

ABSTRACTS OF RECENT LITERATURE

by

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Dr. Schein recently became the first appointee to the David Peikoff Chair in Deafness Studies at the University of Alberta, Edmonton, Canada. His appointment began in January 1989 and will continue for one year. While in this post, Dr. Schein, who is internationally recognized for his work in deafness research, plans to develop a program to train interpreters for the deaf in Canada and also to initiate demographic studies on the deaf population in that country.

Abstracts are drawn primarily from the orthotics, prosthetics, and sensory aids literature. Selections of articles were made from these journals:

American Journal of Occupational Therapy

*American Journal of Physical Medicine and
Rehabilitation*

British Journal of Audiology

Canadian Journal of Occupational Therapy

Foot and Ankle

IEEE Transactions of Biomedical Engineering

Journal of Bone and Joint Surgery

Journal of Visual Impairment and Blindness

Orthopedics

Physical Therapy

Prosthetics and Orthotics International

Rehabilitation Nursing

Scandinavian Journal of Rehabilitation Medicine

Scandinavian Journal of Rheumatology

State University of New York, Stony Brook, NY 11794). Reprinted from *Phys Ther* 69:38-45, 1989.

The ability of individuals to lift heavy loads without injury to the vertebral elements has led to the formulation of several explanations of this phenomenon. In this article, the existing literature on lifting is reviewed and mechanisms of back support during lifting are described. These mechanisms include the intra-abdominal pressure mechanism, the thoracolumbar fascia mechanism, and combinations of these mechanisms with the use of the erector spinae, multifidus, and psoas muscles. Physical therapists are often responsible for teaching patients and workers "proper" lifting techniques; however, controversy exists concerning the proper lift. Although lifting with the lower back in flexion and lifting in extension have been proposed, there are indications for each depending on individual circumstances. Lifting instructions for workers without low back injuries should be distinguished from instructions for patients with low back pain. General rules for lifting include: plan the lift, avoid twisting, keep the load close to the body, and bend at the knees. [JEE]

PROSTHETICS, ORTHOTICS, AND RELATED TOPICS

Back Support Mechanisms During Manual Lifting.

Sullivan MS (Department of Orthopaedics,

A Biomechanical Analysis of Scapular Rotation During Arm Abduction in the Scapular Plane.

Bagg SD, Forrest WJ (Department of Physical Medicine and Rehabilitation, Queen's University, Kingston, Ontario K7L 3N6). Reprinted from *Am J Phys Med Rehabil* 67:238-245, 1988.

The dynamic pattern of scapulohumeral rhythm and the scapular instantaneous center of rotation were studied in 20 healthy young male subjects. The most common pattern of scapulohumeral rhythm was characterized by three separate phases, with the greatest relative amount of scapular rotation occurring between 80 and 140 degrees of arm abduction. The scapular instantaneous center of rotation was observed to be located initially at, or near, the medial root of the scapular spine, and gradually migrated toward the region of the acromioclavicular joint as arm abduction progressed. A biomechanical model of the shoulder girdle was proposed by correlating the results from the present study with the electrical activity of the scapular rotators. This model is useful in demonstrating the true dynamic function of the muscles acting on the scapula as well as the mechanical efficiency of upward scapular rotation during arm abduction. [JEE]

Biomechanics of the Foot and Ankle Under Static Conditions.

Oatis CA (Philadelphia Institute for Physical Therapy, Philadelphia, PA 19104). Reprinted from *Phys Ther* 68:1815-1821, 1988.

The purpose of this article is to discuss the static mechanics of the foot and ankle. First, the motions of the ankle and foot available during nonambulatory activities are described by reviewing the literature discussing the axes of motion for the ankle and joints of the foot. Conflicting terminology is presented and clarified, and a scheme for a reasonable terminology is presented. The role of the ankle-foot complex in closed and open kinetic chains is also discussed. Terminology describing structural and functional positions of the foot is presented, including definitions of the subtalar neutral position. A systematic format of terminology is offered to reduce the current inconsistencies. Finally, the weight-bearing area of the foot and muscle activity in quiet standing are reviewed. [JEE]

Compliance and Subjective Relief by Corset Treatment in Chronic Low Back Pain.

Alaranta H, Hurri H (Orthopaedic Hospital of the Invalid Foundation, Factory of the Prosthetic Foundation, Helsinki, Finland). *Scand J Rehabil Med* 20:133-136, 1988.

