

XIV. Geriatrics

Age-Related Changes in Sensorimotor Performance

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Sponsor: *VA Rehabilitation Research and Development Service*

Purpose—The goal of the proposed research is to achieve an integrated understanding of changes in sensory-motor performance as healthy people grow older. The broadest statement of the question to be answered is “What are the age-related changes in the components of the sensory and motor systems, and how do they relate to functional changes with age?” Answers to this question will help us understand sensorimotor deficits in older patients with neurologic disease.

Progress—We are evaluating a population of 160 individuals, ranging from 45 to 84 years, utilizing measures which objectively evaluate segments of the neuromusculoskeletal system (myostatic reflexes; joint compliance; muscle strength; simple ankle joint voluntary movements; somatosensory evoked potentials) and methods which identify systemic functional integrity (postural stability and steadiness; gait). Correlations are being made of the study variables for each of these test procedures to test the hypotheses about changes in sensory-motor performance in older subjects. Special attention is being paid to variations in data from subjects who report a history of falling or who have a sense of “unsteadiness.” Because of the integrated nature of the tests which we perform, patients with neurologic disease have also been referred for study by the Departments of Neurology, Neurosurgery, Physical Medicine and Rehabilitation, and Pediatric Neurology and Orthopedics.

In addition to a questionnaire and general medical history and a general physical and neurological examination, all subjects studied are being evaluated by the following tests: Functional tests: objective tests of muscle strength; gait study; test of postural stability and steadiness (standing balance); Motor coordination studies of the lower limbs: myostatic reflex test; ankle joint compliance; voluntary ankle joint movement; Sensory test: somatosensory evoked

potentials. Muscle strength is compared in normal adult subjects using the modified Cybex isokinetic dynamometer and the newly acquired Penney and Giles myometer. We intend to validate the use of the myometer to simplify data collection on the healthy elderly subjects. Output of strength from the myometer can then be directly downloaded to a microcomputer for automatic data collection and analysis.

Gait studies are performed on videotape, data is digitized, and analyzed on a microcomputer. The Motion Analysis system captures data optically through a charge-coupled device camera. Two-dimensional data is analyzed on an IBM-AT computer using Expert Vision System software. We measure hip, knee, and ankle joint angles, and velocity and distance profiles for each trial, as well as statistical analysis of these parameters. We are using new software to create stick figures to illustrate movement of the trunk and limb segments during the gait cycle. Video recording permits immediate feedback for the subject, researcher, and clinician. Slow-motion playback of a subject's gait allows improved accuracy of observational analysis, against which the objective computer analysis is compared. This new digitized analysis increases the consistency of measurements between subjects while maintaining the accuracy of the photographic method.

Preliminary Results—During the first 6 months of this project, we have upgraded the data acquisition and data analysis systems for the functional performance and motor control methods. We have been accumulating a database of sensorimotor performance measures on young adult normal volunteers to verify the continuity of new data acquisition systems with the previous methods, and to serve as controls for the formal study of healthy elderly subjects. Furthermore, serial and longitudinal data have been collected from patients with such neurologic dis-

eases as spinal cord injury, cervical spondylotic myelopathy, multiple sclerosis, stroke, developmental delay, Alzheimer's disease, and pyramidal and extrapyramidal disorders.

Future Plans/Implications—Postural stability and steadiness in standing will continue to be evaluated by monitoring the center of pressure (i.e., the excursion of the vertical projection of the center of gravity) and the force distribution under each foot. Data will be collected using a microprocessor-based system (SDK-85) with 12-bit A/D converter to obtain the data from the strain gauge elements in the force plates. The distribution of forces under the left and

right feet and the corresponding weights will be computed and stored. As an option, the overall center of pressure can be output through D/A converters to an oscilloscope for visual feedback to the tester or the subject. Subsequent to data collection, the stored values as a function of time will be downloaded to the IBM-AT for correlation with EMG data and further analysis.

In the interim, tests of the myostatic reflex have been conducted using a portable microcomputer based data collection system, and some limited motor control studies have been conducted in collaboration with the Motor Control Laboratory of Rush Medical Center.

Efficacy of Injectable Collagen to Correct Glottal Insufficiency

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Sponsor: VA Rehabilitation Research and Development Service

Purpose—This study is a pilot project to determine the efficacy of injectable collagen in improving the voices of elderly patients suffering from presbylaryngis—a term used to describe laryngeal changes in the elderly. With advanced age, the voice often becomes weak and breathy due to atrophy of the vocal fold parenchyma. Although such changes are physiologic events associated with aging, these changes may result in impaired ability to communicate and to function in a competitive environment.

Observations in elderly patients treated for glottic insufficiency due to neurologically-induced atrophy indicated that injection of collagen to augment the atrophic vocal fold could increase vocal efficiency. Elderly subjects without associated deficits, as well as those with paresis or paralysis of the laryngeal musculature, would seem to be candidates for such therapy. This study was designed to see if such an approach might be helpful in the patient with presbylaryngis.

Progress—It was estimated that 20 patients with presbylaryngis might be treated over a 1-year period. As of this date, we have screened 36 patients, 18 of whom appear to meet the clinical criteria for presbylaryngis. Progress to date may be summarized as follows:

Thirty-six patients have been screened. Of these,

6 had normal larynges (no pathology); 2, gastroesophageal reflux laryngitis; 2, pulmonary disease; 2, neurological disease; 2, laryngeal cancer; 3, spasmodic dysphonia; and 18, presbylaryngis. Of the presbylaryngis group, 12 had completed voice studies with data processed. Nine underwent skin tests for collagen sensitivity that might preclude collagen injections. All nine patients had nonreactive results. Two patients have completed injection treatment and appropriate follow-up studies. Four patients are scheduled for injection treatment and three are still to be scheduled.

Preliminary Results—Of the two patients treated, there have been no adverse reactions, and the patients feel that their voices have improved. Data analysis of aerodynamic and acoustic studies show areas of improvement, but the two patients are dissimilar anatomically, so it is not meaningful to analyze their pooled or averaged data. In both patients, videostroboscopic studies revealed improved function with more complete vocal fold approximation during phonation following treatment. Both patients exhibited significantly improved habitual intensity or loudness during phonation following injection. All parameters appeared to be improved in one patient with atrophic presbylaryngis changes associated with paresis; changes were mixed

in the other patient who had more subtle changes without paresis. This might suggest that we can anticipate the greatest improvement in patients with the most incapacitated larynges.

Future Plans/Implications—Based on this preliminary study, we have designed a more comprehensive study which will entail a multi-faceted approach to the rehabilitation of patients with symptomatic presbylaryngis. It was apparent that many of the patients who presented had associated problems that con-

tributed to their disability. With some disorders, e.g., early cancer of the vocal fold, this required immediate surgical management. In other patients, the pathology and symptoms were not sufficient to warrant the risk of possible failure of an experimental injection procedure. Some of these patients have been responsive to behavior modification and medical management. Future studies will explore the roles of voice therapy, and medical and surgical management of patients with presbylaryngis.

