

Table I—Parameters Used for Calculation of Lithium Availability in Each of Four Subjects

Subject	$\Delta Cl_R$ , liters/hr	$AUC$ , mEq/liter × hr	$AUC'$ , mEq/liter × hr	$F$
I	0.644	3.337	4.448	1.043
II	0.516	4.823	6.805	1.037
III	0.779	3.740	5.810	0.991
IV	0.191	5.206	5.816	1.152

available dosage form of lithium carbonate using this method.

Four healthy male subjects were given one 300-mg capsule of lithium carbonate<sup>1</sup> under fasting conditions. Plasma concentrations were measured periodically for 30 hr. Three weeks later, the same four subjects ingested 500 mg of chlorothiazide<sup>2</sup> daily for 8 days. On the 8th day, they again were given a single 300-mg dose of lithium carbonate. Details of these experiments were reported elsewhere (6, 7). The coadministration of chlorothiazide and lithium led to an average reduction in renal lithium clearance of 26.5%, thus fulfilling the requirement of renal clearance perturbation (7).

The equation presented by Lalka and Feldman (5) for calculating absolute availability is:

$$F = \frac{\Delta Cl_R}{D} \left[ \frac{(AUC)(AUC')}{AUC' - AUC} \right] \quad (\text{Eq. 1})$$

where  $F$  is the fraction of dose absorbed,  $\Delta Cl_R$  is the change in renal clearance that occurs as a result of changes in the experimental conditions,  $D$  is the dose administered (8.25 mEq in this case), and  $AUC$  and  $AUC'$  are the resulting areas under the plasma concentration-time curves for the two experimental conditions.

<sup>1</sup> Eskalith capsules, Smith Kline and French Laboratories, Philadelphia, PA 19101.

<sup>2</sup> Diuril tablets, Merck Sharp and Dohme, West Point, PA 19486.

Values employed in calculating  $F$  for each subject are given in Table I along with the calculated  $F$  values. As shown, the  $F$  value for each subject is very close to unity, indicating that lithium carbonate is completely absorbed under the conditions of these experiments. Thus, we have demonstrated the applicability of this method for determining absolute availability and have shown that this particular brand of lithium carbonate is completely absorbed.

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## BOOKS

### REVIEWS

**Clinical Pharmacy Sourcebook.** Key Articles from the American Journal of Hospital Pharmacy. Publishing Sciences Group, 162 Great Road, Acton, MA 01720, 1976. xvi + 396 pp. 22 × 28 cm. Price \$20.00.

"Clinical Pharmacy Sourcebook" is, as its title indicates, a collection of carefully selected articles relating to clinical aspects of pharmacy service which have been published previously in the *American Journal of Hospital Pharmacy*. Thus, although not reflecting the entire universe of the clinically oriented pharmacy literature, the "Sourcebook" has tapped one of the most fertile sources of material on this important facet of pharmacy practice.

Stressing clinically oriented pharmacy practice rather than education, the "Sourcebook" is an excellent source of background information for pharmacy students, practicing pharmacists interested, but as yet not fully involved, in clinical practice, industrial representatives, and other health care professionals who desire to learn more about the contributions to

direct patient care which can be offered by the clinically oriented pharmacist.

Readers of the "Sourcebook" will benefit also from its convenient organization. The book is divided into seven sections: Introduction; Clinical Pharmacy Services: Implementation and Administration; Clinical Pharmacy Services: The Hospitalized Patient; Clinical Pharmacy Services: The Ambulatory Patient; Clinical Pharmacy Services: Therapeutic Considerations; Clinical Pharmacy Services: Biopharmaceutics and Pharmacokinetics; and Clinical Pharmacy Services: Evaluation. This format does more than compartmentalize the material; it enables readers to select a specific area of interest such as therapeutics, develop the appropriate "mind set," and review easily a series of related articles in the area of interest selected.

In addition to the extensive number of references cited in each individual article, the "Sourcebook" contains a useful bibliography of approximately 160 selected references dealing with the clinical aspects of pharmacy practice and education. The book's index, which was computer generated from the International Pharmaceutical Abstracts Information

System's data base, is easy to use and provides the reader with fast access to the text's subject matter.

Finally, it will be apparent to readers of "Clinical Pharmacy Sourcebook" who are familiar with the literature of pharmacy that the articles included in this reference were published between 1971 and 1975. It is unfortunate, however, that the dates of original publication for each article are not included in the text—if only to provide a perspective to the chronology of the development of different programs, concepts, and philosophies. Nevertheless, "Clinical Pharmacy Sourcebook" represents a convenient compilation of the literature of clinically oriented pharmacy and would be a valuable addition to the libraries of all health care professionals interested in providing improved service(s) to their patients.

#### Staff Review

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**Liquid Scintillation Counting.** By K. D. NEAME and C. A. HOMEWOOD. Halsted, 605 Third Ave., New York, NY 10016, 1974. 180 pp. 16 × 24 cm. Price \$13.75.

"Liquid Scintillation Counting" could be considered as a "McGuffey Reader" for this radiation detection technique. The book describes the elementary principles of liquid scintillation counter operation and presents information helpful in resolving fundamental practical considerations of proper operation. The authors have written a book that should be required reading for the beginning user of liquid scintillation counters.

