

Journal of Rehabilitation Research and Development

Rehabilitation R & D Progress Reports 1986

X. Arthritis

X. Arthritis

The Use of Biofeedback and Cognitive Behavioral Psychotherapy in the Treatment of Severe Rheumatoid Arthritis Patients: A Controlled Evaluation

Kenneth E. Applebaum; Edward B. Blanchard, Ph.D.; Maria Paz-Alfonso, M.D.; Edward J. Hickling, Psy.D.
East Orange Veterans Administration Medical Center, State University of New York, Albany, NY and Veterans Administration Medical Center, Albany, NY 12208

Sponsor: VA Medical Center and State University of New York at Albany

Purpose—According to the Arthritis Foundation, arthritis is the number one crippling disease in the United States. The majority of all arthritis patients under the age of 45 are those with rheumatoid arthritis (RA). Five million individuals in the United States have RA. Little is known about the etiology of this disease; however, it is known that RA may manifest as a chronic and degenerative disease. This deterioration may affect many aspects of life, including psychological and functional activities.

Medical treatment provided by a multidisciplinary team has become the standard to treat the RA patient. Within this team approach, psychophysiological intervention, as an adjunct to the standard medical regimen, has been used. Psychophysiological treatments have included relaxation training, biofeedback, and cognitive behavioral approaches to chronic pain. These interventions have a logical basis with regard to the maintenance of the RA condition. Lysosomal activity in the inflamed joints may prove differentially responsive to thermal biofeedback. Also, the behavioral manifestations accompanying chronic pain may be amenable to cognitive behavioral interventions in an effort to help patients cope and deal with the chronic nature of the RA condition.

Progress—This study utilized both a within-groups and a between-groups design in an effort to assess the effectiveness of a psychophysiological approach to the treatment of RA. An active treatment group was compared with a wait list control group. Both groups received pre- and post-assessments. The treatment consisted of progressive relaxation training, ther-

mal biofeedback, and cognitive-behavioral approaches to the treatment of chronic pain. Both groups were monitored for pain, sleep, and medication indices for a 10-week period, using both psychological and functional test measures during the treatment.

The participants in this study were 18 Stage II and Stage III RA sufferers, 8 males and 1 female per group. All subjects were from the Albany Veterans Administration Medical Center, referred from the Rehabilitative Medicine or Rheumatology Services.

During the initial assessment, a detailed arthritis history was administered to each subject. Additionally, psychological measures including the Beck Depression Inventory, State Trait Anxiety Inventory, McGill Pain Questionnaire, MMPI, and Functional Activities Questionnaire were administered. Following the completion of these inventories, all patients were shown how to monitor pain, sleep, and medication indices on preprinted arthritis diaries. At the conclusion of this initial assessment, all patients were assessed in Physical Therapy for range of motion, grip strength, and timed walk.

At the conclusion of the initial assessment, all patients in the wait list control group were instructed to monitor pain, sleep, and medication indices for a 10-week period of time. The patients in the active treatment group were asked to return to the hospital in 2 weeks in order to begin treatment. Treatment consisted of twice-weekly meetings for the first 4 weeks. Then, once-a-week meetings were held for 2 weeks. Two weeks after the last treatment session, patients in the active treatment group re-

turned to the hospital for post-treatment assessment. Thus, all patients in each group had a pre-assessment followed in 10 weeks by a post-assessment.

Preliminary Results—All data have been collected and are currently undergoing analysis. It is hoped that this intervention will have afford-

ed an improvement in chronic pain and adjustments that these patients have in their daily living. It is conjectured that this may be due to the perceived sense of control gained in psychophysiological intervention as well as modest improvements in physical functioning. Depending on results of this study, a more comprehensive ambitious project may be begun.