Geriatric Prosthetics: Design and Development of an Improved Above-Knee Socket (Project Extension)

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Sponsor: VA Rehabilitation Research and Development Service (Project #XA308-2RA)

Purpose—The long-term objective of this project is to develop a prosthesis for geriatric Above-Knee (AK) amputees that is comfortable, stable, and energy efficient, and that meets all of the special physiological, biomechanical, and psychological needs of these patients. The immediate objective of this project is to develop the socket component of this prosthesis, such that: 1) it does not introduce stresses in the stump tissues that impair circulation or exceed the viscoelastic limits of these tissues; 2) it is comfortable when sitting, standing, and walking; 3) it provides maximum stability when standing and walking; and, 4) it requires minimal strength to don, to doff, and to use.

The following research plan is proposed:

a) Continue present project protocol of measurement of physiological, biomechanical and prosthetics parameters of geriatric AK amputees and control subjects to identify the special prosthetics needs and characteristics of geriatric amputees.

b) Continue present project protocol of fitting experimental sockets derived using uniform force/tissue displacement (UF/TD) measurements to expand empirical database of socket and stump contours, loading patterns, physiological, biomechanical, and prosthetics parameters.

c) Investigate new socket materials and fabrication

techniques permitting incorporation of controlled gradients in socket wall stiffness, especially at the socket brim, to reduce stump tissue stress concentrations, reduce circulation impairment, and increase patient comfort.

d) Evaluate the effects of socket designs on stump circulation using ultrasonic doppler femoral artery and vein flow measurements, and laser doppler skin capillary perfusion measurements.

e) Conduct comparative static and dynamic socket/stump normal and shear stress loading studies by instrumenting quadrilateral, (UF/TD), and finite element analysis (FEA) sockets for four subjects. Use socket/stump loading study results to iteratively formulate socket design improvements.

f) Continue present project work on developing methods of characterizing and measuring the viscoelastic properties of stump tissues. Develop discrete element models of cutaneous and subcutaneous stump tissues as nonhomogeneous, nonlinear, anisotropic, hydrated, composite biomaterials. Develop computer software incorporating stump tissue models in conjunction with finite element analysis to estimate optimum socket/stump load distribution and the corresponding stump (socket) shape.

g) Develop new, more comfortable, stable, and energy efficient prosthesis suspension systems.

Electromyographic Incontinence Alert Device

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Sponsor: VA Rehabilitation Research and Development Service (Project #B376-DA)

Purpose—The objective of this proposal is to develop an electronic device that measures the decline in electromyographic activity of the pelvic floor muscles and produces an alert to the patient of an impending bladder contraction and subsequent loss of urine. The early warning provided to the patient by the unit will be used as biofeedback to teach the patient to control continence in a cost-effective method with readily available maintenance therapy.

Urinary incontinence is one of the major social and economic problems affecting the elderly population in our country. Incontinence in the aged is the second major cause of admissions to long-term care facilities producing a total annual cost of more than eight billion dollars. Medical and surgical management of urinary incontinence in this group of patients has had limited success and a strong research effort at this time is being focused on behavioral therapy of incontinence. Treatment modalities such as biofeedback have proved to be successful interventions but have the problem of the cost of administering therapy and long-term failures due to lack of maintenance therapy.

Urodynamic evaluation of bladder function in the aged incontinent patient shows most patients to have involuntary detrusor contractions associated with urinary incontinence. The onset of an involuntary detrusor contraction is preceded by a sharp fall in electromyographic activity of the pelvic floor muscles that occurs 6 to 8 seconds before the rise in detrusor pressure is detected. Using the principle that the fall in electromyogram (EMG) activity precedes the involuntary detrusor contraction, the purpose of this project is to design, build, and evaluate an electronic device that will detect the fall in EMG activity and alert the patient of an impending detrusor contraction. This early warning system will provide the patient with a training device that will assist in preventing urinary incontinence as well as teach the patient the skills required to control urinary continence. The device can be worn by the patient and will serve as a biofeedback training and reinforcement unit that is inexpensive to administer and can be used intermittently over a long period of time.

Non-Auditory Factors Affecting Hearing Aid Use in Elderly Veterans

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Sponsor: VA Rehabilitation Research and Development Service (Pilot Project #C952-PA)

Purpose—This pilot project will examine the non-auditory factors that influence successful use of hearing aids in elderly veterans. These factors include cognitive status, fine motor coordination, family support, and visual acuity. They are frequently mentioned in the literature when considering amplification for the hearing-impaired elderly. However, the influence of these different components has not been systematically evaluated in an effort to predict outcome with hearing aids.

The short-term goal of this study will be to review, isolate, and assess non-auditory factors that can be measured in a systematic way. A secondary goal would be to evaluate the utility of the Hearing

Handicap Inventory for the Elderly (HHIE) (Ventry and Weinstein, 1982) with elderly hearing-impaired veterans. At the culmination of the pilot study, it is anticipated that a proposal will be submitted for a multi-year grant to study the non-auditory factors that have a significant relationship with successful hearing aid use in elderly veterans. Selected factors would be analyzed (multiple linear regression) to determine how each influences hearing aid use and how they interact with one another. Further study might be aimed at evaluating whether those factors that prove to be poor predictors can be improved or circumvented to increase the likelihood of success with amplification.

Integrated System for the Management of Wandering Behavior in the Memory-Impaired Elderly: An Interagency Report

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Sponsors: VA Rehabilitation and Research Development Service; Administration on Aging; National Aeronautics and Space Administration; National Institute on Aging; National Institute on Disability and Rehabilitation Research

Purpose—The purpose of this effort is to develop a notification and locator system to aid caregivers in the management of wandering behavior as exhibited by the clinically diagnosed mild to moderately cognitively-impaired elderly. This includes those persons suffering from dementia of the Alzheimer's type as well as other dementias.

Wandering has both beneficial and detrimental effects on persons who wander, and on their caregivers. The freedom to wander safely may help maintain the memory-impaired person's physical, psychological, and activities of daily living capabilities, as well as provide for activities that are intrinsically enjoyable (e.g., visual stimulation, exercise, and social interaction). Yet, wandering can expose the person to physical danger and even death. The need for virtually constant surveillance is particularly devastating in the home where one or only a few caregivers have the responsibility for providing this surveillance. Caregivers respond to these problems by restricting a person's freedom of movement and, in some cases, institutionalizing the individual. Both family and professional caregivers are affected by their fear for the person's safety and their feeling of responsibility to provide for that safety.

Current techniques and devices provide less than adequate solutions to the problem of wandering. Particularly for the home setting, current devices tend to be either overly restrictive or provide inadequate security. The objective of this effort is to develop, produce, and market a device based on NASA and other technology which meets the needs of both the wanderer and the caregiver.

Progress—A Phase Zero Needs Assessment and Feasibility Study funded by the five sponsoring agencies has been completed. This study suggests the development of a modular system capable of using different components based on the requirements of the older person, the caregiver, and the environment. A proposed feature of the system is

that it not only monitor doorways, as most current products do, but that it also allow the older person freedom of movement within a safe perimeter, e.g., an outside yard. In addition, the system could notify not only the caregiver, but the wanderer as well.