One hundred and eighty-six patients responded to questionnaires mailed to 235 consecutive patients who had received their first elastic or semirigid corset for low back pain one year earlier. Those with back injury, malignancy, tuberculosis, idiopathic scoliosis, or any acute disorder were excluded from the survey. Respondents included 115 women. Two-thirds of the respondents reported that they obtained slight or negligible relief with the corset, although 40 percent stated they had worn it during the preceding week. Men did not differ from women with regard to extent of relief or duration of corset use. Men preferred low lumbosacral semirigid and low elastic orthoses, while women preferred thoracolumbarsacral semirigid orthoses. Age, height, weight, and vigor of activity were not correlated with the subjective reports of pain relief. Those who said they performed trunk exercises had slightly better pain relief with the corset. Most subjects experienced muscular weakening with the corset. A fifth of the subjects required a new corset to replace the old one which was worn out within the year.

Acceptance and compliance appeared fair. The study corroborates previous work which indicated that the corset is as effective as traction, exercises, manipulation, physical therapy, or analgesics for patients with low back pain. Patients should receive sufficient information from the prescribing physician and adequate fitting time, from one-half to one hour. Ideally, the patient should wear the corset for several days at home, then return for reevaluation. Prior to corset prescription, the patient should have trunk taping with nonelastic bandage to determine the probable effectiveness of a corset. Corsets do not weaken back muscles, but the physical inactivity associated with corset wear may do so. Thus, moderate physical activity should be prescribed. Because modern corsets are durable, it is unnecessary to deliver two corsets initially. The corset is less expensive than other forms of conservative therapy and safer than drugs. [JEE]

Description and Interobserver Reliability of the Tufts Assessment of Motor Performance. Gans BM, Haley SM, Hallenborg SC, Mann N, Inacio CA, Faas RM (Department of Rehabilitation Medicine, New England Medical Center Hospitals, Boston, MA 02111). Reprinted from *Am J Phys Med Rehabil* 67:202-210, 1988.

This paper describes the conceptual basis for the development of a new clinical evaluation instrument, the Tufts Assessment of Motor Performance (TAMP). The TAMP is a 32-item, diagnosis-independent, criterion-referenced test that samples physical performance items in the areas of mobility, activities of daily living and physical aspects of communication. The administrative and scoring criteria of the TAMP are presented, and the multiple measurement dimensions are described. The documentation of patient status and progress, as described in the functional and performance profiles, is outlined. The paper also reports initial interobserver reliability on the in-trait tasks and the summary indexes of the two profiles. Forty individuals (20 adults and 20 children) with neurologic and musculoskeletal disorders comprised the reliability sample. Kappa and intraclass correlations were used to estimate the reliability of three independent raters on individual tasks and aggregate scores, respectively. Task reliability for the assistance and approach measurement dimensions were generally higher than for the more qualitative pattern and proficiency dimensions. Yet over 90 percent of all the tasks had acceptable reliability, while all the summary indexes had high interobserver reliability. Determination of interobserver reliability data is the initial phase of defining the most appropriate and technically valuable items, and will serve as a basis for item revision and reduction to enhance the clinical utility of the test. [JEE]

Dynamic Biomechanics of the Normal Foot and Ankle During Walking and Running. Rodgers MM (Laboratory of Applied Physiology, Wright State University, Dayton, OH). Reprinted from *Phys Ther* 68:1822-1830, 1988.

This article presents an overview of dynamic biomechanics of the asymptomatic foot and ankle that occur during walking and running. Functional descriptions for walking are provided along with

a review of quantitative findings from biomechanical analyses. Foot and ankle kinematics and kinetics during running are then presented, starting with a general description that is followed by more specific current research information. An understanding of the dynamic characteristics of the symptom-free foot and ankle during the most common forms of upright locomotion provides the necessary basis for objective evaluation of movement dysfunction. [JEE]

Early Post-Surgical Prosthetic Limb Fitting in Dysvascular Below-Knee Amputees with a Pre-Fabricated Temporary Limb. Pinzur MS, Littooy F, Osterman H, Wafer D (Department of Orthopedics and Rehabilitation, Loyola University Medical Center, Maywood, IL 60153). Reprinted from *Orthopedics* 11:1051-1054, 1988.

Two consecutive series of patients undergoing below-knee amputation for peripheral vascular insufficiency were compared relative to the length of acute-care hospitalization and rehabilitation. The residual limb control group was treated with soft-surgical dressings and non-weight bearing ambulation with referral to the amputee clinic when the residual limb wound was "ready." The residual limb experimental group was treated with rigid plaster (cast) dressings with early post-surgical prosthetic limb fitting and progressive weight bearing ambulation.

Acute-care hospitalization following amputation surgery averaged 27.7 days in the control group, and 23.7 days in the treated group. Patients were either re-admitted or transferred to a rehabilitation unit where hospitalization averaged 42.9 days in the control group and 14.1 days in the treated group. This resulted in a cost savings of almost \$15,000 per patient based on present hospital fees. The results of this study suggest that early post-surgical prosthetic limb fitting not only hastens recovery amputation, but can be safe and cost effective. [JEE]

Falls in the Rehabilitation Setting: Incidence and Characteristics. Mion LC, Gregor S, Buettner M, Chworchak D, Lee O, Paras W (Cleveland Metropolitan General/Highland View Hospital, Cleveland, OH 44109). *Rehabil Nurs* 14:17-22, 1989.