After presenting information on radioactivity in general, the authors discuss the liquid scintillation counter, counting efficiency and quenching, and the selection and quantity of tracers to use in experimentation. With the basics covered, they then take up topics of a more applied nature. They discuss preparation of samples for counting, determination of counting efficiency for making quench correction, and double-isotope analysis. Such subjects as errors from various sources and what the user should be concerned about in correcting or evaluating them are considered. The authors omit discussion of errors that are common to all methods of analysis but cover in detail several errors peculiar to the nature of radioactivity and to its measurement by liquid counting.

The book could be considered by educators as a text in courses that teach principles of nuclear detection and the liquid scintillation method.

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**A Flexible Design for Health Professions Education.** Edited by RICHARD M. JACOBS. Wiley, 605 Third Ave., New York, NY 10016, 1976. 260 pp. 16 × 23.5 cm.

"Flexible Design" is essential reading for anyone involved in the field of health education, particularly for those who are involved in, or are getting ready to embark on, "experiments" in new instructional techniques and/or curriculum design.

The chapters, which represent the thinking of 23 outstanding educators from the disciplines of medicine, dentistry, pharmacy, nursing, and allied health, are based on material originally presented at an invitational conference (by the same title) held in Iowa City in April 1975.

The editor's introduction succinctly states the book's purpose: "Recent trends in education, health care, and society in general have stimulated serious efforts to find alternatives to the traditional approaches to the health professions education." The volume examines how societal expectations and individual aspirations might be more effectively fulfilled outside the context of the "traditional, highly regimented and stereotyped health professions education programs"—through educational flexibility.

The 20 chapters are grouped into five parts: Basic Educational Considerations and Instructional Strategies; An Overview of Individualized Instructional Practices in the Major Health Professions, (included is the paper on "Flexible Approaches to Pharmacy Education" by L. C. Weaver and H. R. Manassee, Jr.); Planning, Implementation, and Evaluation;

Case Studies; Cost of Flexibility; and Broader Dimensions of Flexibility.

The flexibility to which the work is addressed involves a personalized approach to education: individualized curricular content, individualized modes of instruction, flexible scheduling of instruction, and flexible admissions.

Several notable experiments in health professions education are elaborated upon. The authors provide excellent insights into such areas as outreach programs, individual and elective study, hospital programs, different modes of instruction, multitrack systems, independent study programs, computer-aided instruction, use of simulation, social costs, and flexible tuition.

Douglas R. Whitney's chapter on the Placement, Monitoring, and Evaluation System (PME) is important for the distinction it makes between flexible and traditional instruction in view of the demands that the flexible approach places on the system. PME is a decision-making network that collects data; a management system to hold and control data; and an output system to produce reports, documents, and summaries for use in decision making.

Alvin L. Morris, in his chapter on "Implementation," raises important questions and presents a broader perspective on the subject. He argues that: "While flexible education introduces varieties of time and methods to bring all students to the same end point, traditional education does just the opposite.

There is something disturbing about the idea of all students being the same at the end of an educational experience. Conversely, it can be argued that the identification of a wide range of achievements and achievers through traditional education has served both the students and their professions well." Dr. Morris cautions that: "Educators must be willing to reconcile their views and aspirations with those of the 'real world' where the products of the educational process must ultimately function."

"A Flexible Design for Health Professions Education" presents a balanced and timely discussion about the traditional and experimental approaches being used to educate health professionals.

#### Staff Review

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**Radiopharmacy.** Edited by MANUEL TUBIS and WALTER WOLF. Wiley, 605 Third Ave., New York, NY 10016, 1976. 911 pp. 16 × 24 cm. Price \$44.50.

This book is very pertinent and timely considering the current expansion of radiopharmacy in the curricula of schools of pharmacy both at the undergraduate and graduate levels. The editors themselves have been key figures in the development of radiopharmacy and its establishment in pharmacy education. They are eminent researchers in their own right and have assembled a highly knowledgeable group of contributors to aid them in their presentation of the subject matter. The problems of multiple-author books and variability in style and presentation occur to some extent in this text. For example, the author of Chapter 1 decided that *in vitro* tests would not be considered in the scope of the book from his vantage point, while the editors considered it pertinent and devoted Chapter 26 to a discussion of competitive binding assay procedures. This reviewer considers that the radiopharmacist does need to have an appreciation of such procedures since they will clearly become more important both clinically and industrially.

The structure of the text is orderly in the presentation of material. It is composed of six basic sections dealing with history, physics and instrumentation, biology, chemistry, radiopharmaceutics, and nuclear medicine. The organization is certainly desirable, providing the student with the background material in these various scientific areas that impinge directly on the practice of radiopharmacy. Additionally, there is an important section on regulations and legal aspects in the handling and dispensing of radiopharmaceuticals. Obviously, such information is of importance to the potential practitioner.

There is also a chapter on radionuclides in space biology and medicine by two very knowledgeable individuals. Such material will certainly gain importance with time, but presently its general application is limited and of a highly specialized nature.

In conclusion, this is a most worthwhile and highly informative text and one that will undoubtedly be widely used by those in academia for teaching purposes and by those who wish to familiarize themselves with the exciting opportunities presented by radiopharmacy. Clearly,