Supervision of the developmental work is being provided by technical experts at NASA's Johnson Space Center in the areas of radio frequency (RF) communications, frequency spectrum allocation, ergonomics, antenna design, tracking techniques, systems engineering, mechanical design, and component miniaturization. In addition, access to NASA environmental and RF test facilities and computer modeling systems can be provided.

A Request for Proposals (RFP) was issued in May, 1987, by NASA to select a collaborating manufacturer for device development. An award was made in November, 1987, to provide the design and trade-off specifications. This phase of the effort will be completed in 6 months.

Future Plans/Implications—The contractual effort to develop the notification and locator system will be conducted in two phases with incremental co-funding provided by the five sponsoring agencies. It is anticipated that the total project will be completed within a two-year time frame. In addition to Phase I, Engineering Design, expected to be completed in approximately six months, Phase II, Prototype Development, will take approximately sixteen months. A clinical evaluation will follow. The decision by the sponsoring agencies to continue on to each successive phase will depend largely upon the results of the prior phase.

The project representatives of the sponsoring agencies are: Administration on Aging, Anita Shalit; National Aeronautics and Space Administration, Raymond P. Whitten; National Institute on Aging, Shirley Bagley; National Institute on Disability and Rehabilitation Research, Joseph Traub; VA Rehabilitation Research and Development Service, Dr. Margaret J. Giannini.

Work Disability, Disability Management, and the Older Worker

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Sponsor: *National Institute on Disability and Rehabilitation Research*

Purpose—The purpose of the project is to analyze critically the employer and medical and personal influences on the work status of the older worker.

Progress—A variety of large employers in the areas of manufacturing, healthcare, city municipalities, and transportation were asked to participate in the research program. A corporate analysis was developed that documents the employer's response to disability, and the key factors that impact on the benefits and worker's compensation costs.

Employees within the selected companies over the age of 45 as of December 31, 1984, were invited to participate in the research by completing a health and vocational questionnaire. Of these employees, those who had had a major health problem resulting in lost time from work were asked to complete additional sections focusing on their disability experience and rehabilitation intervention. The final target of analysis involved identifying and defining the healthcare services/providers within the local community.

Preliminary Results—Labor relations is a very critical issue with respect to a company's ability to participate in the project. Union attitudes and perceptions heavily influence the participation rate of the employees. In addition, the labor relations climate within a company is a strong precursor to the scope and nature of disability problems of the older workers.

Employers feel that participation in the research may increase expectations of the older workforce in that the employees will anticipate changes in their current work status, retirement programs and disability benefits. Employers also believe that workers may feel threatened if they think the research is being conducted for other reasons, i.e., to "weed out" the older or undesirable employees and/or older employees who have had health problems.

Employers have established good controls and consistent claims monitoring on worker's compensation cases; however, they do not have a comparable strategy in place for non-work-related injuries/

illnesses. The management of those cases is relinquished to the insurance company, which provides little or no expertise in the disability management of the claim. Back problems, degenerative arthritis, carpal tunnel syndrome, and gynecological conditions comprise the majority of lost time disabilities for the older workers within the companies reviewed.

Employers do not evaluate rehabilitation providers. There is no written policy and/or other method in place for employers to appropriately assess the services being provided to their older workers, and workforce in general. The employer assumes this is being handled by the service company/actuary.

No formal linkages exist between employers and healthcare providers. Employees tend to seek medical attention where it is most convenient for them; employers hesitate to recommend or encourage the employee to utilize one type of healthcare provider and/or service over another.

Future Plans/Implications—The analysis of this data will be helpful in identifying variables that are a critical influence on older workers in the disability process. Once these variables are known, the impact of disability and chronic illness can be better controlled, resulting both in reduced healthcare costs and protection for the employability of the older worker.

The International Center will continue to conduct research in the area of the older worker, as well as participate in training and education programs that deal with the issues of an aging workforce. Currently, the International Center is planning a National Conference on Work Disability, Disability Management and the Older Worker, which will be a forum for corporate managers and labor officials, healthcare professionals/administrators, and public policy makers, as well as for researchers and specialists in the aforementioned areas. The conference will include a coordinated series of lectures and position papers presented from noted professionals dealing with issues related to older workers. This is scheduled to take place in the spring of 1988.

Perceptual Retention and Age

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Sponsor: *National Institutes of Health*

Purpose—Among the goals of this project is to describe adult age differences and age changes in nonverbal memory performance. Nonverbal memory is measured in the Baltimore Longitudinal Study of Aging (BSLA) with the Benton Visual Retention Test (BVRT).

Progress—Previous analyses of 6-year and 12-year longitudinal data indicated that for men, performance on the BVRT declines late in life. This year, extensive analyses of individual regression measures of change found substantial mean declines in the groups of men who were in their sixties or seventies when first tested. The correlation of age with change

was $-.38$. These regression measures of change were based on 12 years (3 points) or 18 years (4 points) of longitudinal data.

Also this year, the BVRT was one of the measures included in a comparison of noninsulin dependent diabetic men with healthy age-matched men. There is some controversy in the literature about the effects of diabetes on cognitive performance; all of those studies were cross-sectional. No differences were found in the cross-sectional analysis or the longitudinal comparisons of change in BVRT performance in the BLSA. No support was found for the hypothesis that diabetes accelerates age declines in cognitive performance.

Geriatric Medicine Academic Award

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Sponsor: *National Institutes of Health*

Purpose—The long-term objective of this Geriatric Medicine Academic Award application is to develop a superior curriculum in aging and geriatric medicine at the University of North Carolina, Chapel Hill, (UNC-CH) School of Medicine that will stimulate medical students, house officers, faculty, and practicing physicians to provide high quality medical care of the elderly and which will attract outstanding students and house officers to research in the processes of aging and diseases of the elderly.

The specific aims and methods of this curriculum proposal are: 1) to update the standard required curriculum for medical students to insure that they obtain the knowledge of gerontology and skills of communication and physical examination necessary for working with elderly patients; 2) to reinforce the principles of gerontology and geriatric care through clinical problem solving experiences with case ex-

ercises and with geriatric patients. Resident's reports, case conferences, medical grand rounds, and interdisciplinary (medical, nursing, social work, occupational therapy) team consultations will be used as teaching settings; 3) to develop model care sites (at the University teaching hospital, Area Health Education Centers (AHEC's), retirement communities, nursing homes) where geriatric care will be provided in a manner which is conducive to learning; 4) to enhance the competence of the faculty in dealing with the problems of aging, particularly encouraging acquisition of knowledge about geriatric topics that are related to their respective areas of expertise; and, 5) to foster research opportunities for students and faculty which will bring about new solutions for common problems of the elderly and/or better ways of coping with them.