Fall incidents were studied in two general medical rehabilitation hospital units with identical floor plans and safety features, similar staff, and patients. All patients admitted during a 5-month period were studied with regard to demographics, admission source, discharge disposition, medical information, activities of daily living, blood pressure and pulse, cognition, ability to follow commands, proprioception, neuromuscular status, and use of physical restraints. Falls, that is uncontrolled, unintentional bodily displacement, were documented with regard to day, time of day, location, injury, vital signs, assistance, cognitive status, activity, clothing, lighting, obstacles, and medications. A third of patients fell at least once; of those who fell, most fell only once.

A higher proportion of fallers were men. Psychiatric illness was significantly associated with falling. Patients who received sedatives and tranquilizers were more apt to fall. Inability to follow directions and impaired memory or judgment were also associated with falling. Fallers were more likely to have physical restraints. Falls were most common during the first two weeks of hospitalization, especially in the patient's room; most involved the wheelchair. Generally the patient was alone. Forty percent lacked eyeglasses at the time of falling. Fewest falls occurred during the night. To reduce falls, patient assessment should focus on the ability to understand and follow directions, proprioception, impaired memory, use of tranquilizers, lowered ability to perform activities of daily living, and psychosis. The unit's routine should be examined in terms of high patient activity and staff availability. Observations should be increased during the first weeks of patient hospitalization. The patient's ability to use the call system should be assessed, and alternatives instituted as needed. Anti-tip devices should be installed on wheelchairs or the legrests removed; improper footwear should be eliminated, and the acquisition of eyeglasses, and the establishment of routine toilet schedules should be emphasized. [JEE]

A Flexible, Portable System for Neuromuscular Stimulation in the Paralyzed Upper Extremity. Buckett JR, Peckham PH, Thrope GB, Braswell SD, Keith MW (Case Western University, Cleveland, OH 44106). Reprinted from *IEEE Trans Biomed Eng* 35:897-904, 1988.

A portable functional neuromuscular stimulation (FNS) system for control of the muscles of the paralyzed upper extremity has been developed and evaluated for outpatient use. This system, which has been tested over a five-year period, incorporates a microprocessor which can be programmed to accept and process a variety of user-generated commands and to output complex stimulus patterns. Eight channels of analog input can be used to control four channels of constant current compensated monophasic stimulus output. The portable FNS system is programmed using a multichannel laboratory stimulation system. [JEE]

Foot and Ankle Biomechanics in Walking and Running: A Review. Czerniecki JM (Department of Rehabilitation Medicine, University of Washington, Seattle, WA). Reprinted from *Am J Phys Med Rehabil* 67:246-252, 1988.

The biomechanics of the foot and ankle are initially discussed, as a series of isolated joints and segments, and subsequently as an integrated unit during the functional activities of walking and running. The kinematics and kinetics of the foot and ankle during the three major components of stance phase are reviewed. The first component, between foot contact and foot flat, is characterized primarily by force absorption. The portion of the gait cycle between foot flat and heel-off is associated with controlled forward progression of the center of mass and maximum mobility of the transverse tarsal joint. In the third phase, supination of the foot results in increased rigidity of the transverse tarsal joint, and therefore, improved force transmission. The controversy regarding the function of the triceps surae during this phase of the gait cycle is discussed. [JEE]

Foot Orthoses. Lockard MA (Department of Anatomy, Hahnemann University, Philadelphia, PA 19102). Reprinted from *Phys Ther* 68:1866-1873, 1988.

This review article describes shoe inserts and provides information to assist physical therapists to identify patients who may benefit from foot orthoses. The article discusses goals for and types of shoe inserts, in addition to the materials and methods that can be used in fabricating appliances.

Clinical considerations for the use of shoe inserts and application to specific patient populations are presented. [JEE]

Footwear. McPoil TG, Jr (Department of Physical Therapy, Northern Arizona University, Flagstaff, AZ 86011). Reprinted from *Phys Ther* 68:1857-1865, 1988.

The purpose of this article is to provide information that will assist the physical therapist in recommending appropriate footwear for patients with foot disorders. The discussion is divided into the following areas: 1) purposes of footwear, 2) shoe anatomy, 3) the last, 4) shoe construction, and 5) shoe sizing and fitting. Throughout the discussion, variations are noted between the terminology used to describe nonathletic and athletic footwear. Recommendations for both nonathletic and athletic footwear are provided. [JEE]

Individually Adapted Lightweight Walking Aids with Moulded Handles for Patients with Severely Deforming Chronic Arthritis. Kofkvist U-B, Brattstrom M, Geborek P, Lidgren L (Department of Rheumatology, University Hospital, Lund S-22185, Sweden). *Scand J Rheumatol* 17:167-173, 1988.