Arthritis Rehabilitation Unit

Carolyn Brunner, M.D.; Cynthia Stabenow, OTR; Stephen Wegener, Ph.D.; Amy O'Leary, MA
Rehabilitation Research and Training Center, University of Virginia Medical Center, Charlottesville, VA 22908
Sponsor: *National Institute of Handicapped Research*

Purpose—The purpose of the Arthritis Rehabilitation Unit (ARU), which consists of five beds in a 22-bed general rehabilitation unit, is to identify methods of managing arthritis patients that will result in either keeping them employed or in eliminating the need. The staff consists of a rheumatologist, orthopedic surgeon, psychiatrist, rehabilitation nurses, occupational and physical therapists, social workers, psychologists, and a vocational rehabilitation counselor.

Progress—To date, more than 160 patients have been admitted to the inpatient rehabilitation program. The primary diagnosis is rheumatoid arthritis, although patients with other diagnoses such as osteoarthritis and ankylosing spondylitis are admitted.

During the grant period the staff of the ARU have been collecting demographic data on patients participating in the program. In addition, the staff is using the Arthritis Impact Measurement Scale, an outcome measure developed at the Boston University Multipurpose Arthritis Center, to assess patients on nine scales: mobility, physical activity, dexterity, household activity, social activity, ADL, pain, depression, and anxiety. Three-month, 6-month, and 1-year followup data are collected on all of the patients at the rehabilitation unit to help determine the long-term benefits of the rehabilita-

tion program.

Training efforts have included a program in arthritis for the rehabilitation nurses on the unit, a physical therapy consultant to discuss management of musculoskeletal problems in arthritis for the entire staff, a statewide program for public health nurses in rehabilitation of patients with arthritis, and a nationwide video conference on management of arthritis using the multidisciplinary team approach.

The staff has completed a survey of more than 500 rehabilitation units to help determine the scope of arthritis rehabilitation in the United States and the need for staff training in management of arthritis patients. The ARU staff has also been engaged in a cooperative effort with the Virginia Division of Rehabilitation Services to place a part-time vocational counselor in the Arthritic Clinic and make available a program evaluator to interview patients. Information is gathered on their employment status or disability status to determine the extent to which people with arthritis are placed on disability and the extent to which rehabilitation services are utilized.

The staff currently has two research projects under way. These include an investigation of sleep problems in patients with rheumatoid arthritis and an outcome study of equipment use following discharge from the inpatient rehabilitation program.

Impact of Arthritis Self-Care for Rural Persons

Jean Goepfinger, Ph.D.

University of Virginia, School of Nursing, Charlottesville, VA 22903

Sponsor: *National Institute of Handicapped Research*

Purpose—The purpose of the Arthritis Self-Care (ASC) project is to develop and evaluate the impact of arthritis self-care programs for rural persons. The independent variable is type of arthritis self-care program, correspondence course, or small-group format; the dependent variables are knowledge, self-care behavior, pain, depression, and function/disability; intervening variables are self-care efficacy and social support.

Progress—Between 1982 and 1984 we: 1) conducted an assessment of the education needs of rural persons with arthritis; 2) developed the self-care curriculum; 3) “packaged” the curriculum in six classes that are offered to the participants in either the correspondence course or small-group format; and 4) completed a study of the psychometric properties and ease of administration of selected instruments to assess ar-

thritis pain and function.

Preliminary Results—In 1985 we: 1) began the process of entry into the rural communities selected as research settings; 2) identified and trained approximately 55 lay persons as community coordinators of the correspondence course or as lay leaders of the small groups; 3) recruited participants; and 4) completed the processes of random assignment, pretesting, and intervention with the first cohort of participants ($N = 250$). In 1986 we completed random assignment, pretesting, and intervention with a second cohort of participants ($N = 250$). We also began the collection of post-test data, at 4-month, 8-month, and 12-month intervals. Throughout the project we have presented our preliminary findings at professional meetings, regional and national, and have recently begun to publish our results.

Multipurpose Arthritis Center: Stanford University

Halsted R. Homan; James F. Fries; Deborah P. Lubeck; Diana B. Dutton

Stanford University, Palo Alto, CA 94304

Sponsor: *National Institutes of Health*

Purpose—The Stanford Arthritis Center (SAC) conducts research, educational, and patient care programs to improve health outcomes of arthritic patients. In particular, SAC designs and implements new educational and community programs and gauges their success by outcomes experienced by patients. To do so, SAC draws upon multifaceted research activities, large numbers of patients and community physicians, cooperating hospitals and health services, a major system for managing data (ARAMIS), and skills of economists, epidemiologists, educators, and health professionals in assessing new programs.