Studies in Idiopathic Normal Pressure Hydrocephalus

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Sponsor: National Institutes of Health

Purpose—Idiopathic Normal Pressure Hydrocephalus (INPH) is an important cause of dementia, gait disturbance, and incontinence in the elderly. It may be confused with Alzheimer's Disease (AD); unlike AD, however, it may be markedly improved by cerebrospinal fluid (CSF) shunting. Because CSF shunting may have substantial morbidity, it is important to select patients carefully. There are presently no reliable criteria for deciding to shunt. This proposal has two goals: to clarify the diagnostic differences between INPH and AD, and to evaluate three tests presently thought to predict a good shunt response in INPH.

The study will test three measures presently thought to distinguish INPH from AD: concentrations of the peptides vasopressin and somatostatin in CSF, atrophy and periventricular lucency on computed tomographic and magnetic resonance im-

aging, and gait and psychometric test profile. These features will be compared in 50 patients given the diagnosis of INPH over a three year period with 50 others given the diagnosis of AD. To help establish predictive tests for INPH, the study will use the tests just described as well as overnight recording of CSF pressure, lumbo-ventricular perfusion of CSF, and withdrawal of 50 cc of CSF with subsequent analysis of gait. Domain analysis as well as analysis of variance will be used in the statistical evaluation of these measures.

This study will provide the first prospective and rigorous testing of several criteria thought to distinguish INPH from AD and predict a good shunt response. By refining criteria for diagnosis and shunt placement it will be a major contribution to the management of gait and memory disorder in the elderly.

Respite Care for Older Adults: A Prototype

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Sponsor: National Institutes of Health

Purpose—This research is to implement, further refine and evaluate a prototype within the private business sector which uses a foster care model to provide short-term, overnight care to frail older adults using private residences. Appropriate community care utilization can ease caregiver burden and stress and decrease the likelihood of institutional placement. One undeveloped service option is short-term, overnight, community-based respite care within private residences.

The anticipated outcome will be an effective, self-sustaining, marketable service which can be replicated by either proprietary or not-for-profit agencies for frail older adults or other dependent populations. Data are expected to support the ability of private individuals to implement a training program generalized from behavioral approaches and nursing care

concepts enabling them to function as surrogate caregivers. Caregiver burden and stress is expected to be relieved. Frail older adults who utilize the service are expected to maintain their living statuses longer than would be expected by chance. Financial data are expected to support Kin Care's ability to function independently in the third year and licensure recommendations will be developed. A pre/post test design with follow-up utilizing a non-equivalent comparison group and survey techniques will be implemented. Eighty older adults and 40 caregivers will comprise the main sample and be followed over a period of one year. Data analysis will utilize descriptive and inferential statistics including Anova, Manova, Logit and Probit procedures.

Epidemiology of Cardiovascular Diseases in the Elderly

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Sponsor: National Institutes of Health

Purpose—The objective of this research is to identify and describe the distribution of risk factors for cardiovascular disease (CVD) incidence and mortality in a cohort of free-living elderly persons. The identification of risk factors for CVD in older persons is important as CVD is the leading cause of death and disability in elderly Americans and because there is evidence that CVD can be prevented or delayed in this age group.

Progress—The data to be used in these analyses were collected in the Dunedin Program, a population-based geriatric health program designed to screen persons 65 years of age and older for a wide range of medical disorders. The Dunedin Program, located in Dunedin, Florida, has been in continuous operation since July 1975. Participants are screened annually, and extensive data on CVD and CVD risk factors are gathered during each visit. Information is available from questionnaires (i.e., family history, previous and present illnesses, drug use, smoking and alcohol use), physical examinations (i.e., EKGs, pulse rate, blood pressures) and laboratory measures (i.e., glucose, cholesterol, uric acid). Through 1985, 5,085 elderly men and women had been screened at least once, and 1,540 persons had participated in the program for a full 8 years. This participation represents a total of 14,783 person-years of obser-

vation with an average follow-up of 4.9 years.

The analysis will consist of three distinct phases. In the first phase, follow-up time for each participant will be computed, and changes in risk factor status will be analyzed. Descriptive information of the distribution of risk factors, and the prevalence of CVD in the entire cohort will be presented. CVD incidence and CVD mortality rates will be calculated for all participants. In the second analysis phase, incidence rates of CVD will be computed (number of events/person-years of follow-up) by category of risk factor level at baseline. The relative risk of CVD (incidence in exposed/incidence in unexposed) will be calculated for each hypothesized risk factor. The third phase will be multivariable analyses. Cox regression models will be used to determine independent and interactive effects of the identified risk factors on the incidence of and mortality from CVD in this cohort.

This study will provide information on the prevalence and risk of CVD in a large, free-living elderly population. The potential identification of factors which may both increase the risk for CVD in older persons, and be modifiable or treatable is of significant public health importance, as modification of these factors may lead to a further reduction of events/deaths in this large and growing segment of our population.

Does Improvement in Mortality Mean Better Health?

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Sponsor: National Institutes of Health

Purpose—The purpose of this research is to answer the question, "Has the recent reduction in mortality among the older population been accompanied by an improvement in health, or has the mortality decline resulted in an increase in the proportion of the older population with poor health and/or disabling conditions?"

Data employed to answer this question are from

the National Health Interview Survey of the noninstitutionalized population of the U.S. from 1969 through 1984 and surveys of the institutionalized population such as the National Nursing Home Survey available from the same period.

This project differs from others in that it takes a disease-specific approach to health and will determine levels, trends, and differentials in disability

from specific diseases for the older population subdivided by age, sex, race, ethnicity, socio-economic status and place of residence. In addition, the project proposes a detailed documentation of the cause termed "senility" which preliminary analysis has

shown to be a major cause of disability among the population 85 and over. Lastly, an analysis of the changing health of succeeding cohorts will be completed.

The Community Adaptation of Mildly Retarded Persons: The Lives and Needs of Aging Mentally Retarded Persons

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Sponsor: National Institutes of Health

Progress—All goals set for Year 1 have been met on schedule. Research personnel have been recruited and trained; data indexing and retrieval systems have been completed; a large core sample pool (N equals 289) of psychometrically retarded adults has been generated; based on personal history and demographic data collection with this core sample, 4 sub-samples have been selected for intensive data collection (60 Black and 60 matched White adults—principally for research on communicative competence, 33 young adults currently enrolled in independent living training programs, and 4 sub-samples. While longitudinal data collection will continue as planned, all 4 projects anticipate data

collection, analysis, and publication in Year 2.

Future Plans—Some major topics for Year 2 data analysis are: a network analysis of the personal support systems of independently living adults; a sociolinguistic comparison of competence in giving directions between mentally retarded and normal adults; a study of parental beliefs and attitudes about the socioemotional histories of their mildly retarded, adult, children; and, a comparison of mathematical skills evoked by a test instrument versus similar skills exhibited by the same persons in everyday life.

Learned Modification of Visceral Function in Man

B.T. Engel

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Sponsor: National Institutes of Health

Purpose—This project is concerned with the application of behavioral methods and principles to clinical medicine. Subjects are patients selected from various medical clinics, or normal subjects who are

studied to evaluate potential clinical methods. The main focus of this project is on clinical problems especially relevant to middle-aged or elderly persons.