Forty-two rheumatoid arthritic patients were provided with modified walking aids because they had functional impairment of the upper extremities precluding use of conventional aids. Each patient had a plaster cast of the hand in functionally-correct position; sensitive places were marked on the cast. The angle of the crutch upright and its length were measured to place least stress on the shoulder, elbow, and wrist. The new handle was attached to the forearm support with the patient standing. The handle was then cast in polyurethane and sprayed with velour-like material. The aids were made of lightweight metal alloy. Weights were: stick 250 gm; crutch-stick 400 gm; forearm crutch 550 gm; and crutch 650 gm. A follow-up after 12 to 18 months of use of the 75 aids manufactured, indicated that no change in functional class was observed. Eight patients did not use the aids, four of whom were no longer in need of assistance. Most aids were in good repair, although 13 needed adjustment because of frequent use. Fifteen patients had diminished upper

limb pain, and 7 had more pain. Two had progressive grip deformity and received new handles. Only one patient could not use the new walking aid.

The low weight of the walking aid, as well as biomechanically better loading of all joints of the upper limb, and increased loading area in the hand grip, contributed to improved function and comfort. The textured grip surface reduced the force needed to stabilize the aid, which also had a strap to facilitate carrying, and a ferrule to reduce slippage. Modified aids are most helpful for patients in classes II and III, rather than class IV. Poorly motivated patients used the aids less. [JEE]

Long-Term Follow-Up of Syme Amputations for Peripheral Vascular Disease Associated with Diabetes Mellitus. Jany RS, Burkus JK (Minnesota Spine Center, Minneapolis, MN 55454). *Foot and Ankle* 9:107-110, 1988.

A retrospective study of ten patients who had Syme amputation secondary to complications from diabetes included an evaluation of preoperative status. Surgery was performed at the Naval Hospital, Oakland, CA. Those who had Syme amputation for nondiabetic causes were excluded from the study. The Doppler ischemic index predicted healing if the ratio of posterior tibial arterial pressure to brachial arterial pressure was greater than 0.45. Nutritional status was evaluated by serum blood tests, including red and white blood cell counts, total lymphocyte and protein counts, and albumin. The extent of skin breakdown was graded by the Wagner system. Those with deep lesions or toe gangrene had whirlpool debridement in a sterile environment. Amputation was performed for persistent open ulcers with failure of granulation tissue formation or uncontrollable infection. The Syme's level was selected only if the ischemic index at the ankle was greater than 0.45, the heel pad was intact and uninfected, and bleeding occurred at the skin margins. A two-stage procedure was performed. All patients were fitted with permanent prostheses. None complained of distal bulbousness, heel pad migration, or ambulatory difficulty. Follow-up ranged from 2 years to 6 years/3 months. Five patients had revision to below-knee amputation. All the patients were men, averaging 58 years of age; all had been community ambulators. Of those who had below-knee amputation, all had abnormal serum

laboratory values. Failures occurred 4 to 12 weeks after Syme surgery, secondary to wound healing problems. [JEE]

Measuring the Shape and Volume of an Above-Knee Stump. Krouskop TA, Dougherty D, Yalcinkaya MI, Muilenberg A (The Institute for Rehabilitation and Research, Houston, TX 77030). Reprinted from *Prosthet Orthot Int* 12:136-142, 1988.

A set of design criteria for sensing the shape of an above-knee (AK) stump is presented and used as the basis for evaluating various shape sensing technologies. A mechanical probe type shape sensing system is described and its use in quantifying the external shape of the AK stump is discussed as it relates to generating a grid for finite element analysis in CAD/CAM studies and comparing the segmental volumes of the loaded and unloaded stump. This study also discusses a method that uses circumferential measurements to compute total and incremental volumes of the stump. [JEE]

Memory Plastics for Prosthetic and Orthotic Applications. Coombes AGA, Greenwood CD (University of Texas Health Science Center, San Antonio, TX 78284). Reprinted from *Prosthet Orthot Int* 12:143-151, 1988.

Shrink-forming prosthetic sockets from memory plastics offers several advantages over existing techniques. The manual skill requirement is reduced relative to drapeforming flat sheet while compared with the Rapidform process, the requirement for a purpose-built vacuum forming machine is eliminated.

Two methods for producing thermoplastic sockets from heat shrinkable preforms are described. One uses established heat shrink technology and crosslinked thermoplastics. The second, based on blowmolding, simplifies preform manufacture relative to existing techniques by reducing it to a single-stage operation. Shrink-formed sockets have been produced for three application areas concerned with the lower limb, namely load-bearing sockets, flexible ISNY type and rigid transparent check sockets. Static testing has demonstrated the ability of shrink-formed, load-bearing sockets to surpass Philadelphia Static Load Levels (ISPO, 1978) while

fatigue testing has indicated a capability for long service life. [JEE]

Pathomechanics of Structural Foot Deformities.

