BOOK REVIEWS

Spinal Cord Injury Medical Engineering, by Dhanjoo N. Ghista and Hans L. Frankel, Eds. Springfield, IL: Charles C Thomas Publisher, 1986. Cloth, 557 pp., $93.50.

The 1981 NATO Advanced Study Institute at the National Spinal Injuries Center, Stoke Mandeville Hospital, Aylesbury, Buckinghamshire, England, brought together biomedical engineers and clinicians for the 2-week series of lectures and discussion that are the basis for this book. The state-of-the-art of medical and surgical treatment and medical engineering is presented in five sections, each composed of three to five chapters by various authorities.

Section I, Spinal Cord Response to Injury and Repair, highlights animal and human cadaver studies in such topics as biomechanical activation of growth of ruptured medullary tissue. Repair and restoration of neurophysical function may be achieved through apposition of wound surfaces, pharmacologic agents, or peripheral nerve grafts.

Section II, Fractured Spinal Fixation, Stabilization, and Monitoring, focuses on various modes of vertebral fixation and their rationale, including rods, wires, plates, cement, and grafts. Section III, Pressure Sores and Plastic Surgical Procedures, introduces the many factors that contribute to decubitus formation, as well as preliminary studies of carbon fiber pads used as pressure sore prostheses. (Somewhat incongruously placed is an excellent chapter on surgical restoration of triceps function and prehension in quadriplegia.) Section IV covers Circulatory and Bladder Dysfunctions, Characterization and Management.

The longest is Section V, Electrical Stimulation Techniques. Computer assisted finite element analysis enables prediction of electrical fields generated in the spinal cord from various electrode systems. Electrical stimulation has a long history, with present application in bladder control, phrenic nerve stimulation, and muscle stimulation. The last requires proportional control of movement, coordination and control of movement, human studies on muscle control, and training of paralyzed muscle with such devices as an outdoor tricycle. One investigator envisions the eventual development of a practical implanted "locomotion pacemaker;" another author the imminent commercial availability of a stimulator with wheelchair-attached foldable crutch-like bars to aid the paraplegic to stand. The reports of fundamental and applied research should most certainly lead to practical application in, it is hoped, the not-too-distant future.

A Comparison of Computerized Job Matching Systems, 2nd edition, by Karl F. Botterbusch. Menomonie, WI: Materials Development Center, School of Education and Human Services, University of Wisconsin-Stout, 1986. Paper, 260 pp., $20.50.

Job matching compares a client's strengths and weaknesses against the requirements of a specific job, or closely related jobs, or a training program. Assessment, evaluation, and review of medical records reveal a client's qualifications. Job requirements derive from the fourth edition of the United States Department of Labor's Dictionary of Occupational Titles. Karl Botterbusch, Professor at the University of Wisconsin-Stout Vocational Rehabilitation Institute, assisted by graduate assistant Michael Beaupre, reviewed 15 computer programs in the field, namely: CHOICES, VOCOMP, CompuJOBS, CCAPP, DataMaster III, Isabel, Job Matching II, JOBS, JPMS, LMA, OASYS, ValSEARCH Series, VARS, VIPS, and Work-Match. Each review involved reading the user's manual, checking data entry forms, and running test cases. Reviews were then sent to the program developer for comment.

The heart of the monograph is a detailed description of each program. Preliminary comments, however, enhance the value of the volume. Computerized job matching systems usually have several common features. The first, trait-and-factor basis, is cast as an equation where, ideally, the client's traits equal job performance factors. Most programs use Department of Labor terminology, including General Education Development, Specific Vocational Preparation, Aptitudes, Physical Demands,

