much differently, as each potential applicant must first complete the first year of the predoctoral program entered. Recruitment of predoctoral trainees will therefore take place each spring (May-June).

Admission. Postdoctoral applicants to P&RMP

accepted into our predoctoral programs has steadily increased from 75% in 2007 to 84% in 2011 (Table 7A). As demonstrated in **Data Tables 8A and 8B**, our programs attract very high caliber TGE applicants from a truly nationwide recruitment pool (e.g., among accepted predoctoral students, average GRE = 1232 and GPA = 3.6). Qualifications of postdoctoral trainees currently being mentored by P&RMP program faculty, many of whom would be strong P&RMP candidates, are listed in **Data Table 9B**. Similar data for predoctoral candidates are shown in **Data Table 9A**. These tables combined clearly show the collective ability of this team of 31 mentors to recruit and train a highly qualified and diverse pool of trainees. The training histories of some of our more senior mentors are exceptional. A remarkably extensive listing of trainee publications can be viewed in **Data Tables 6A and 6B**.

f. INSTITUTIONAL ENVIRONMENT AND COMMITMENT

Institutional Environment

A truly translational research training program in pathobiology and rehabilitation medicine is only possible at an academic health center poised to meet the challenges of integrating basic biological sciences with clinical applications. Among the nation's leading biomedical research universities, UAB cultivates a long-standing, rich collaborative research environment ideal for comprehensive research training in the biology and clinical application of rehabilitation science. UAB offers an exceptionally rich combination of more than 80 state-of-the-art Scientific Core Facilities and 28 University-Wide Interdisciplinary Research Centers (UWIRCs) (see Facilities and Other Resources), over 75 pilot and departmental research centers, outstanding clinical research facilities capped by the CCTS, and a collective faculty that is world-renowned for its wealth and breadth of scholarly productivity. In essence, research training opportunities are limitless—any technology, experimental model system, or intellectual expertise sought by a burgeoning translational scientist can be found at UAB.

UAB is the only four-year, public university in Birmingham—Alabama's largest metropolitan area. The University has grown from 15 blocks in 1969 to more than 80 blocks with some 225 buildings providing over 12 million square feet of assignable space. UAB's budget of \$49.9 million in 1969 has multiplied to a current level in excess of \$2 billion. The economic impact of UAB is unparalleled in the state. It is Alabama's largest employer with over 53,000 full-time equivalent jobs, translating as 8 out of every 100 jobs in the Birmingham metropolitan area, as well as 3 of every 100 in Alabama. Additionally, externally funded grants and contracts continue to increase. This funding has doubled every decade since 1969 when UAB was established, and now stands at more than \$433 million. In funding from the National Institutes of Health, UAB and the School of Medicine consistently rank among the top 25, with seven departments among the nation's top ten. Excellence in health care is recognized within the UAB Health System. UAB Hospital specialty programs consistently rank among the top 25 (e.g., from 2011 edition of *US News and World Report's* rankings of "America's Best Hospitals": Rheumatology 11th, Nephrology 22nd, Pulmonology 25th, Urology 24th, and Gynecology 20th).

Our core of 31 enthusiastic and highly-productive faculty mentors are committed to advancing the field of rehabilitation medicine. These mentors, many of whom are united by long-standing research and mentoring collaborations, span 13 Departments and Divisions across the UAB Schools of Medicine, Health Professions, Public Health, and Arts and Sciences (see **Data Table 1**). Mentors direct active and well-funded research programs in an area of concentration highly relevant to this training program (see **Data Table 2**).

Translational Rehabilitation Research Environment. In addition to primary mentors' laboratories, numerous Center-affiliated basic and clinical core facilities and laboratories are utilized regularly by both trainees and mentors. Several of the primary mentors serve as Directors of Centers (Drs. Ball, Bamman, Dell'Italia, Garvey, Jackson, McMahon, Rimmer, Shalev, Standaert, and Zayzafoon) and Scientific Core Facilities (Drs. Ball, Ballinger, Bamman, Dell'Italia, Garvey, Gower, Jackson, and Nagy). **Particularly advantageous to trainees in this program are the established collaborations among specific centers directed by program mentors:** Spain Rehabilitation Center (Jackson); UAB Center for Exercise Medicine (Bamman); Comprehensive Neuroscience Center (McMahon); Center for Translational Research on Aging and Mobility (Ball); Comprehensive Diabetes Center (Shalev); Center for Heart Failure Research (Dell'Italia); and Center for Metabolic Bone Disease (Zayzafoon). University-wide Centers important to the cross-cutting themes of this program are also led by some of the primary mentors: Comprehensive Cancer Center (Assoc. Director Demark-Wahnefried); Center for Aging (Assoc. Directors Ball, Bamman, and McMahon).