Progress—Central to SAC activities is develop-

ment of reliable methods to evaluate health outcomes. SAC has developed instruments measuring functional status, symptoms, adverse effects of drugs, and costs of health care for arthritic persons; other instruments, particularly concerning psychological variables and quality of life, are in developmental phases. This work depends upon a core unit that assists in experimental design, instrument development, data management and computational issues, biostatistics, and data analysis.

Continuing are seven successful programs concerning long-term outcomes for rheumatoid arthritis, juvenile arthritis and joint replacement; self-management education for patients; comparison of osteoarthritis outcomes in three

different health services; comparison of team versus individual physician care of chronic arthritis of the elderly; and treatment of refractory lupus nephritis with total lymphoid irradiation. Six new projects are added, all related to chronic arthritis: identification of influential psychological factors; analysis of incidence by population characteristics; a new method for estimating indirect costs; the impact of exercise on incidence of osteoarthritis; distinction be-

tween seronegative and seropositive arthropathies; and search for a pathogenic antigen in cartilage of rheumatoid joints.

Improved outcomes for arthritic patients nationally must occur within the limits of financial resources available. This center develops and evaluates care programs for large groups of arthritic patients with the objective of improving the effectiveness, efficiency, and satisfaction achieved by health services.

Multipurpose Arthritis Center: Boston University

Robert F. Meenan

Boston University, School of Medicine, Boston, MA 02118

Sponsor: *National Institutes of Health*

Purpose—This proposal describes in detail a plan to expand and strengthen the Boston University Multipurpose Arthritis Center (MAC). A program of activities and specific projects will be pursued in three major components: research, education, and community/health services research. The proposal also describes a plan to support areas of special research interest by means of two core units and to continue an effective administration component.

The research component will build on a strong base of work funded from other sources. In addition, four developmental and feasibility studies are proposed: 1) a study of Vitamin A metabolism in prealbumin forms of amyloid disease; 2) the isolation of cDNA clones for serum amyloid A; 3) an investigation of stair climbing and arthritis; and 4) a study of the difficulty dimension in functional assessments.

Progress—MAC education efforts will continue to be aimed at a broad spectrum of arthritis health professionals in conjunction with the Schools of Medicine, Nursing and Allied Health Professions of Boston University. Specific projects in the education component will include an evaluation of the current status of house officer education in rheumatology at internal medicine and family practice residency programs, a study of the effects of a targeted training program on interpersonal skills of

physical therapy students, and an investigation of coping in chronic arthritis.

Future Plans—Activities in the Community/HSR component of the MAC will continue to focus on the inner-city community in conjunction with the Department of Health and Hospitals of the city of Boston. Seven specific community/health services research projects are proposed: 1) a project to modify the Arthritis Impact Measurement Scales for use in clinical practice; 2) a project to develop a computer-based community network for clinical rheumatology trials; 3) an inner-city nursing home project combining outreach and data collection for this important population; 4) a study of the rheumatology referral behavior of general internists and family practitioners; 5) an epidemiologic study of osteoarthritis in conjunction with the Framingham Heart Study; 6) an epidemiologic study of oral contraceptives and rheumatoid arthritis in conjunction with an established drug epidemiology group; and 7) an investigation of the relationship between stressful life events and disease activity in rheumatoid arthritis.

Two core units are proposed: an amyloid studies core unit and a research and evaluation support core unit. These core units will support numerous investigations in areas of special interest to the Center.

Northeast Ohio Arthritis Center Support: Legal Aspects of Chronic Illness—A Study of Arthritis Patients

Judith P. Lipton

Case Western Reserve University, Cleveland, OH 44106

Sponsor: *National Institutes of Health*

Purpose—The long-term objectives of this proposal are: 1) to expand efforts directed towards the education of health professionals, patients, families, and the general public; 2) to develop, implement, and evaluate prototype community/health services programs at a high level of scientific endeavor; and 3) to expand clinical and basic research efforts.