Senile Dementia: Natural History

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Sponsor: National Institutes of Health

Purpose—This study is to provide an in-depth assessment of a community-based sample of persons who have been previously classified as either having

senile dementia or to be high risk for having this disorder. The study includes a clinical examination plus a surveillance by contacting the subject and a

close relative or friend every nine months. Comparison will be made with unaffected persons to define risk factors and etiologic events.

This is a 5-year study of a free-living population having been identified as positive for senile dementia by a standard screening instrument. The cases and controls will have a clinical examination with valid

and quantified measurement techniques and interviews every nine months to obtain demographic, social-psychological, cognitive, medical, drug usage information and health service utilization, and other related information. Similar information will be gathered from a relative or close friend.

Geriatric Medicine Academic Award

Steven R. Gambert

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Sponsor: National Institutes of Health

Purpose—Changes in demography mandate that health professionals be skilled in all aspects of Geriatric healthcare. Institutions of medical education must assume a leadership role in planning and providing for future needs. New York Medical College is deeply committed to the teaching, research, and clinical aspects of Geriatrics and Gerontology. Located in Westchester County, an area where the number of elderly far exceed the national average, New York Medical College has a total enrollment of 760 M.D. candidates and over 300 graduate students. In addition, its affiliated clinical programs

provide training in a variety of settings including urban New York City.

New York Medical College proposes to establish a Program in Geriatric Education comprised of Program Director and a select Geriatric Education Group, both administratively functioning out of a newly created Center on Aging and Human Development. The program will serve to improve the quality and quantity of existing curriculum in Geriatrics and to help foster additional research and careers in Geriatrics and Gerontology.

Falls in the Elderly: Causes and Reduction

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Sponsor: National Institutes of Health

Purpose—There appears to be a pressing need to develop therapeutic measures for elderly Americans which will preserve their physical capacities, promote optimal functional ability and reduce the incidence of falls. The following proposal has the potential of coordinating the efforts of specialists in biomechanics, physiology, orthopaedics, and rehabilitation. These specialists are capable of focusing their research on the movement patterns of elderly adults, analyzing the results of research, recommending therapy, and evaluating the therapeutic program.

During the first year the aim of this proposed study is to determine the profile of two groups of elderly adults: one with a history of falls and one

without a history of falls. The second aim will be to determine the effects of the fall related factors on gait. The third aim will be to determine the effects of an intervention rehabilitation program on the factors which most affect gait and incidence of falls as indicated by the previous two studies.

A total of 60 (30 males and 30 females) healthy caucasian volunteers will comprise this study. The subjects will be placed into two groups (i.e., history of falls and no history of falls). The following measurements will be made: anthropometer, gait, strength, flexibility, balance (static and dynamic), depth perception, and response time. The subjects will be interviewed to determine: fall assessment, medication and medical history, activity level, and

joint pain. A total of 30 subjects per factor studied will be involved in the second year project. The subjects will be elderly adults recruited from the Muncie, Indiana community. The subjects will be assigned to either a high or low score group.

The same testing procedures will be used in the second year of this study as were used in the first year. The subjects in the rehabilitation program will be a minimum of 30 and a maximum of 50 male and female subjects age 65 to 75 years with characteristics which would make them susceptible to a fall. The rehabilitation exercise program will take place

over a 10-week period, 3 days a week during the second year of study. The first year testing procedures will be repeated at the end of the rehabilitation program. The rehabilitation program will consist of activities suitable for elderly adults and will be based on the results of the first and second year investigation results and recommendations from the consulting Physician and therapist. Appropriate statistical procedures will be used to determine the significance of effect for each phase of this proposed study.

Improving Recovery from Cardiac Surgery

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Sponsor: National Institutes of Health

Progress—The Family Heart Study is a prospective randomized clinical trial of individual and family behavioral interventions of the first-time and repeat cardiac surgery patients and family members designed to: 1) monitor and enhance recovery at home; 2) reinforce inpatient teaching on risk factor reduction; and, 3) provide support to the family as primary caretaker. Family stress and coping theory and social learning theory (self-efficacy) provide the theoretical basis. Baseline (preoperative) measures of family functioning, family coping, demands of illness and cardiac status are compared with those at three and six months post-surgery, along with self-reports of recovery, self-efficacy, quality of life,

and physician appraisal of patient recovery.

Specific study aims are: 1) to test the efficacy of nursing interventions designed to facilitate posthospital recovery and rehabilitation of the cardiac surgery patient and his family; 2) to describe the impact of cardiac surgery on the family over time; and, 3) to document care needs and differences in recovery for the older (ages 70-80) cardiac surgery patient and family. Long-term objectives are to mobilize family coping and personal efficacy in recovery from surgical treatment for heart disease, in ways that maximize the surgical benefit for patients and families.

Cancer Control Science Program: Fox Chase Cancer Center: Cancer Education and Management for Patients

Wendy L. Jones

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Sponsor: National Institutes of Health

Progress—The Cancer Control Science Program of the Fox Chase Cancer Center is designed to complement the existing cancer control program and basic research efforts at the center. Prior cancer control research has included hypothesis development, descriptive studies and demonstration efforts. The scope of this initiative includes primary and

secondary prevention, as well as management of the cancer patient. The ongoing research projects are: 1) Cancer Control in an Urban Neighborhood; 2) Cancer Education Program for Older Citizens; 3) Cancer Education and Management for Patients.

The primary hepatocellular carcinoma prevention studies have been continued as a developmental

study. In addition, studies are planned in the Philadelphia urban neighborhoods on lung cancer epidemiology and on dietary habits and cancer. A study using physicians' offices for smoking cessation activities is planned.

The resources and support of this CCSP program

include a core group of investigators in medical oncology, biostatistics, epidemiology, social science, health education and health planning. The shared resources for this program include the statistical laboratory, the cancer information service and education and program evaluation.

The Treatment of Acute Illness in Nursing Homes

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Sponsor: National Institutes of Health

Purpose—The treatment of acute illness of the chronically disabled nursing home patient is a problem of great magnitude that concerns healthcare providers, the elderly, and their families. Currently there is no knowledge available on the process of decision-making in nursing homes when an acute illness occurs, and there is little information available on the attitudes and beliefs of healthcare providers, patients and their families on this important issue.

This is an anthropological field study. The purpose of the research is to investigate the social-cultural factors and other circumstances most likely to influence the evaluation and treatment of acute illness in nursing homes. The goals of the research are to identify, describe and analyze: 1) the social-cultural factors (e.g., marital status and ethnicity) and other circumstances that influence decisions regarding treatment of acute illness in nursing homes; 2) the relationship between the attitudes, beliefs, values, and expectations of healthcare providers, patients, and their families and the decisions made when an acute illness occurs; 3) the process of evaluation and treatment of acute illness in nursing homes;

and, 4) the cultural rules that influence decisions regarding treatment of acute illness.

