

FACTORS REGULATING BLOOD PRESSURE

*Transactions of the Third Conference
May 5-6, 1949, New York, N. Y.*



PUBLICATION OF JOSIAH MACY, JR. FOUNDATION
NEW YORK, N. Y.

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Edited by

B. W. ZWEIFACH *and* EPHRAIM SHORR
DEPARTMENT OF MEDICINE
CORNELL UNIVERSITY MEDICAL COLLEGE
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JOSIAH MACY, JR. FOUNDATION CONFERENCE PROGRAM

FRANK FREMONT-SMITH

With the accelerating rate at which new knowledge is accumulating and with the increasing recognition that nature is of one piece, it becomes evident that the continued isolation of the several branches of science from one another is a serious obstacle to scientific progress.

Nowhere in science is the need for "combined operations" more evident than in medicine. Today, to be effective medical research and practice must embrace data from all the disciplines including nuclear physics at one end of the spectrum and cultural anthropology at the other, for advances in one field are frequently dependent upon knowledge derived from quite another discipline.

Although the fertility of the multi-discipline approach is thus recognized, universities, scientific societies and journals have not yet made adequate provision for channels of interdisciplinary communication.

The Josiah Macy, Jr. Foundation therefore has endeavored to meet this need by bringing together for a series of two-day annual conferences a small group of investigators, representing in so far as possible all the branches of science which bear on a chosen problem. These round-table discussions of research experience, concepts and plans are conducted in a friendly and informal atmosphere which promotes communication, cross-fertilization of ideas and cooperation. The success of such an endeavor is dependent upon full participation of all members in the discussion. Accordingly the attendance at any conference is limited to twenty-five.

Under the guidance of Dr. Willard C. Rappleye, President of the Foundation since 1942, the Conference Program has been gradually expanded and enlarged until it now includes thirteen different groups which meet annually to discuss a wide variety of problems in the field of medicine and the closely related disciplines. The Conference Program has become a major interest of the Foundation.

In order to share with a wider group of investigators and students the essential quality of these conferences, the informal nature and tempo of the discussions in so far as possible are preserved in the published transactions.

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3rd Conference on Factors Regulating Blood Pressure

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INTRODUCTORY REMARKS

HARRY GOLDBLATT

Institute for Medical Research, Cedars of Lebanon Hospital

Because of the late start which we are making this morning, I have decided to make my introduction even briefer than usual, for which I know you will be duly grateful.

Those of you who have participated in previous Conferences know that when we were organizing this group we considered it desirable to get down immediately to fundamentals and discuss the subject of hemodynamics, as it applies to the general circulation as well as to particular organs such as the kidney. You know, however, that in the first two Conferences, for various reasons, this was not possible and that we resorted instead to the evaluation of previous progress and a mutual disclosure of our activities in the field of hypertension and vascular disease.

These two past Conferences were valuable. They certainly meant much to those who participated and, judging from the popularity of the printed reports, I would say that they also proved of considerable value to those who did not attend but who read the reports.

Now, at last, at the Third Conference, we have decided to make the topic of hemodynamics the subject of discussion. I hope that this will also be the subject of future conferences, because I do not feel that we can exhaust it in a single one.

We are making another departure at this time by inviting the guests to be the contributors of most of the topics. This should prove stimulating and of great value. As you know, and as Dr. Frank Fremont-Smith has emphasized, we lay great stress on discussion and consider it the most important part of these Conferences. We urge the guests also to participate.

It seems to me to begin the conference with a discussion of the capillary circulation is appropriate, and I am going to ask Dr. Zweifach to be our first speaker.

BASIC MECHANISMS IN PERIPHERAL VASCULAR HOMEOSTASIS*

BENJAMIN W. ZWEIFACH

Cornell University Medical College

The capillary bed represents a unique segment of the vascular system which although it is relatively independent of the remainder of the peripheral vascular apparatus, is profoundly influenced by the state of the circulation in the arteries and veins on either side of it. Passive changes in the capillary circulation result from fluctuations in the arterial blood pressure and in the degree of arteriolar constriction. Active changes in blood flow are introduced by local mechanisms which regulate the blood flow to the tissues in accord with their varying nutritive demands. Because of its relative inaccessibility, the contribution of this portion of the vascular apparatus to the overall cardiovascular hemodynamics has not been subjected to a sufficiently critical analysis. Discussions on cardiovascular hemodynamics usually refer to the peripheral circulation by a mathematical term which represents the so-called "peripheral resistance." Actually, the major resistance to blood flow lies in the arterioles. The vessels which lie distal to the arterioles are then collectively referred to as the capillaries and are assigned a somewhat obscure role in the physiology of the vascular system as a whole. It has been our thesis that this portion of the vascular system is intimately concerned with the initiation and perpetuation of a wide variety of circulatory disturbances, including the hypertensive syndrome. I would like to bring to your attention several basic mechanisms residing in the capillary bed which have been shown to play a significant role in the circulatory adjustments to both physiological and abnormal situations.

From a functional viewpoint, the peripheral vascular system consists of three major subdivisions. After penetrating the tissue mass which they supply with blood, the small arteries subdivide

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