Progress—New programs in education include: 1) an evaluation of use of the education-influential in teaching rheumatology to family practice training units; 2) studies of continuing graduate medical education in arthritis with emphasis upon involvement of the learner in the identification of objectives; and 3) augmentation of an audiovisual library as an umbrella educational resource.

Specific new community programs include:

1) a systems analysis of arthritis health care delivery in Northeast Ohio; 2) identification of the legal needs of arthritis (chronically ill) patients;

3) studies of the perceived needs of arthritis patients, and available resources to meet those needs as viewed by the patient and community health nurses; 4) the establishment of an industrial database pertaining to arthritis problems and management in Northeast Ohio; and 5) an evaluation of Northeast Ohio MAC/community organizations' behavioral interrelationships. Research programs are targeted to study cartilage metabolism and osteoarthritis, mediators of inflammation, acute phase reactants, the immune response in arthritis, genetic/clinical interplays in ankylosing spondylitis, and myopathic disorders.

Core programs include a cell/tissue culture unit, and an evaluation/education core as an overall resource to center project components. Administration includes administrative policy, executive, steering (operations), and community advisory committees to fully integrate center/university/community activities.

Multipurpose Arthritis Center: Community Component—Coping Responses to Rheumatoid Arthritis; Social Security Disability Study; Role Performance Limitations in Women With RA

Glenn G. Affleck; Arthur Weinstein; Susan T. Reisine

University of Connecticut Health Center, Farmington, CT 06032

Sponsor: *National Institutes of Health*

Progress—The NIH Multipurpose Arthritis Center is currently funding four major educational efforts: the computer-assisted patient education project, the physician-assisted program, family resident training education, and physical therapist education.

The computer-assisted patient education project has successfully completed a program for patients and families of patients with rheumatoid arthritis. This has been well received by patients and is currently undergoing testing by both patients and their families. Editing of the

program will proceed along with the evaluation process.

The physician-assisted program has completed a longitudinal study in which physicians are in contact with a patient with rheumatoid arthritis (the computer) over a period of 7 years. This is being evaluated by various types of physicians and by medical students. Editing of the program will continue as the evaluation proceeds.

The third program involves developing methods for teaching family medicine residents

and is continuing during the next year in which more data will be available and the testing methods improved.

The fourth program involves teaching methods and content development in the area of physical therapy. Undergraduate teaching of rheumatology by our NIH Multipurpose Arthritis Center funded physical therapist-educator is now in progress, and efficacy will be evaluated

during the coming year.

The research project on C3 phenotypes has led to interesting findings in that juvenile onset systemic lupus erythematosus patients have a higher incidence of one phenotype than adult onset patients. Patients with other rheumatic diseases are currently being evaluated. The Administrative Unit is functioning adequately for the Center.

Multipurpose Arthritis Center: Pain Management in Arthritis; Physical Conditioning Exercise Programs for the Arthritis Patient; Motor Skill Learning; Mini-Sabbatical for Physical and Occupational Therapists

Jerry C. Parker; Marian A. Minor; Terry D. Tenbrink; Marilyn K. Sanford
University of Missouri, Department of Medicine, Columbia, MO 65212

Sponsor: *National Institutes of Health*

Purpose—We propose the following objectives under education and training: 1) train arthritis specialist professionals to become educators; 2) provide high quality continuing education programs for all professionals; 3) develop improved curricula in musculoskeletal disease for undergraduate and graduate education of primary care professionals; and 4) study the effect of patient education and team care in knowledge, attitudes, and behavior in rheumatoid arthritis.

The research objective of our work is to determine if a computer-assisted program can increase the efficacy of the expert rheumatologist to influence favorably the medical management

for arthritis patients.

The community program objective is to: 1) determine the needs of various communities as related to arthritis; 2) plan programs best suited to meet these needs; and 3) conduct community demonstration programs in public and professional groups.

Methods will include questionnaires on information, attitudes, and behavior; computer analysis, regional and national conferences; team visits to communities; and personal participation in a multidisciplinary team approach to patient care in arthritis.