Tiberio D (Program in Physical Therapy, University of Connecticut, Storrs, CT 06268). Reprinted from *Phys Ther* 68:1840-1849, 1988.

This article presents the most common structural foot deformities encountered in clinical practice. The deformities are defined, and the expected compensations at the subtalar joint (STJ) are described. The theoretical consequences of the STJ compensations on proximal and distal tissues are presented. A biomechanical rationale for certain tissue disorders is described. The possible effects of abnormal STJ compensation on osseous development are briefly discussed. [JEE]

Post-Operative Metacarpophalangeal Arthroplasty Dynamic Splint for Patients with Rheumatoid Arthritis. Fairleigh A, Hacking S (Arthritis Society, Vancouver, British Columbia V5Z 1L7, Canada). *Can J Occup Ther* 55:141-146, 1988.

A dynamic splint is needed after arthroplasty. A volar splint was designed to allow individual adjustment of support and direction of pull, with a dynamic extension and a passive flexion pull incorporated into the orthosis, to assist the return of muscle power by allowing function in a protected environment. The orthosis is made of polyform thermoplastic, coat hanger wire, and various straps and accessories. The wrist is in neutral extension and 5 degrees ulnar deviation, maintained by the volar plastic support which terminates at the palmar arch and thenar eminence. Plastic-covered wire is bonded to the orthosis, and traverses the distal dorsum of the forearm, to serve as the reaction point for dorsally-placed rubber bands which extend to Dura Collar fixtures located above the proximal phalanges. Each finger rests in a leather or vinyl sling-like loop which is attached to a Dura Collar attached to a wire frame located dorsally.

The splint is worn all day for six weeks postoperatively, while a resting splint is worn at night. Wearing time is gradually reduced until the tenth week, when no orthosis is needed. During the period of splint use, patients have daily physical

therapy, affording an opportunity to check and adjust the orthosis. Research is proceeding to modify the design to streamline the dorsal outrigger. [JEE]

Prosthetic Problem Inventory Scale. Huber PM, Medhat A, Carter MC (School of Nursing, University of Kansas, Kansas City, KS 66103). *Rehabil Nurs* 13:326-329, 1988.

A reliable and valid instrument was constructed to identify problem areas pertaining to lower-limb prosthesis wearers. Considerable time and an average of \$2,900 is spent for a prosthesis, together with health worker, clinic, equipment, and training costs. Maslow's Hierarchy of Needs and Roy's Adaptation Model were the conceptual framework for the instrument; both theories presume that people are biopsychosocial beings with modes of adaptation. The amputee's behavior relates to a fulfillment of needs and adjustment status. Loss of the lower limb requires many adjustments, including learning new mobility skills, achieving a sense of self-value, accepting dependent function, and developing support systems. Maximum adjustment means the amputee can perform most activities as done preoperatively. The instrument measures four dimensions of activity performance: activities of daily living, social participation, sexual activity, and athletic participation. Interactions were outlined according to responsibilities related to self, spouse, household members, extended family, friends, and the community. Fifteen items were generated for activities of daily living, 11 for social participation, 8 for sexual activity, and 12 for athletics. One could respond about how often a prosthesis interfered with the activity on a five-point Likert scale in a mail survey. Experts in nursing, rehabilitation medicine, sex therapy, sports medicine, and physical fitness reviewed the instrument for content validity. Twenty-six amputees participated in a pilot study which demonstrated the instrument's validity and internal consistency. The revised instrument was given to 131 amputees, demonstrating its reliability and validity in assessing deficits in the social, psychological, and physical aspects of life. [JEE]

Results of Amputation for Gangrene in Diabetic and Non-Diabetic Patients: Selection of Amputation

Level Using Photoelectric Measurements of Skin-Perfusion Pressure. Christensen KS, Falstie-Jansen N, Christensen ES, Brochner-Mortensen J (Aalborg Hospital, 9000 Aalborg, Denmark). *J Bone Joint Surg* 70-A:1514-1519, 1988.

A review of 277 primary major amputations performed on 239 patients over a three-and-a-half year period revealed that 157 patients had below-knee, 116 above-knee, and 4 knee disarticulation. All had gangrene and/or intractable ischemic pain. The knee disarticulation patients were excluded for further analysis. Of the 235 study patients, 90 had diabetes; 19 had bilateral amputation. Their ages and male-to-female ratio was similar to the 145 nondiabetic patients, 19 of whom also had bilateral amputation. Measurement of skin perfusion pressure was performed on the anterolateral side of the calf, 10 cm distal to the knee. Measurements were also taken 10 cm above the patella. In 51 limbs, the level of amputation was selected without skin perfusion or systolic blood pressure measurements. Criteria were skin-perfusion pressure below 20 mmHg, less than 25 percent chance of healing; 20-30 mmHg, 50 percent chance; 31-40 mmHg 85 percent; more than 40 mmHg, 100 percent. All below-knee amputations had a long posterior myocutaneous flap or equal sagittal fasciocutaneous flaps. The latter flap type was used in all above-knee amputations. Postoperatively, wounds had soft bandaging and no prophylactic antibiotics.

