thus far unavailable for this method, since the sections contract shut as soon as the gelatin is melted from the lumen, and are not relaxed by any of the known dilators. Tentatively, this effect is attributed to the action of elastic tissue in the bronchial wall.

Conclusion. Fresh sections of excised lung may be used for microscopic study of ciliary activity, rhythmic contractions, peristalsis, and drug and anaphylactic reactions of bronchioles.

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A Method for Studying Changes in Diastolic Resistance to Blood Flow in the Coronary Arteries.

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In a series of recent articles[1, 2, 3] the blood flow from moment to moment in the various branches of the coronary arteries has been established by constructing differential pressure curves from a combination of the central and peripheral coronary pressure curves (after the latter had been raised to their proper ordinate value). The method, however, is time consuming and what is more important, may miss altogether very rapid and transient changes in coronary flow such as, for example, might follow nerve stimulation, since the necessary data for constructing a flow curve can not be obtained in less than 10-20 heart beats.

To offset these drawbacks, a simple method (requiring the registration of only 1-2 heart beats) is suggested for determining changes in diastolic resistance and in most cases this can be used as an index of qualitative changes in coronary diastolic blood flow.

The experimental setup and method are as follows: After opening the chest and pericardium of an anesthetized dog, optical records of aortic and coronary pressures are taken by inserting manometers of adequate frequency into the aorta through the subclavian artery and into a suitable side branch of a coronary artery. An electromagnetic clamp is placed on the coronary artery central to its recording

[1] Gregg, D. E., Green, H. D., and Wiggers, C. J., *Am. J. Physiol.*, 1935, **112**, 362.

[2] Green, H. D., Gregg, D. E., and Wiggers, C. J., *Am. J. Physiol.*, 1935, **112**, 627.

[3] Gregg, D. E., *Am. J. Physiol.* In press.

manometer. The heart is driven by an artificial pacemaker connected to the right auricle. The clamp and pacemaker are so synchronized (by a device to be described later) that the artery is clamped in successive beats only during the latter part of diastole. Since it has already been established (1) that the diastolic coronary resistance remains unchanged during the latter portion of diastole, then the rate of pressure drop in the artery (obtained by drawing a tangent to the recorded pressure curve at an arbitrary pressure point) can be utilized as an index of the prevailing diastolic resistance. This measure of coronary diastolic resistance taken together with the central coronary or aortic pressure will in most cases give adequate information for comparing qualitatively diastolic flows under different experimental conditions.

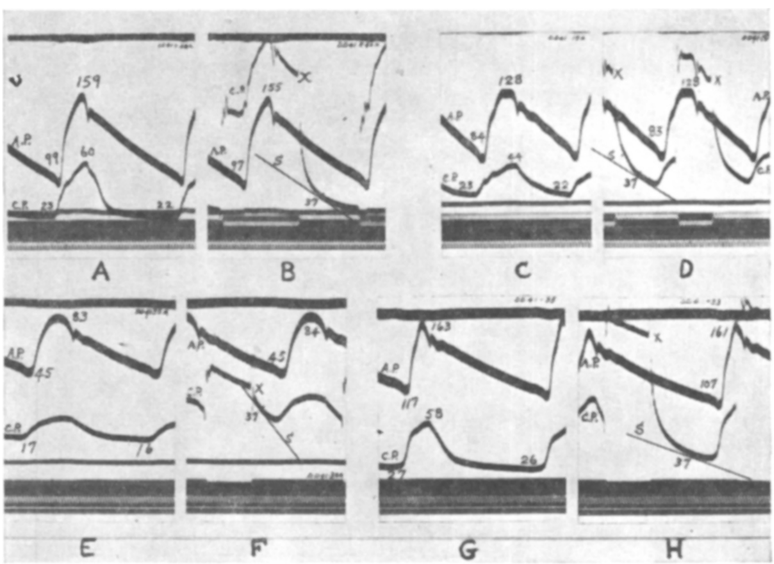

FIG. 1.

Curves illustrating rates of diastolic runoff B, D, F, H and actual coronary diastolic resistance, A, C, E, G, in ramus descendens anterior. A.P., aortic pressure; C.P., coronary pressure; X, time of clamping; S, slope line. Time, 0.02 second.

Figure 1 presents typical records, all taken from the same experiment. In records B, D, F, H, the ramus descendens anterior was mechanically clamped at the time marked X and the diastolic slopes determined at 37 mm. Hg. (this pressure being arbitrarily chosen). The slope lines, S, were then drawn. To check the use of such slopes as a criterion of diastolic resistance, the peripheral coronary resistances have been recorded in records A, C, E, G (after permanently clamping the coronary artery central to the recording manometer until diastolic equilibrium was attained). These curves were obtained within a few heart beats of records B, D, F, H.

Records B, D may first be compared. In such records with aortic blood pressures of 155/97 and 128/83 mm. Hg. respectively, the diastolic slopes at 37 mm. Hg. are identical. This necessitates that the peripheral coronary diastolic resistances also agree. Inspection of records A, C shows that each diastolic peripheral pressure has a value of 22 mm. Hg. giving a resultant effective pressure of 15 mm. Hg. in each case. It is obvious that this agreement of diastolic slopes does not necessarily mean that the diastolic blood flows are the same, for the peripheral coronary pressure is only one of the determinants of blood flow. When the aortic head of diastolic pressure is also considered, the diastolic coronary flow is greater in B than in D (effective pressure at the end of diastole of 75 mm. Hg. as compared with 61 mm. Hg.).

In F as compared with H is shown the effect on coronary diastolic resistance and also flow of raising the aortic pressure by moderate compression of the aorta. In F, the aortic pressure is 84/45 mm. Hg. and the diastolic slope at 37 mm. Hg. is greatly in excess of that in B and D. This is in keeping with the much lower diastolic resistance of 16 mm. Hg. in E. In G the aortic pressure has been raised by aortic compression to 163/117 mm. Hg. This results in a higher diastolic resistance of 26 mm. Hg. and markedly lowers the rate of diastolic runoff as evidenced by the decreased slope S, in H. The diastolic blood flow is here much greater than in F (also D) because the difference between the aortic and peripheral diastolic pressure is much greater. The relative diastolic blood flow in B as compared with H cannot be predicted from the data at hand.

Such records, then, indicate that the gradient of pressure decline in a peripheral coronary artery clamped during the latter part of diastole can be used as a simple and accurate index of coronary diastolic resistance to blood flow under variable physiological conditions such as blood pressure, pulse pressure, heart rate, and nerve stimulation. In conjunction with the central coronary pressure, it can at times serve as a qualitative index of diastolic coronary blood flow.