Multipurpose Arthritis Center: Community Component—Studies Using a Panel of Rheumatoid Arthritis Patients; Secondary Data Studies; Education Component—Arthritis In-Service Program for Home Health Agencies

Edward H. Yelin and Ida M. Martinson
San Francisco General Hospital, San Francisco, CA 94110

Sponsor: *National Institutes of Health*

Purpose—The Multipurpose Arthritis Center conducts a broad range of activities in each of three areas—education, community programs, and research. A strong basic research program includes studies in the underlying mechanisms of the rheumatic diseases, particularly immunological mechanisms. Almost all this research is supported by sources other than the center

grant. Among the activities directly supported by the current grant, the highest priority is given to education, particularly education of primary care physicians, nurses, and allied health professionals.

One objective is to improve the knowledge and skills of students and practitioners of these disciplines in caring for people with arthritis.

High priority is also given to research on a variety of issues in the delivery of health care to people with arthritis. Other objectives of this research are to construct a database in such areas as the distribution of rheumatology manpower, the costs and utilization of health services, and the causes and consequences of work

disability, and to analyze the data for their implications for public policy.

The center also conducts programs in patient and public education and is both an advocate in the community for people with arthritis and a source of authoritative information about the special needs of this group.

A National Arthritis Data Source (ARAMIS)

James F. Fries

Stanford University, Palo Alto, CA 94304

Sponsor: *National Institutes of Health*

Purpose—ARAMIS (the American Rheumatism Association Medical Information System) is a rheumatic disease computer data bank system containing longitudinal clinical data for approximately 19,000 patients and 120,000 patient encounters, and representing more than 100,000 patient-years of observation. The system operates from an IBM 370/3081 computer at Stanford University and is accessed nationally through TYMNET or TELENET communications networks using the Time-Oriented Data Bank (TOD) data management system.

Progress—The program is based upon the premises that chronic diseases have become the most prevalent health problems, that study of such diseases requires observation of occurrences over prolonged time periods, that the expense of longitudinal study requires use of economies of scale, that patient outcome in chronic disease results from a complex interplay between multiple factors, and that many important questions need to be studied with observation and experiments. This program has the goal of improving knowledge, management, and patient outcome in arthritis by providing long-term information relating disease severity, patient characteristics, social factors, and treatment to patient outcome.

The program has two major aims: first, to continue to develop a national data resource of high quality, longitudinal, accessible clinical data; and second, to employ these data in a systematic, multicenter investigative program of major clinical questions in the rheumatic diseases. Program priorities include the classification and definition of diseases, the systematic study of long-term (6- to 20-year) outcomes, the economic impact of illness and treatment, and study of regional and national differences. Thirty clinical investigators and epidemiologists at 12 institutions undertake more than 50 projects annually.

The present proposal includes classification studies of osteoarthritis, rheumatoid arthritis, vasculitis, and systemic lupus erythematosus; economic impact studies in each major disease; comparative studies of arthritis at different sites; population-based studies of incidence and prevalence; and long-term studies of outcome in rheumatoid arthritis, juvenile arthritis, scleroderma, systemic lupus, osteoarthritis, and following joint surgery. With this project, 15 years of data development at numerous institutions are brought to bear upon major clinical questions, and very large and detailed longitudinal patient data sets are made nationally available.

Epidemiology Program Project: Rheumatoid Arthritis—Course and Outcome

Leonard T. Kurland

Mayo Foundation, Rochester, MN 55901

Sponsor: *National Institutes of Health*

Purpose—Under the Rochester Epidemiologic Program Project (REPP), a unique population-based data source, covering the medical histories of the Olmsted County population throughout their local residence, has been developed.

Progress—This central diagnostic index has served as the basis for over 180 epidemiologic studies on a myriad of topics—many relating to critical health issues of national importance, and all with excellent case ascertainment. The research facility has been used not only by the REPP staff, but also by many clinical and public health colleagues both within and outside of the Mayo Clinic. The REPP provides the population-based data for several other major program projects, including the Comprehensive (Minnesota) Epilepsy Center and the Mayo Stroke Center. The continued updating of the central diagnostic index is essential to preserve this research potential.