The investigation uses three research strategies: participant observation, in-depth interviews, and event analysis. Participant observation and event analysis will document the process of decision-making when an acute illness occurs, and identify those factors most likely to influence decision making. In-depth interviews with 105 physicians, nurses, patients, and their families (N = 420) will investigate the social-cultural factors and other circumstances that influence the attitudes, beliefs, and expectations of healthcare providers, patients, and their families. The research will be conducted in three long-term care institutions selected because of their unique characteristics which facilitate investigation of the problem.

This study has significance for important theoretical questions in Medical Anthropology, Medical Sociology, and Gerontology as well as applied significance for healthcare providers (the elderly), and their families.

Research in Mental Retardation: Elderly Mentally Retarded—Population Description and Service Needs

Marty Krauss

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Sponsor: National Institutes of Health

Purpose—The Eunice Kennedy Shriver Center conducts research on the causes, treatment and prevention of mental retardation in seven departments: Behavioral Neurology, Biochemistry, Clinical Re-

search, Educational Psychology, Genetics, Neuropathology, and Social Science. It also trains professionals in the field of mental retardation and related disorders and provides services to institutionalized

and community-based retarded individuals and their families. The Center is closely affiliated with the Massachusetts General Hospital and other institutions of higher learning. Numerous collaborations between Shriver scientists and investigators at these other institutions place the Center within the mainstream of biomedical, behavioral, and social science research in the area.

Progress—Major new appointments have been made at the Shriver Center in the last three years. Dr. Edwin Kolodny has been appointed Acting Director and is a candidate for a new Harvard Medical School (HMS) professorship established for the directorship of the Center. Dr. Verne Caviness, Jr. has been appointed to the Kennedy Professorship in Child Neurology and Mental Retardation established at HMS in 1982. Dr. Marcel Kinsbourne was appointed Director of Behavioral Neurology, Dr. Marty Kruass, as Co-Director of the Social Science Department

and Dr. Wayne Miller, as Interim Director of the Genetics Department. Core grant funds were used to attract Drs. Kinsbourne and Krauss, and also to recruit Dr. Curtis Deutsch, a behavioral geneticist, Dr. Miyuki Yamamoto, a neuroimmunocytologist, and Dr. Joseph Urbanowski, a biochemist and molecular geneticist.

Research productivity at the Shriver Center is enhanced by core facilities for animal care and glassware washing as well as through the computer, electron microscopy, machine shop, medical illustration, mass spectrometry, monoclonal antibody, and tissue culture facilities. This application seeks funds to add to these services and facilities a P-2 laboratory for molecular genetics, to replace aged central equipment, to purchase new equipment for common usage, to recruit a Director of Clinical Research, and to develop a Neuroendocrine Division within the Biochemistry Department.

Older ESRD Patients: Rehabilitation and Quality of Life

Nancy G. Kutner

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Sponsor: National Institutes of Health

Purpose—This research will provide needed information about persons ages 60+ who are undergoing treatment for end-stage renal disease (ESRD) and will furnish data on the relation of personal control and illness intrusiveness to the psychosocial well-being of older persons who are characterized by varying circumstances of chronic illness. Kidney function becomes less efficient as people age, and as the entire population ages, increasing numbers of older people will develop ESRD; about 40 percent of all chronic dialysis patients in the U.S. are age 60+, and almost half of all new patients started on dialysis therapy each year are 60+. There is limited information to date about the quality of life of older people who undergo treatment for ESRD. Rehabilitation and quality of life outcomes can be studied from a behavioral science perspective, with attention to the patient's psychosocial problems and assessment of his/her life situation. A better understanding of these issues has implications not only for improved patient care and functioning but also for the difficult ethical question of when dialytic therapy should be terminated or perhaps not initiated.

The study population will be ESRD patients

undergoing treatment in Georgia who are age 60+ as of December 31, 1985. Using the ESRD Network 20 census for that date, a 33 1/3 percent stratified random sample will be selected so that each of the four race/sex groups will be equally represented. Personal interviews will be conducted with patients in the sample; most interviews will take place at the patient's residence. A matched community sample of older persons in Georgia who are not undergoing treatment for ESRD will also be selected and interviewed at their place of residence. These data will allow comparison of quality of life in older ESRD patients with quality of life in persons who are similar in age, race, and sex and who share chronic conditions (e.g., diabetes, cardiovascular disease) and/or age-related impairments such as vision or hearing loss but who are not receiving treatment for ESRD. The analysis will therefore contribute to a better understanding of how the psychosocial well-being of older persons is affected by varying circumstances of chronic illness, as well as furnishing needed information about the rapidly growing segment of the ESRD population that is age 60 or older.

Illness Cognition and Coping in the Elderly

Howard Leventhal

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Sponsor: National Institutes of Health

Purpose—The proposed studies use multi-dimensional scaling and open-ended interviews to uncover the content and underlying dimensions of elderly people's illness cognition: i.e., the cues they use to identify specific illnesses, and their ideas about the cause, time line and consequences of illness. The procedures will also tap how they respond emotionally to illness and how they cope with it. Scales will be developed to measure these factors in clinical populations so we can compare elderly and middle-aged respondents and patients to one another and to patients with four different chronic diseases (hypertension, COPD, arthritis and cancer in remission).

We will study how illness cognition affects emotion and coping, how all three affect selection of symptoms for reporting at clinic visits, how the three affect confusions between different illnesses and how they influence compliance with treatment for problems presented by the patients in comparison to unreported problems uncovered by the practitioner. We will assess whether patients misidentify the nature and cause of illness because their expect-

tations regarding symptom presentations are appropriate to the natural history of disorders in the middle rather than the later years of life.

The final goals are to see whether illness representations and coping are related to feelings of age and to the development of dependency and to unnecessary physical and psychosocial disability. Seeing illness as progressing uncontrollably with age may provoke loss of hope and depressive feelings and lead to apathy and withdrawal from social relationships. These hypotheses will be tested in the four clinical populations of elderly patients.

Finally, an intervention study is proposed comparing a participatory interaction with a standard, treatment control. The participatory interaction is designed to enhance the patient's perception that he/she is an active agent in the identification and treatment of illness problems and to increase his/her feeling of competence, reduce his/her sense of psychological age, and generalize improved coping skills to every-day problems so as to reduce physical and psychosocial disability.

Profile of Visual Function in Low Vision Patients

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Sponsor: National Institutes of Health

Purpose—One of the major problems associated with the management of the low vision patient is the lack of diagnostic tests that accurately reflect the impact of a vision loss. This study will address this problem by investigating the parameters involved in a specific vision task; recognition. Facial recognition is one of the most commonly reported problems for the low vision patient, especially the older low vision patient.

The objective of this research proposal is to develop a battery of clinical tests, the central vision performance profile (CVPP), which will provide the clinician with a more accurate description of the

functional/performance capabilities of the older low vision patient. Problems with recognition have been identified as being one of the major frustrations of individuals with visual impairment. Thus, recognition tasks will be used by the investigators to evaluate performance (or function). The ultimate goal of this project is to gain a better understanding of visual impairment through the development of the vision profile concept, the study of the recognition task, better characterization of residual functional vision, and the improvement of clinical diagnostic services.