Three months postoperatively, 20 percent had died (28 of 103 above-knee and 18 of 132 below-knee amputees). The death rate was significantly higher in those with failed amputation, but the presence of diabetes was not a significant determinant. The ratio of below- to above-knee amputations was significantly higher in diabetics. The overall rate of failure for amputations in which skin-perfusion pressure served as an adjuvant guide in level selection was not significant. The photoelectric technique to obtain measurements of skin-perfusion pressure is a convenient method for predicting healing, and results in the salvage of more knees, and a reduced number of reamputations. [JEE]

Shoe Insoles in the Workplace. Basford JR, Smith MA (Department of Physical Medicine and

Rehabilitation, Mayo Clinic, Rochester, MN 55905). Reprinted from *Orthopedics* 12:285-289, 1989.

Ninety-six women participated in a crossover study to evaluate the effectiveness of viscoelastic polyurethane insoles in reducing back, leg, and foot pain among adults who spend the majority of each work day standing. Twenty-five of the subjects reported that the insoles made their shoes too tight to be comfortable. The remainder, however, found the insoles very comfortable ($P < .002$, Wilcoxon, signed-rank test) and reported significant reductions in back pain ($P < .02$), foot pain ($P < .03$), and leg pain ($P < .007$). When these subjects were asked whether they would prefer to wear their shoes alone or with insoles, the preference for insoles was overwhelming ($P < .007$, back; $P < .03$, leg; and $P < .009$, foot pain). It is concluded that viscoelastic insoles can effectively improve comfort and reduce back, leg, and foot pain in individuals who must stand throughout the day. [JEE]

SENSORY AIDS/REHABILITATION

The Acceptability of Cochlear Implants and Vibrotactile Aids. Thornton ARD (MRC Institute of Hearing Research, Royal South Hants Hospital, Southampton SO9 4PE, England.) *Br J Audiol* 22:105-112, 1988.

One hundred and fifty-three hearing-impaired persons responded to a questionnaire that asked for their opinions on cochlear implants and vibrotactile aids. Overall results (in percents) showed that 22 would accept cochlear implants, 36 might, and 42 would not; 40 would accept vibrotactile aids, 33 might, and 27 would not accept them. [JDS]

An Alternative to Braille. Thurlow WR (Department of Psychology, University of Wisconsin, Madison, WI 53706). *J Visual Impairm Blindn* 82:378, 1988.

After two learning trials of one minute each, 10 college-student volunteers correctly identified 21.8 of the 26 C5 symbols on the third trial. The C5 symbols were produced by a Braille printer. The evidence of this and earlier research supports the

contention that these symbols are easier to discriminate and to learn than Braille. [JDS]

Assessing the Environment of Low Vision Persons: A Validation of Procedure. Graves WH, Maxon JH, McCaa C (Rehabilitation Research and Training Center on Blindness and Low Vision, Mississippi State, MS 39762).

Describes the Work Environmental Visual Demands (WEVD) protocol used to analyze visual job requirements. WEVDs were prepared for 16 persons with low vision who were engaged in a variety of occupations. Their performances were compared with 14 controls. The analyses showed that the experimental group had fewer follow-up visits to the workplace, reductions in near- and intermediate-task problems, and better correspondence between types of low-vision aids prescribed and their use on the job. No relationships were found between the WEVD and the examination time, patient fatigue, number of low-vision aids, and use of these aids. [JDS]

Behavioural Therapy in the Clinical Management of Tinnitus. Lindberg P, Scott B, Melin L, Lyttkens L (Department of Clinical Psychology, University of Uppsala, 5751 42 Uppsala, Sweden). *Br J Audiol* 22:265-272, 1988.

Seventy-five consecutive patients presenting with severe tinnitus were individually given 10 one-hour training sessions in a coping regimen consisting of a variety of relaxation, operant tinnitus-control procedures and, when necessary, counseling. Significant differences in mood and discomfort were found between pre- and post-treatment measures. [JDS]

Benefit From Binaural Hearing Aids in Individuals with a Severe Hearing Impairment. Day GA, Browning GG, Gatehouse S (MRC Institute of Hearing Research, Glasgow Royal Infirmary, Glasgow G31 2ER, Scotland). *Br J Audiol* 22:273-277, 1988.