Future Plans—In the near future it will be necessary to obtain support for our epidemiologic program from the several categorical institutes of NIH. The purpose of this continuation proposal is to apply for funds that will allow for an orderly transition without a breakdown of the basic system. In this proposal, we request funding for: 1) continued supplementation of the Mayo Clinic diagnostic index with data from the Olmsted Medical group, Olmsted Community Hospital, and several other non-Mayo sources of medical care in Olmsted County; 2) the development, from the medical records, of an Olmsted County population frame to permit unbiased selection of controls for case-control studies; 3) development of methods within the database for studies of familial aggregation; 4) continued support for epidemiologic projects now nearing completion, such as rheumatic fever, prostate cancer, and cholelithiasis; and 5) new studies in limb fractures and trauma to the nervous system.

Multipurpose Arthritis Center: Problem-Oriented Educational Program for Arthritis Using Aerobic-Type Exercise

Susan G. Perlman

Northwestern University, Chicago, IL 60611

Sponsor: *National Institutes of Health*

Purpose—This MAC proposal engages scholars and scientists from various schools and departments of Northwestern University and from the community in a comprehensive arthritis program. Five feasibility projects are proposed: cell cytotoxicity in rheumatoid arthritis; phenytoin modulation of collagen and collagenase synthesis in synovial cells and effect on macrophages; connective tissue constituent immunogenicity in juvenile chronic arthritis; synovial pathology in early osteoarthritis; and analysis of osteoarthritic and rheumatoid bone for use in prosthesis design. These projects will support new young scientists as well as allow three

senior scientists to extend or redirect their work.

The second area of focus is an interdisciplinary educational program, utilizing a problem-solving approach, aimed at both professionals and patients. The three projects proposed are to: train and evaluate rheumatology fellows as teachers of medical residents using a new curriculum to be developed in outpatient musculoskeletal disease; evaluate a problem-oriented, aerobic-like exercise program for arthritics; and use a discussion group format to enhance problem-solving skills in the older osteoarthritic. The interdisciplinary team includes profession-

al educators, a medical education evaluator, and health professionals at the medical school.

The third area of focus, community and health services research, draws upon a strong base of community involvement combined with the research excellence of Northwestern's Center for Health Service and Policy Research (CHSPR). Three interrelated projects explore various aspects of knee pathology. The first will develop and validate a measure of outcome for a subsequent comparative study. The second will examine the costs of treatments for osteoarthritis of the knee. The third builds upon the

work of the earlier two to compare costs and efficacy of arthroscopic surgery and alternatives. Three additional projects add breadth to the research agenda focusing upon musculoskeletal impairment in the elderly, status of families with juvenile arthritic children and a multi-center study of Social Security payment allocation systems.

The Biostatistics and Data Management Core will provide individual project technical assistance as well as database management for a computerized case finding patient index.

Multipurpose Arthritis Center: Education—Arthritis Patient Education Model; Medical Allied Health Professions Integrated Curriculum in Arthritis; Arthritis Rehabilitation Training Program for Industrial Managers; Disability Determination of Arthritis

Brenda Devellis; Marlys M. Mitchell; Charles P. Friedman; Paul Leung
University of North Carolina at Chapel Hill, Chapel Hill, NC 27514

Sponsor: National Institutes of Health

Purpose—The UNC-CH Multipurpose Arthritis Center (MAC) represents a broadly based, coordinated effort by faculty and staff in the Schools of Medicine, Nursing, and Public Health to develop new basic knowledge, enhanced education, and improved mechanisms for health care delivery in arthritis. Providing special impetus and support in this regard are the following: Area Health Education Centers Program; NC Rehabilitation Network; UNC Rehabilitation Program; the ongoing Arthritis Rehabilitation in Industry Program; and the NC State Arthritis Act and its legislated planning committee. Certain new directions in an already well-established immunology research program will be pursued, e.g., study of the idiotype/anti-idiotypic network in human autoimmune disease, analysis of tissue deposited immune complex function in SLE, and the establishment of an immunoreagent/immunoassay core facility.