The Behavioral Context of Incontinence in the Elderly

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Sponsor: *National Institutes of Health*

Purpose—Urinary incontinence (UI) is a problem for a significant portion of the community-living elderly. Two of the most striking and consistent findings of my earlier research on UI in the relatively healthy elderly have been a) that management strategies for UI depend on the presence of coexistent illnesses or disabilities, and b) that UI, despite being recognized as troublesome, is cognitively seen to be a normal part of old age and therefore irremediable.

This study extends the investigation of behavioral and cognitive contexts of UI to a very different population, the frail, homebound elderly, and asks: How do multiple and/or severe coexistent illnesses influence the management of UI? What types of cognitive organizational strategies are used by this group of elderly who are heavily embedded in a health service network? It consists of careful description of: 1) the patterns of UI in this population; 2) the illness or disability contexts, the physical environment contexts and the social contexts in which UI occurs; and, 3) the cognitive organizational

strategies used by the incontinent elderly and their caretakers. Further, several analytic questions are posed concerning hierarchies of disorder and cognitive organizational strategies.

A stratified, random sample of 200 homebound elderly clients will be drawn from the client list of the Visiting Nurse Association. A case study of each client will be constructed through interviews with the client, the client's family and/or caretakers, the VNA staff responsible for the client's care, and the client's referring physician. Each case study will start when the client begins receiving services and monthly follow-up will be conducted for a six-month period.

The findings of this study will provide information about the behavioral contexts of urinary incontinence in the frail elderly. This knowledge will be useful for theory development concerning hierarchies of disorder and cognitive organizational strategies about age-related disorders as well as for interventions focusing on reducing the medical, social and personal burden of urinary incontinence.

Teaching Nursing Home: Modification of Exercise Capacity in the Elderly

Joel D. Posner

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Sponsor: *National Institutes of Health*

Progress—This study is testing the hypothesis that a simple program of regular exercise for relatively healthy elderly individuals will result in tangible improvements in exercise capacity and physical and psychosocial health. The study will use 360 physically normal adults between the ages of 60 and 90 years. Initial and subsequent evaluations for exercise capacity will include the anaerobic threshold, maximal aerobic power (VO_2 max), and other common exercise parameters such as heart rate.

Aside from the exercise measurements, a full

battery of physiological tests will be used to evaluate resting responses before and after exercise training, including pulmonary and cardiac functions. In addition, psychological tests and healthcare-use data will be obtained. The major measurements (exercise, resting, and psychological data) will be determined before exercise training and after 4 and 12 months of training. The subjects will be assigned to one of the following groups: 1) the center and home exercise group; 2) the center only exercise group; and, 3) a control group.

Geriatric Medicine Academic Award

Leif Sorensen

University of Chicago, Pritzker School of Medicine, Chicago, IL 60637

Sponsor: *National Institutes of Health*

Purpose—The Pritzker School of Medicine, University of Chicago, has designated Dr. Leif B. Sorensen, Professor of Medicine, as its candidate for the Geriatric Medicine Academic Award. A program for development and continuous strengthening of teaching and research in gerontology and geriatric medicine is proposed, with the following objectives:

1) to expose all students to gerontology/geriatrics by incorporating topics on aging into the required courses of the preclinical curriculum; 2) to develop an elective course "Introduction to Geriatrics" in the sophomore year; 3) to incorporate segments of geriatric medicine into the major clinical clerkships; 4) to develop a 2-month elective for senior students "Comprehensive Geriatrics"; 5) to establish a Geriatric Outpatient Clinic and an Inpatient Consultation Service as educational and clinical care facilities; 6) to establish an "Office of Geriatrics" as a

center for administrative and educational activities; 7) to provide house-staff with opportunities for training in geriatric medicine in the ambulatory setting; 8) to offer a 2-year fellowship training program aimed at promoting careers in academic geriatric medicine; 9) to conduct Grand Rounds and CME courses to increase the awareness of faculty and practitioners to the unique medical and psychosocial problems of the elderly; 10) to foster the development of research programs in aging; 11) to develop promising young faculty interested in committing their careers to geriatrics; 12) to provide an opportunity for the awardee to acquire additional skills with a view toward enriching the curriculum; and, 13) to facilitate interdepartmental and multidisciplinary teaching and research in the field of aging.

Geriatric Dentistry Academic Award

Hilde H. Tillman

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Sponsor: *National Institutes of Health*

Purpose—It is the specific aim of this program to create a Division of Geriatric Dentistry at Tufts University School of Dental Medicine and to develop a comprehensive interdisciplinary didactic and clinical curriculum. It will be allied with Forsyth Dental Center, the developing Medical Geriatric program, the Human Nutrition Research Center on Aging, the Aging Activities of the Department of Psychiatry and the Veterinary School. This division will present the complexity of aging to undergraduate dental students, graduate dental students, dentists, dental hygienists, and staff. The interdisciplinary faculty will include all dental specialties. The Medical specialists will include Gerontology, Physical Medicine and Rehabilitation, Nutrition, and Psychiatry. The allied professionals include Social Service, Occupational Therapy, Physical Therapy and Speech and Hearing. The curriculum will be interwoven throughout the four years. The program consists of

a special lecture series. Second semester of the second year, required seminars, required clinical assignments in the 4-chair geriatric area and the Chelsea Soldier's Home.

The outreach activities include: the Hebrew Rehabilitation Center, Community Residencies, nursing homes, and bedside dentistry with portable equipment; research activities in all phases of Gerontology and Geriatric Dentistry; and, a strong continuing education program for dentists, postdoctoral students and staff. Particular emphasis is placed on faculty development in Gerontology and Geriatric Dentistry. The program evaluation will insure our long-term objectives: to train dentists competent in rendering total patient care to this growing segment of our society and to accept the obligation and challenge through continuing growth and development.

Cutaneous Mechanoreceptor System

Ronald T. Verrillo

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Sponsor: National Institutes of Health

Purpose—Information processing by cutaneous tactile systems may be utilized when the effectiveness of a conventional channel is limited, as in high noise environments; when existing channels are overtaxed, as in jet and space control systems; or when existing channels suffer a deficit, as in the sensory losses of deafness and blindness. Of increasing interest are the sensory characteristics associated with advancing age and those associated with pathologies that may affect neural functioning. There are still sizeable gaps in our knowledge of important fundamental characteristics of the cutaneous sensory systems.

The aim of the proposed experiments is to extend

our understanding of the psychophysical characteristics of responses to vibrotactile stimulation in humans. Intimately related to this is a better understanding of the morphological structure of the receptors involved. We also plan to investigate the fine structure of the Pacinian corpuscle. The experiments fall into five general problem areas: spatio-temporal aspects of vibrotactile sensation; sensory interactions among cutaneous mechanoreceptor systems; interaction between vibrotaction and other sense modalities (cutaneous and noncutaneous); characteristics of cutaneous sensory systems as a function of aging and handedness; and, the detailed anatomical features of the Pacinian corpuscle.

