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Book Reviews

Mathematical Models of Gravity Effects on Pulmonary Functions. (Matematicheskie Modeli Deectviya Gravitatsie na Funktsie Legkich.) Vol. No. 51 of a series on *Problems of Space Biology*. (Problemi Kosmicheskoe Biology, A. M. Genin, Editor.) A. I. Dyachenko and V. G. Shabelnicov, Institute of Biomedical Problems. Ministry of Health of the USSR, Khoroshevskoye Shosse 76A, Moscow D-7 (Director of the Institute, Academician Oleg G. Gazenko, M.D.), Published by Moscow, Nauka, 1985, pp. 279

REVIEWED BY Y. C. FUNG[1]

This is an interesting book presenting a thorough review of the subject in its relationship to space flight. I am grateful to Dr. Gazenko for sending me a copy. The scope of the book is clearly seen from its chapter headings:

1. Mathematical models and experimental methods for investigating gravitational effects on pulmonary function.
2. Pulmonary gas exchange and its modeling.
3. Effect of gravity on pulmonary circulation.
4. Biomechanics of the lung under gravitational influence.
5. Effect of gravity on the distribution of ventilation and ventilation/perfusion ratio.
6. Influence of gravitation on the ventilation/perfusion inequality in stationary pulmonary gas exchange.
7. Dynamics of gas transport in the lung.
8. Mixing of gases in airway and lung.

The treatment is comprehensive, but brief, with emphasis on mathematical models. It is delightful to see that the authors begin each subject with the general governing partial differential equations, much as we do in our class rooms, but almost always advised by the editors of *Circulation Research* or *Journal of Applied Physiology* to omit or to put in an Appendix. The mathematical development given in this book is, however, extremely brief. Some topics, such as high frequency ventilation, were given only a short verbal discussion.

The list of references quotes 98 Russian publications and 372 papers written in English and German. Hence, it is fairly easy for an American reader to follow the General Review and Summary. Most of the numerical results are from the Russian literature, however, and to a Western reader the book is an excellent introduction to the Russian literature not only on the gravitational effect, but on pulmonary physiology in general.

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Electrocardiographic Body Surface Mapping, *Proc. of the Third Intern. Symp. on Body Surface Mapping*. Edited by R. Th. van Dam and A. van Oosterom, Univ. of Nijmegan. A volume in the series on Developments in *Cardiovascular Medicine*. Martinus Nijhoff Publishers, Dordrecht/Boston/Lancaster. Price: Cloth Df1 175, US $75. £ 54.25 ISBN, 0-898 38-834-1. xviii + 311 pp. Publication date Jan. 86.

REVIEWED BY Y. C. FUNG

The objective of studying body surface distribution of electric potential is to solve the *inverse problem* of determining what is happening to the heart, similar to the study of seismological waves in order to learn about the structure of the earth. Clinically, the 12-lead electrocardiogram has been one of the most important methods for the diagnosis of myocardial infarction. It is natural then to inquire whether a large increase in the number of electrodes to cover the surface of the body more completely would yield more precise information about the heart. The answer is, of course, yes. But the practical utility depends not only on the gathering of the data, but also on the processing of the data, and more profoundly, on knowing what data to collect, and how to process the data. Thus body surface mapping of ECG faces the same basic problems of information theory as any other large scale information processing and discrimination programs, such as the evaluation of the patients in the intensive care units, the diagnosis of diabetics, or the forecasting of stock market.

The present volume presents an assessment of the present status and future prospects of body surface mapping of electric potential by 118 authors in 37 papers. There are 33 first authors, all invited by the Scientific Committee of the meeting, the members of which are B. Taccardi of Parma, Italy, F. A. Roberge of Montreal, Canada, and A. van Oosterom of Nijmegen, Holland. The first authors from the U.S.A. are Larry S. Green and R. L. Lux, from Salt Lake City, J. Liebman and Y. Rudy from Cleveland, D. M. Mirvis from Memphis, and R. Sylvester from Los Angeles.

The book is divided into 6 parts. (1) Normals, 4 chapters. (2) Myocardial Infarction, 5 chapters. (3) Conduction Disturbances, 8 chapters. (4) Recording and Display Techniques, 6 chapters. (5) Data Analysis, 8 chapters. (6) Model Studies, 6 chapters.

In Chapter 1, Taccardi describes the current instrumentation that enable the heart potentials to be recorded simultaneously up to 256 points. From these recordings various kinds of maps are produced: *Equipotential contour maps* at different instants of time, *Iso-integral* contour maps