The major thrust of MAC-proposed activi-

ties, however, concerns a series of innovative projects in the education and community components. These include: 1) study of a new psychosocial model for patient education; 2) development of educational models in arthritis for occupational and physical therapists, both as part of a core undergraduate curriculum, and also in the community for those already in practice; 3) development of a health care model for ambulatory elderly patients with arthritis to be conducted jointly by nurse practitioners and occupational therapists; 4) analysis of the Social Security Administration disability determination process for arthritis; 5) development of a model training program in arthritis and rehabilitation for industrial managers with applicability to the general problem of the worker with arthritis; and 6) an epidemiologic study of patterns of arthritis care in Eastern North Carolina. In all of these projects, particular emphasis has been placed upon effective evaluation, which will be aided by an evaluation core.

Robert B. Brigham Multipurpose Arthritis Center: Feasibility Study—Evaluation of Total Knee Replacement by Gait Analysis; Community Component—Social Security Disability Study

Sheldon R. Simon and Matthew H. Liang

Brigham and Women's Hospital, Boston, MA 02115

Sponsor: *National Institutes of Health*

Purpose—This grant is requested to develop three areas of special interest. The first is applied research in which we aim to: 1) develop a necessary and sufficient database for the rational planning of health services to arthritics; and 2) develop and evaluate model components of cost-effective health care delivery for arthritis patients. Thus, under community component, we propose to develop and critically evaluate: a seven-day rehabilitation work schedule; a model health care system for arthritis disability; stepped-up rehabilitation services to homebound patients; a system of follow-up of rheumatic disease patients discharged from a tertiary care facility; a patient-oriented strategy to improve clinical outcomes; and an educational strategy for the primary prevention of low back injuries in the work place.

As one of the four major joint replacement centers in the world, we propose to evaluate the cost-effectiveness of joint replacement by a multidimensional outcome assessment. We seek to document the economic burden to arthritics and shortfalls in the present health care reim-

bursement scheme. We also propose to evaluate the means by which interventions can be evaluated by comparing the relative merits of existing health status functional instruments.

The second priority is the development of a core unit for quantitative research methods, clinical epidemiology and evaluation research, which would overlap with many activities of the center and would aid investigators in training and establishing investigators. The unit would support at least 10 projects, from the day-to-day management of special disease registries to clinical studies directed at improving clinical strategies and registries to clinical studies directed at improving clinical strategies and decision-making in rheumatology, and applications of basic research.

Finally, we propose pilot studies in a neglected area of research, the management of severe rheumatoid arthritis patients who have failed all conventional therapy; thus, the protocols addressing the critical evaluation of total nodal irradiation therapy and leukapheresis therapy of refractory rheumatoid arthritis.

Study of Behavioral Aspects of Rheumatoid Arthritis

Kenneth A. Wallston

Vanderbilt University, School of Nursing, Nashville, TN 37240

Sponsor: *National Institutes of Health*

Purpose—The long-term objective of this project is to gain a fuller understanding of the behavioral aspects of rheumatoid arthritis (RA), a chronic condition that affects more than 5 million persons in the United States and is a leading cause of disability. The major question to be explored is: Why and how do some persons with RA manage to cope very effectively with this disease while others appear to become helpless in the face of it? Specifically, this investigation aims to 1) investigate longitudinally

the health and illness behaviors of a samples (panel) of persons with RA; and 2) to determine the extent and developmental course of learned helplessness and active coping in persons with this condition.

This investigation will lay the groundwork for future interventions aimed at helping persons with RA cope with their illness. A panel of 360 patients with RA ranging from those newly diagnosed to those who have had the condition from 5 to 6 years will be studied at six-month

intervals over a 3-to-3.5-year-period via mailed questionnaires and/or telephone interviews.

Progress—Among the instruments already developed for this project are measures of arthritis-specific attitudes, locus of control beliefs, depressive affect, values, health and illness behaviors, and functional capacity. These measures will be administered repeatedly over the course of the study to ascertain changes in behavior and its psychological concomitants. This design was chosen to provide data over the first 10 years of a person's history with rheumatoid ar-

thritis and its resulting disabilities.