Morbidity Risk Assessment in the Elderly

Ben T. Williams

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Sponsor: National Institutes of Health

Purpose—We plan to design, implement, and test a health risk assessment computer program to generate estimates of the probability of hospitalization, disability, and other undesirable health consequences as a function of medical history, laboratory findings, and health habits. The program, used in conjunction with health examination programs for persons aged 60 and above, will facilitate appropriate screening diagnostic tests and risk reduction interventions. Estimates of health consequences from risk reduction will be used to motivate and reinforce behavior changes.

Phase I is a feasibility study to evaluate existing research regarding the association between health habits and consequences among the elderly and

research on the effectiveness of risk reduction activities in this population. Phase I also includes preliminary analysis of public use datatapes from the National Center for Health Statistics. Phase II includes further statistical analyses, risk factor quantification, development of program specifications, software production, and instrument testing in a clinical setting. Phase III is devoted to marketing the program to medical sites where health risk appraisal is commonly used as a health education intervention; the 1984 American Hospital Association questionnaire reported that 17 percent of respondents use health risk appraisal in community outreach programs.

Cooperative Group Outreach Program (ECOG)

Marvin Zelen

Frontier Science and Technology Research Foundation, Inc., Brookline, MA 02146

Sponsor: *National Institutes of Health*

Purpose—The major aims of this project are: 1) to carry out multi-institutional “state-of-the-art” clinical trials with patients being treated in community hospital settings by expanding and maintaining the ECOG community hospital network; 2) to involve community hospitals and their patients in studies relating to cancer prevention and epidemiology; 3) to implement an educational program to meet the special needs of community physicians, nurses and data managers; 4) to develop a micro-computer

network which will lead to increased communication and hence greater participation by community affiliates; 5) to evaluate the impact of this Program on community hospitals with regard to patient outcome (survival, toxicity, etc.); 6) to study the special problems of the elderly cancer patients to determine if treatment in community hospitals is different from major cancer centers; and, 7) to carry out methodological research which will enhance the goals described above.

Assessment of the Spatial and Temporal Characteristics of Vision as a Function of Age

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Sponsor: *Research Service, VA Medical Center, Decatur, GA 30033*

Purpose—The main objective of the research reported here was to examine changes that occur in the spatial and temporal properties of the human visual system as a function of the aging process. It was proposed that data of a preliminary nature be gathered on spatial contrast sensitivity, visual persistence, and color vision differences for a group of young adult observers (18-29), middle-aged (30-49), and older observers (50-75).

In order to assess the visual system's limitations in resolving changes in light intensity over space, one can measure the observer's threshold for detecting sine wave gratings as different from uniform stimuli for a range of spatial frequencies (i.e., spatial sine wave gratings varying in the number of cycles per degree of visual angle). These measurements produce a spatial contrast sensitivity function (CSF) which provides a basis for predicting the apparent brightness of many types of stimulus configurations. The CSF has a characteristic shape for the normal adult visual system and should vary in level or shape as a function of age/or pathology.

The temporal characteristics of the human visual system in the present case refer to how it responds to changes in the perceived duration of the visual

stimulus (e.g., a spatial sine wave grating). The temporal response characteristics of the visual system can be examined through the phenomenon of visible persistence. Visible persistence refers to the existence of an internal representation of a briefly presented stimulus, which remains available (i.e., persists) to the subject after the offset of the stimulus.

Progress—A visual assessment battery has been developed for use with the age groups of interest. This battery includes the following tests and/or measurements: 1) the Vistech Contrast Test; 2) a measure of Snellen acuity; 3) the Ishihara Color Vision Test; 4) The Tritan Plate (F2 test) developed by the Naval Medical Submarine Research Laboratory—New London, CT; 5) the Munsell-Farnsworth 100-hue test; and, 6) a measure of visible persistence.

Visible persistence will be measured by flickering a grating of a given spatial frequency (e.g., 1, 3, and 12 cycles per degree) at a rate that is just fast enough to be seen as fused (i.e., until a critical fusion frequency is obtained). This technique will allow a rapid and relatively undemanding collection of data

using older observers. A test for visible persistence should be useful for determining spatio-temporal changes in the visual system with age.

Future Plans—Initial data collection, which began at the Georgia Institute of Technology, will be completed at the University of Central Florida.

Future research in this area will include an examination not only of visible persistence, but also the effects of masking of one spatial grating by another, the effects of transient adaptation on visibility loss (losses due to sudden increases or decreases in luminance level), and the effects of foveal loading on peripheral visual sensitivity as a function of age.

Environmental Influences on Behavior of Patients with Alzheimer's Disease

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Sponsor: VA Medical Center, Salem, VA

Purpose—The purpose of the investigation was to explore the effects of lighting and sound on the agitated and confused mealtime behaviors of Alzheimer's patients. The study was based on documented observations by the nursing staff of patient behaviors related to their obvious lack of response to verbal and pictorial stimulation, the apparent calming effects of a power outage on their agitation, as well as the absence of effective treatment for confusion and demented conditions.

Progress—Sixteen confused patients on a long-term ward were videotaped during weekday mealtimes for 8 consecutive weeks. Videotaping was accomplished unobtrusively with a portable camera, using a multiple baseline design study. Two light and three sound environmental manipulations were introduced for one week at mealtimes. The two light conditions consisted of low level pink lighting and high level ceiling fluorescent lighting. The three sound conditions were white noise, country and western music, golden journey, and nature sounds.

Control conditions included the naturally occurring voices of staff, patient sounds, and daylight with fluorescent lights. Recorders observed and coded the videotaped behavior of each subject for the entire hour-long period. Ratings of the patient's behaviors were made according to identification of criterion behaviors selected in pre-experiment viewing of tapes made at mealtimes, which had recorded the following behaviors: handclapping, mouth-to-hand repetitive movements, leg slapping, grabbing at toes, picking feet, pulling up and back in chair, coughing, moaning, shrieking laughter, foot banging,

and "ah" sounds. Eight behaviors were analyzed for frequency, as well as intensity during baseline periods, and compared with behaviors during experimental periods.

Results—Analysis revealed a decrease in frequency and duration of motor criterion behaviors with both low level light, golden journey, and nature sounds. The Haycox rating scores of dementia for patients ranged from 36 to 47. The recorded food consumption increased and the length of eating time decreased (only nature sounds could be correlated with increased food consumption and decreased eating feeding time). Decreased food consumption was documented with country and western music.

Future Plans/Implications—Since this limited study did show positive changes in behavior, we plan to continue exploring the effects of light and sound stimuli on the behavior of Alzheimer's patients in a naturalistic setting. Plans include introducing stimuli such as pre-warmed beds at bedtime and breakfast food odors upon arousal. Also, we are in the process of developing a behavioral checklist for patients with Alzheimer's disease and other dementia-producing illnesses.

It appears that low level lighting may well be an important environmental factor to be considered in designing treatment centers for confused elderly patients. Other environmental factors such as temperature and odors need to be investigated for possible inclusion in the design of these treatment centers. An article describing this project was published in *Nursing Times*, January 7-13, 1987.