Using a diotically presented, audiovisual speech-in-noise test given to 51 postlingually, severely, bilaterally hearing-impaired adults, investigators found significantly better results with binaural

aids than with monaural aids— even though all subjects had previously used only monaural aids, and 11 of the 51 subjects had refused binaural amplification relatively early in the study. Benefit of binaural amplification appeared to increase with age. [JDS]

Bringing Imagery into the World of Visual Impairment. Wagner-Lampl A, Oliver GW (Braille Institute, Los Angeles, CA 90024). *J Visual Impairm Blindn* 82:373-377, 1988.

Voluntary imagery (VI—"visual imagination") and involuntary imagery (II—dreams, hallucinations, etc.) can be used to aid adventitiously and congenitally blind clients improve their emotional adjustment. [JDS]

A Closed- Versus Open-Set Measure of Speech Discrimination in Normally Hearing Young and Elderly Adults. Holmes AE, Kricos PB, Kessler RA (Department of Speech, University of Florida, Gainesville, FL 32611). *Br J Audiol* 22:29-33, 1988.

Using the California Consonant Test, the authors tested 20 young and 20 elderly persons with normal hearing under open- and closed-set response conditions. The only significant difference was the better performance of the young group in the closed-set condition. Results challenge the concept of phonemic regression as a consequence of aging. [JDS]

Delayed Manifestations of Congenital Rubella. O'Dea AF, Mayhall CA (Great Lakes Area Regional Center for Deaf-Blind Education, Columbus, OH 43202). *J Visual Impairm Blindn* 82:379-381, 1988.

Follow-up studies of victims of congenital rubella display continued deterioration in initially affected organs and higher-than-expected incidences of new conditions, especially vascular diseases, endocrine disorders, ocular and auditory impairments, and behavioral disturbances. [JDS]

Drug-Induced Ototoxicity. Griffin JP (Association of British Pharmaceutical Industries, London SW1A 2DY England). *Br J Audiol* 22:195-210, 1988.

Reviews 136 articles dealing with drugs other than the aminoglycosides. Discusses incidence, features of ototoxicity, sites of action, mechanisms of action, biochemical effects, anti-inflammatory agents, anti-tumor drugs, loop diuretics, anti-malarials, topical applications, and miscellaneous substances. [JDS]

A Guide to Selecting Large Print/Enhanced Image Computer Access Hardware/Software for Persons with Low Vision. De Witt JC, Schreier EM, Leventhal JD, Meyers AM (National Technology Center, American Foundation for the Blind, New York, NY 10011). *J Visual Impairm Blindn* 82:432-442, 1988.

Reviews six large-print enhanced image products: Vista/Vista 2, Lyon LP, LP-DOS, DP-11/Plus, PC Lens, and ZoomText. Each system was studied in-house to judge its performance and verify its specifications and documentation. [JDS]

Identification of Blind and Visually Impaired Persons in Sri Lanka. Munasinghe T, Campbell LF, Harary J, Sloan NL, Texley R (Helen Keller International, New York, NY 10011). *J Visual Impairm Blindn* 82:370-372, 1988.

Investigators tested the costs and efficiency of three methods of finding functionally blind people in 18 villages. Supervisors visited each identified person to verify the diagnosis, but did not determine false-negative rates. Key informants cost \$231, identified 40 blind persons, and had a 66 percent false-positive rate. House-to-house searches cost \$797, found 30 blind persons, and had a 30 percent false-positive rate. Using local students to identify blind persons cost \$170 to find 10 blind persons with a false-positive rate of 73 percent. [JDS]

A Method of Digital Filtering to Enhance the Peaks of Evoked Potentials: Application to Auditory Brainstem Responses. Grandori F, Bonfioli F, Peretti G, Antonelli AR (Clinica Otorinolaringoiatrica, Universita' di Brescia, Brescia, Italy). *Br J Audiol* 22:171-178, 1988.

Describes a filter with a high-pass section that is a double derivative (+40 dB per decade) and a low-pass section consisting of a Butterworth filter

(zero-phase cut-off frequency of 1800 Hz, roll-off of 120 dB per decade). Results of the testing suggest a considerable increase in reliability of estimation of response waves and their latency. [JDS]

Qualitative Analysis of the Handicap Associated with Occupational Hearing Loss. Hetu R, Riverin L, Lalande L, Getty L, St-Cyr C (Groupe d'Accoustique de l'Universite de Montreal, Montreal, Quebec, Canada H3C 3J7). *Br J Audiol* 22:251-264, 1988.

Based on 63 hearing-impaired workers and their spouses' responses to a questionnaire and an interview, descriptors of the effects of hearing impairment on everyday living were obtained. The descriptions were divided into disabilities (listening/monitoring problems, communication problems, after-effects of daily noise exposure, and tinnitus), primary disadvantages, spontaneous adjustment outcomes, and secondary disadvantages. Implications for rehabilitation were drawn from the content analysis. [JDS]

Reaction Time as an Indicator of Access to Frequency-Resolved Information. Davis AC (MRC Institute of Hearing Research, University of Nottingham, Nottingham NG7 2RD England). *Br J Audiol* 22:305-308, 1988.