Future Plans—Multiple regression analyses are planned to test theoretical models linking arthritis history and experience variables to indicators of learned helplessness or coping which, in turn, will be regressed upon health and illness behaviors and health outcomes. In addition to testing models, these data will provide a wealth of systematically gathered descriptive information to greatly expand our knowledge of rheumatoid arthritis.

Energy Conservation and Joint Protection in Rheumatoid Arthritis

L. H. Gerber

National Institutes of Health, Bethesda, MD 20892

Sponsor: *National Institutes of Health*

Progress—To facilitate the adoption of energy conservation (EC) and joint protection (JP) behaviors in adults with rheumatoid arthritis (RA), a workbook-based education program using behavioral modification techniques with emphasis on developing behavioral awareness and problem-solving skills was designed. To evaluate the effectiveness of this intervention, a randomized study was designed to compare traditional occupational therapy (OT) training in the NIH and EC centers (Ann Arbor, Michigan; Brigham and Women's, Boston; and Good Samaritan, Baltimore). Patients were evaluated using an activity record adapted to measure behavioral objectives, as well as ADL, joint, psychosocial adjustment to illness, and patient and family knowledge evaluations. Experimental and control patients were tested immediately before treatment, and three months and one year following treatment. Behavioral objectives included modified patterns of rest and physical activity, including increasing frequency of rest during physical activity periods, increasing time spent physically active and in preparation and planning.

Preliminary Results—A total of 28 patients from all centers were entered from March 1983 until March 1984. Three months of data on 23 patients are currently available. Findings from the activity record showed that 46 percent of the experimental and 12 percent of the control patients improved in the amount of time spent physically active ($p = 0.1$); 53 percent of the experimental and 16 percent of the control patients increased the frequency of rest during periods of physical activity ($p = 0.07$); and 50 percent of the experimental and 20 percent of the control patients increased the time spent in preparation and planning. Three months after treatment, 25 percent of the control patients increased their index of physical activity (IPA) (i.e., index of the balance between rest and physical activity) while 47 percent of the experimental patients increased their IPA.

Although the number of patients in this preliminary research study is small, the results indicate that the new program may be more effective in changing energy conservation behaviors in RA than current approaches.

Ferrographic and Biochemical Analysis of Wear Particles in Human Joints _____

Dana C. Mears, B.M., B.CH., D.D. S., and Christopher H. Evans
Veterans Administration Medical Center, Pittsburgh, PA 15240

Sponsor: VA Rehabilitation Research and Development Service

Purpose—This project had two goals. The first was to use the technique of ferrography to analyze the wear particles of human synovial fluids with the aim of providing improved diagnostic and prognostic information. The second was to determine to what extent the wear particles were involved in pathophysiological processes in arthritic joints.

The ferrographic analysis has confirmed the presence of discrete populations of cartilaginous particles within the synovial fluids of human joints. Furthermore, these populations varied according to the nature of the disorders within the joint. This was best illustrated by the results obtained with knees with torn anterior cruciate ligaments. Here, a large population of very small microspheres of cartilage was recovered. Our biochemical studies suggest that these particles may be involved in the arthritic degeneration that often follows transection of this ligament.

Preliminary Results—Preliminary ferrographic studies have also shown that the pattern of particles obtained from rheumatoid fluids is quite different from those seen in non-rheumatoid fluids. Furthermore, the ferrographic analysis of fluids from prosthetic joint replacements has yielded promising results.

Wear particles activate synoviocyte cultures, promoting the synthesis of collagenase and other neutral proteinases. At least part of this response is due to the collagenous component of the particles, as this alone is active. These reactions are probably important *in vivo*, as our results have shown that intraarticularly injected wear particles or highly purified cartilage proteoglycans promote arthritic changes in rabbits' knees.

Synoviocytes activated by wear particles, or their products, secrete substances related to interleukin-1 which cause chondrocytes to degrade their own cartilaginous matrix.