Editorial Views

The Anesthesiologist and Basic Circulatory Research

DR. SOL HERSHEY, who has worked for many years in the field of basic circulatory research and its application to anesthesiology, has assembled a group of articles that tell an important story in circulatory function. The value of the articles is immediately presaged by the recognized authority of each one of the authors, and even more by the known interest of each author in teaching and in basic physiologic principles of patient care.

As a former student of surgery myself, though now completely devoted to basic physiologic teaching and research, I am acutely aware of the role that anesthesiologists have played in modern surgical achievement. Many of the most successful techniques of modern surgery are not new; what is new, instead, is tremendous improvement in basic management of the patient's physiologic systems during the surgical procedure. This has been achieved primarily because the modern clinical anesthesiologist has applied with great success the results of research and scholarship in the fundamental sciences. This attitude of the anesthesiologist is a great personal pleasure to me, and I know also to all other basic scientists, because it gives us a common ground for communication. And it is a special credit to this journal that it seeks out and communicates fundamental scientific material of the quality displayed in the present series of articles.

The present set of articles addresses itself primarily to local function and regulation of the tissue vasculature. Though in the past we have often been content to study gross variables of circulatory function such as cardiac output, total peripheral resistance, and pressure, it is now clear that the gross factors can all be normal and yet microvascular function can be abnormal, even to the point of lethality. An example of this occurs in some persons with septic shock in whom the cardiac output can be normal or even supernormal, and yet many isolated tissues will be suffering from severe local ischemia.

Ordinarily, each tissue has its own characteristics of local vascular control; these characteristics are designed for maximizing the ability of the circulation to respond to abnormal stresses. The two major systems of local control are 1) local autoregulation and 2) neural control of the vessels. The autoregulation phenomenon allows each tissue to respond to the tissue's own local needs, most often to the tissue's need for oxygen, though also to other needs, such as the need to remove carbon dioxide or the need to maintain a normal tissue *p*H. In addition, research workers have postulated specific vasodilator substances that may be released by ischemic or active tissues, these substances also helping to control the local vasculature in relation to the tissue's needs.

The second major mechanism for control of tissue blood flow, the neural control, in general is not concerned with the local needs of the tissues but instead with the overall needs of the body. For instance, the neural control elements can decrease blood flow to many areas of the body such as the kidneys, the skin, and the splanchnic areas during stressful situations, thereby translocating blood flow from these areas to the more essential tissues of the heart and brain. The net blood flow in each individual tissue, therefore, results from an interplay between the neural dictates of the total body's needs and the humoral dictates of the local tissue needs. An understanding of the detailed interrelationships between these two major systems for local blood flow control, including their conflicts and their mutual support, can often be invaluable in understanding the vagaries of circulatory function during stressful conditions. A major share of the articles in this issue of the journal will be addressed to these problems.

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