In addition, since the prior submission of this application (2011), Dr. Jim Rimmer was recruited to UAB and brought the CDC funded National Center on Health, Physical Activity and Disability (NCHPAD), and the NIDRR funded Rehabilitation Engineering Research Center on Interactive Exercise Technologies and Exercise Physiology for People with Disabilities (RERC Rec-Tech). These are indeed outstanding additions that significantly enhance even further the UAB research and training environment, particularly in the area of

rehabilitation research training for persons with disabilities. Finally, Dr. Rimmer's appointment as Director of the Lakeshore Foundation/UAB Research Collaborative establishes a strong linkage between these two institutions. Lakeshore Foundation is one of the largest disability service providers in the U.S. that serves over 3500 people with disabilities on an annual basis in the areas of health promotion, sport and physical activity, and provides a strong base for conducting research on people with disabilities.

The environment for clinical and translational research and training is further enhanced by the programs and services provided by the CCTS. The CCTS was developed in response to the National Institutes of Health's (NIH) request for applications for Clinical and Translational Science Awards (CTSAs). The Center was officially approved by the University of Alabama's Board of Trustees on February 3, 2006 and funded by the NIH on May 19, 2008 (5UL1 RR025777). Robert P. Kimberly, MD, directs the Center. UAB is one of 60 academic health centers nationwide that are member institutions of the CTSA Consortium. The mission of the CCTS is to enhance human health by driving scientific discovery and dialogue across the bench, bedside, and community continuum. The vision of the CCTS is to speed the translation of research into improved human health. The Center is comprised of nine Components [Biomedical Informatics; Pilots; Drug Discovery; Research Ethics, Regulatory Knowledge and Support; Research Education and Training; Biostatistics, Epidemiology and Research Design (BERD); the Clinical Research Unit (CRU); One Great Community; and Cores] and the Research Commons. Detailed descriptions of CCTS programs, that will be of great value to the trainees and mentors in the P&RMP, can be found in Facilities and Other Resources. The CCTS is well-integrated into this training program and CCTS leaders are clearly committed to fostering the development of our trainees (see letters from Drs. Kimberly and Chaplin).

Commitment

In addition to the outstanding facilities, trainees of this training program will benefit from significant institutional support in several ways: **Major Financial Investments.** We are very fortunate to have strong support from the major programs and Schools associated with this training program. The Schools of Medicine and Health Professions have each committed \$5000/yr to support the annual interdisciplinary symposium as well as recruitment expenses (see letters from Drs. Ray Watts and Harold Jones). Similarly, we are fortunate to have received a generous contribution from the Nutrition Obesity Research Center (\$4000/yr) to support trainee travel for obesity related rehabilitation research. Finally, the UAB Center for Exercise Medicine has committed \$13,000/yr to support a number of enrichment activities including the annual symposium, bi-weekly research roundtable, journal clubs, and the Exercise Medicine Distinguished Lecture Series. All of these programs and efforts will have a significant, positive impact on our trainees' development and on the overall success of P&RMP. **These contributions total \$27,000 per year, or \$135,000 over five years**—real value added to the P&RMP by institutional support. Clearly, UAB is behind this program.

Administrative Support. Recruitment, appointment, tracking, and other administrative functions will be supported by the directors of the GBS and Rehabilitation Science programs (see letters from Dr. Susan Rich and Dr. David Brown) and Office of Postdoctoral Education (see letter from Dr. Lisa Schwiebert). Each of these offices assisted in the preparation of this application, and will continue to provide invaluable support during operation of the program. **Supplementation of Stipends.** Mentors in this program have a lengthy history of supplementing NIH stipends for postdoctoral trainees. These supplements are typically 3-5K annually, and are usually funded by a Center closely affiliated with the trainee's research. The practice of supplementing NRSA stipends with state funds is one of the many factors contributing to UAB's remarkable success in recruiting competitive trainees on a national scale. **New Curriculum Development.** New course development is strongly encouraged at UAB. Each of the major programmatic entities involved in this program (GBS; Rehabilitation Science; OPE; and CCTS) is responsible for curriculum development and each has encouraged new course development to fill knowledge gaps for a particular program. For P&RMP trainees, program faculty will offer a workshop, *The State of Exercise Science in Rehabilitation Medicine*, which will also be available to faculty and residents (e.g., Physical Medicine and Rehabilitation residents). **Protected Time for Mentoring.** Institutional commitment for protected mentoring time is very clear (see letters from Drs. Ray Watts and Harold Jones). This is not trivial; rather, it is significant that the mentors on each trainee's Translational Mentoring Team will have ample protected time for working with the trainee, which will optimize his/her training experience. In addition, the PD's 10% effort will be fully supported by the Department (see letter from Dr. Benveniste, Chair).