Environmental Conditions, and Bi-Polar Interests. The terms appear in a glossary at the end of the monograph, although Botterbusch cautions that the reader should be familiar not only with the terms, but also with their sources, the Dictionary of Occupational Titles, Guide for Occupational Exploration, Handbook for Analyzing Jobs, Standard Industrial Classification Manual, and the Standard Occupational Classification Manual. The great number of job possibilities rapidly displayed by the programs increases the demand on professional time and knowledge to select pertinent choices. Job matching systems can be used for placement, selection of training programs, providing occupational information, counseling, and education and training. Before selecting any system, one should decide on the most desirable and required features, then match the various systems to the institution's requirements. No system described is designed to serve individuals who are so disabled that they cannot cope with competitive employment. Some programs do not include all 12,375 occupations defined by the Dictionary of Occupational Titles. Many job descriptions do not reflect changes in duties which have occurred over the past 20 years; new occupations are missing from the database. Some programs are more versatile than others, permitting multiple modes of entering the client's work profile, and sorting options. Cost, and compatibility with other counseling resources, are other factors in the selection process.

Eleven descriptive categories are applied to each program. They are: development (producer, purpose, database, user groups); hardware; software (manual forms, other software, supplies, support systems); machine processing (input procedures, data input, user control, processing sequence and logic, data output); output (format, content); relationship to assessment sevices; training (required, available, follow-up); reviewer's summary and comments; address of marketer; cost; and references. A two-way presentation aids comparison with the descriptive categories charted as columns and the programs as rows, followed by detailed description of each program addressing the eleven categories.

A fictitious case study enables comparison of 13 systems in a practical context. Two programs, Isabel and Job Matching II Survey, could not be included because they are not based on Dictionary of Occupational Titles used in the case study. The number of jobs suggested by the programs ranged from 4 to 1573. Sample printouts, most of which are in response to the trial case, emphasize the diversity of the programs.

Clinical Orthopaedics and Related Research, Number 215, by Marshall R. Urist, Editor-in-Chief. Philadelphia: J. B. Lippincott Company, 1987. Cloth, 312 pp., $145 annual individual US subscription for monthly edition; other rates also apply.

Advances in China, highlighting current orthopaedic practice, is the feature of the current edition. Eleven scientific articles follow a tribute to the founders of orthopaedic surgery in China. Of particular interest is an extensive report on limb replantation.

The first successful replantation of a severed hand was reported in 1963. Since then, Chinese surgeons have performed more than 3735 replantations at local county, industrial, and mining hospitals, and army units. The vast size of the country necessitated definitive treatment without transporting patients far distances. The general survival rate is 78.8 percent. Cases include 1,131 limbs with an 83.9 percent survival and 2,604 digits with survival of 76.5 percent. Incomplete severances have higher survival. Success is associated with careful patient selection, positive mental attitude of the surgeon, and skillful microsurgery with meticulous placement of every stitch. The type of injury is also related to survival, with guillotine most likely to heal and avulsion least successful. The vascular bed must be reasonably undamaged. Digital detachments are much more common, usually with severance of several fingers, than are proximal involvements. The thumb should be replanted first, or if not viable, another digit replanted in its place. Leg replantation may result in substantial limb shortening. The replantation time limit, the longest interval between severance and restoration of circulation, is usually 10 hours, although one digit survived after 37.5 hours. Cold storage of the severed member reduces tissue degeneration. Digits remain viable for much longer than limbs severed at higher levels. Replantation has been accomplished in patients as young as 14 months. Follow-up of more than 3 years on 243 successfully implanted upper limbs indicates that most achieved at least independence in daily activ-

ities and useful sensation. Of 24 cases of lower-limb survival, only one patient elected reamputation; most obtained functional walking with a shoe lift.

The second section is devoted to the general orthopaedics with reports on the hip, upper extremity, knee, ankle, and miscellany. An analysis by Kazumouri Yasuda and Tetsuto Sasaki, of Hokkaido University, Sapporo, Japan, of the effects of lateral sole wedging on medial knee osteoarthritis, concludes that wedging decreases medial knee loading and lateral collateral and iliotibial tract tension, mitigating pain. Changes may be induced by muscular activity and alteration of trunk posture.

The final section, Basic Science and Pathology, includes a biomechanical analysis of elbow motion by J. T. Deland and associates from Brigham and Women's Hospital, Boston, Massachusetts.

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