THERMOLUMINESCENT DOSIMETRY. By J. R. Cameron, N. Suntharalingam and G. N. Kenney. The University of Wisconsin Press, Milwaukee, 1968. 232 pp, 38 pp of references, indexed, 115 illustrations, 9 tables, $7.50.

This text is an excellent reference on thermoluminescent dosimetry for the reader who has a good background knowledge of radiation physics. The fact that the authors are reputed experts in the field and that the text material, in general, is clearly expressed in a simplified but comprehensive manner are two good reasons for recommending the book to the beginner in thermoluminiscent dosimetry. The presentation is not pedestrian but is imaginatively given in a logical sequence. The possibility of it becoming outdated in the near future is inherently remote because the field of thermoluminescent dosimetry does not lend itself to drastic changes. Any additional information would be specific and not sufficiently general to warrant complete revision. This text is unique in the field and well referenced.

Of the entire material, Chapters 1, 5 and 6 are the most comprehensive and practical. In the introduction (Chapter 1) the historical background and basic understanding of the thermoluminescent (TL) phenomenon are reviewed. Chapter 2 deals with TLD applications but is vague in the description of neutron dosimetry. Oversimplification of the method for roentgen-to-rad conversion spoils the good approach of Chapter 3 on irradiation techniques. The discussion of phosphor characteristics omits the role that impurities play in lithium fluoride, which in its pure state is a very poor phosphor, and the complete annealing procedures for the activated calcium phosphors; however, these omissions are minor compared to the comprehensive information that is given. Chapter 5 is the most useful chapter for developing good TLD technique. There is an error on page 86, first line, where it should read Figure 4.4 not 4.3. Chapter 6 aptly deals with the difficult problems encountered at the milliroentgen dose range and discusses health-physics applications. The fact that there is limited information available concerning nonradiation-induced thermoluminescence (NRI-TL) is brought out in Chapter 7. An excellent discussion of annealing characteristics of lithium fluoride is given (Chapter 8); however, no definite information is given about the effects of cooling lithium fluoride after the 10-min postirradiation annealing cycle.

The discussion of supralinearity of lithium fluoride (Chapter 9) is difficult to follow and is the weakest part of the text. In the last chapter (Chapter 10) the authors present current theoretical aspects of the TL phenomenon but point out that the fundamental theory is incomplete. The TL method will probably never provide us with an absolute method for measuring radiation but it is an excellent method for intercomparison studies with accuracy in the 2% range with 1% obtainable in the foreseeable future.

The appendices, which include a list of manufacturers of TLD equipment and a simple design for a TLD reader, are excellent, and the extensive bibliography adds greatly to the book. *Thermoluminescent Dosimetry* by Cameron, Suntharalingam and Kenney is highly recommended for individuals who plan to use thermoluminescent dosimetry or would like a basic knowledge of it.

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RADIOAKTIVE ISOTOPE IN KLINIK AND FORSCHUNG, Vol. VIII, Lectures and Discussions of Gastein International Symposium. Edited by K. Fellinger and R. Höfer. Urban and Schwarzenberg, Munich, 1968. 499 pp + xxii, 339 illustrations, DM 99.60 (ca. $25.00).

This latest volume of these outstanding important proceedings of the Gastein International Symposium of 1968 follows the admirable precedent set by the previous volumes, published since 1954.

The themes of the 1968 Symposium were: Kinetic Metabolic Studies, Gastrointestinal Resorption, Essential Trace Elements and Quantitative Organ Distribution Studies.

The Program Committee, faced with the task of selection from numerous excellent works submitted, has chosen a well-rounded, worthwhile group of presentations from the readily recognizable experts and promising new researchers. The authors and participants represent virtually every center of activity in the realms of the themes chosen for the symposium and present a balance between clinical and theoretical studies. The work generally reported uses the latest equipment and techniques. While the program was evidently not subdivided according to subject matter, the subject index which is well cross-indexed lets the reader scan the volume according to his interest. The list of participants provides a ready source of reference.

Abstracts are presented in English, French and German, and the Discussion following each presentation provides additional sources for active or interested participants.

Physically, the volume is very appealing and well assembled and should provide a ready source for frequent reference.

The editors and publishers are to be commended for making the Proceedings available so quickly.

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nm/ LETTERS TO THE EDITOR

A PRACTICAL FIGURE OF MERIT IN RADIOISOTOPE IMAGING

I read with interest the paper "Relative Importance of Resolution and Sensitivity in Tumor Detection" by Westerman *et al* in the *Journal of Nuclear Medicine* (*J. Nucl. Med.* **9**:638, 1968).

May I suggest that these writers' experimental findings may be conveniently formulized using a rather simple theory which, although rather philosophically conceived, provides a very usable, practical, comparison criterion for radioisotope systems?

In analyzing the results of imaging procedures, we perceive useful information through changes in dot concentration (or film density). Thus a system that provides a higher "image density" (e.g. counts/unit area for a subject point source) will be more efficient at displaying real differences because of enhanced statistics. A scintillation camera with point-source sensitivity, S, will thus "smear" the image dots from each subject "point" over an area proportional to R^2, where R is the f.w.h.h. resolution distance, such that we may define a simple figure of merit, proportional to image density, as

$$FM_1 = S/R^2. \quad (1)$$

In situations where point-source sensitivity is invalid (e.g. for focusing-collimator scanners), the plane-source sensitivity and resolution distance for a given collimator-to-subject distance may be substituted with equal validity in Eq. 1.

To take exposure time T into account, all we need do is realize that from a count or image density point of view doubling in exposure is equivalent to doubling in sensitivity, etc. Thus our overall figure of merit is given by

$$FM = ST/R^2. \quad (2)$$

Therefore to compare two scintillation-camera systems (different collimators) with the assumed same *shape* of point-source response functions and for the same application all that is required is to compare FM values. It is interesting to note that this figure of merit contains no reference to subject size, concentration ratios, etc., but provides a *relative* detection probability criterion. So when comparing System 1 with System 2, the merit ratio MR is given by

$$MR = FM_1/FM_2 \quad (3)$$
$$= (S_1/S_2)\,(T_1/T_2)\,(R_2/R_1)^2. \quad (4)$$

To consider Westerman's first experiment of imaging bulbs with equal exposure time and taking the "technetium collimator" as System 1 and the "coarse collimator" as System 2, we have

$$S_1/S_2 = 1/4$$
$$T_1/T_2 = 1$$
$$R_2/R_1 = 2.2/1.5.$$

Substituting into Eq. 4, and evaluating the merit ratio, we get

$$MR = 0.54.$$

Thus, in spite of its coarser resolution, System 2 has an increased probability of detecting abnormalities because of its greatly superior sensitivity.

Westerman notes that while the coarser-resolution system requires an exposure time of 13 sec, the other system requires 25 sec for approximately equivalent perception. This agrees with the theory presented, since

$$T_2/T_1 = 0.52,$$