Psychophysical testing of five normally-hearing young adults' reaction times (RT) to tones in a notch-noise background showed that as the notch width increased, RT decreased. The magnitude of the decrease in RT was a function of sensation level. Experimenters interpret their findings as demonstrating that RT can be used "to measure access to information in a way that reflects frequency resolution." [JDS]

Recognition of Synthesized Speech by Experienced Echo+ Users: A Follow-Up. Kuyk T, Story S (Southeastern Blind Rehabilitation Center, VA Medical Center, Birmingham, AL 35233). *J Visual Impairm Blindn* 82:382, 1988.

Six adults who had used Echo+ an average of 21 months (from 5 weeks to 4 years) listened to its synthesized speech and reproduced what they heard in four trials. Experienced users obtained overall

scores of 67.3 percent correct compared to 48.3 and 52.9 percent correct for naive users in the earlier studies. [JDS]

Rehabilitation Teachers and Orientation and Mobility Instructors: Interprofessional Perceptions. Ponchillia PE, Dewey C, Cymerant J (Department of Blind Rehabilitation, Western Michigan University, Kalamazoo, MI 49008-5111). *J Visual Impairm Blindn* 82:411-414, 1988.

Twenty-three rehabilitation teachers and 23 orientation-mobility instructors took the Interprofessional Perceptions Scale. Responses showed more agreement than disagreement between the two groups on the items covered. However, both groups expressed some concern that the others did not fully appreciate them nor understand their work. [JDS]

The Relative Accuracy of Coupler and Behavioural Estimates of the Real Ear Gain of a Hearing Aid. Green R (Audiology Unit, Royal Berkshire Hospital, Reading, England). *Br J Audiol* 22:35-44, 1988.

From a theoretical stance, the author argues that coupler estimates of real-ear gain can be as accurate as functional estimates, provided that proper correction factors are used. Experimental evidence with Kemar measures support the argument. [JDS]

Self-Reported Benefits of Hearing Aids by the Hearing Impaired. Golabek W, Nowakowska M, Siwec H, Stephens SDG (Welsh Hearing Institute, University Hospital of Wales, Cardiff, Wales). *Br J Audiol* 22:183-186, 1988.

One hundred and sixty-nine adults who had used a hearing aid for two or more years verbally reported all circumstances in which they had benefitted from their aids. Most-often listed were various conversations, listening/watching radio and television, attending church, and hearing traffic and warning signals. Some differences emerged between those who worked and those who did not, and between levels of hearing loss. Those who used their aids constantly differed somewhat from those who used them sporadically. [JDS]

The Tactile Acoustic Monitor as an Aid for Postlingually Totally Deafened Adults: A Pilot Study. Delmont J (City Lit. Centre for the Deaf, Keeley House, London WC2, England). *Br J Audiol* 22:313-316, 1988.

The results of pre- and post-testing of two women with total acquired losses of hearing showed that a tactile acoustic monitor aided the detection, but not the recognition of environmental sounds after daily use for one month. Their lipreading did not improve and their voice quality tended to become "creaky." The women received no specific training with the device. [JDS]

Threshold of Hearing as a Function of Age and Sex for the Typical Unscreened Population. Robinson DW (Audiology and Human Effects Group, ISVR, University of Southampton, Southampton, Hants, England). *Br J Audiol* 22:5-20, 1988.

Based on the re-analysis of data from 17 studies, the authors conclude that, "Adventitious hearing loss . . . is essentially equivalent to accelerated aging." [JDS]

Vibrotactile Stimulation: An Educational Program for Spatial Concept Development. Miletic G, Hughes B, Bach-y-Rita P (Sevrain-Tech, Inc.,

Madison, WI 53717). *J Visual Impairm Blindn* 82:366-370, 1988.

Thirty blind children, 8 to 14 years of age, practiced individually with a modified Optacon (Telesensory Systems) through eight educational units. The children required between 15 and 25 hours to complete the programmed instruction. [JDS]

Wayfinding Information for Congenitally Blind Individuals. Passini R, Delisle J, Langlois C, Proulx G (Universite de Montreal, Montreal, Quebec H3C 3J7, Canada). *J Visual Impairm Blindn* 82:425-429, 1988.

Fifteen congenitally blind (CB) and 15 sighted controls (SC) were guided twice over a route in a building using any mobility devices they had. The subjects then described the route in as much detail as they could. Next, they made the journey unguided, verbalizing what they were doing and why, as they went. Finally, they reproduced the route using a magnetic board and magnetized strips of wood. The CBs made 58 percent more decisions, 76 percent more during travel, and used more information. The CBs and SCs used different information; CBs relied on proximal information from various sensory modalities, while SCs focused exclusively on visual information. Researchers argue for more consistency in architectural design. [JDS]