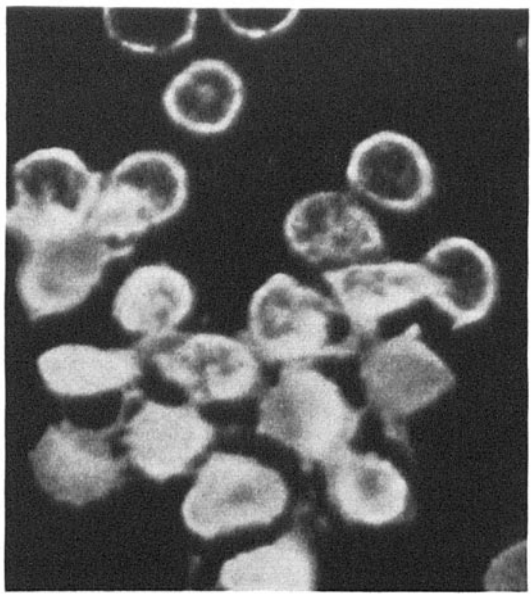

Figure b

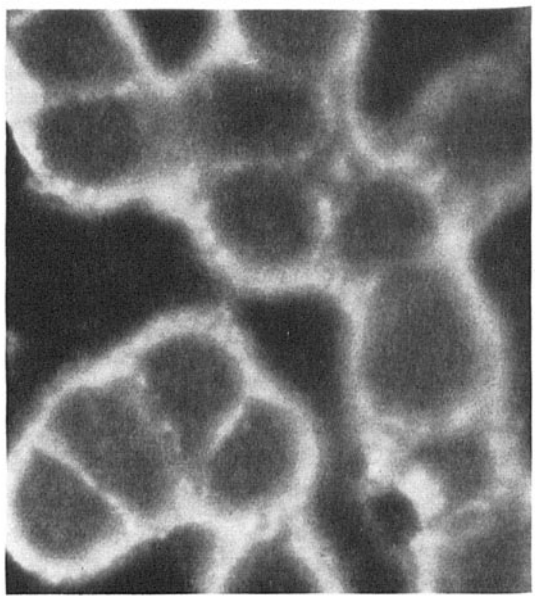

Figure c

observed under the microscope. (We used an Ortholux Leitz microscope with an HBO 200 W lamp and a BG 3 UV-filter.)

The Figures *a* and *b* (× 1800) show positive results with this technique. In Figure *c* (× 3000) can be clearly noted a strong fluorescence just at the points where the penicilyl-polylysine molecules are fixed on the erythrocyte membrane and therefore where the specific reaction takes place.

Since we have failed in our previous assays using penicillin instead of cilligen as antigen, we consider the present technique to be a useful tool for studying antigenicity in complete and modified antibiotic molecules.

*Resumen.* Se propone un sencillo y rápido método de inmuno fluorescencia para detectar anticuerpos antipenicilina: Frotis de eritrocitos de conejo, sobre los que se han fijado moleculas de peniciloyl-polylisina, son tratados con suero de conejo inmunizado y despues con suero de cabra anticonejo marcado con isothiocianato de fluoresceina. De este modo se observa acusada fluorescencia en los casos positivos.

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## Intraluminal Pressure and Equivalent Arterial Wall Tension

Mechanical properties of the arterial wall can be studied conveniently on two types of isolated preparations: isolated segments and helically cut strips of artery. In a segment of artery filled with Ringer's solution the transmural or intraluminal pressure ($P$) acts radially from the aqueous phase into the tissue phase attempting to increase the radius. $P$ is equilibrated by the circumferential elastic tension ($T$) developed within the tissue phase itself at right angles to the radius (Figure 1c, top). Physiological workers usually determine $P$, and then calculate $T$ from a law of Laplace, $P \cdot r = T$, $r$ being the radius of the arterial segment (see BURTON[1]). A formula modified to include the thickness of the arterial wall was used by PATTERSON[2].

It was possible to bring about an experimental situation in which a value of intraluminal pressure, $P$, and its equivalent tension, $T$, of the vascular wall can be measured. $k$, the correlating factor from $P \cdot k = T$, can thus be compared with $r$, the radius measured at $P$ pressure. In other words, an experimentally determined $T$ value can be compared with a $T'$ value computed by use of Laplace's formula $P \cdot r = T'$.

*Methods.* The isolated helically cut aortic strip of the rabbit was prepared as described before[3]. A strip 4 mm wide was suspended in Krebs-$HCO_3$-Ringer solution maintained at 37 °C, and aerated with a gas mixture of oxygen, 95%, and $CO_2$, 5%. The strip was extended to a tension

[1] A. C. BURTON, in *Handbook of Physiology, Circulation* (American Physiological Society, Washington, D. C. 1962), vol. 1, p. 85.

[2] L. H. PETERSON, R. E. JENSEN, and J. PARNELL, Circulation Res. *8*, 622 (1960).

[3] M. WURZEL, T. P. PRUSS, W. WEISS, and G. D. MAENGWYN-DAVIES, Proc. Soc. exp. Biol. Med. *105*, 659 (1960).

of 2.5 g, and single doses of norepinephrine (NOR) were applied to contract the tissue for 3 min periods.

The isolated segment of aorta of the rabbit was suspended suitably for performing a pressure vs. radius curve. Aided by a dissecting microscope, we tied 6–8 pairs of intercostal arteries which originate from the segment of the aorta. Then the airtight segment filled with Ringer solution was suspended at a longitudinal tension of 25 g in Krebs-$HCO_3$-Ringer solution at 37 °C, and connected through polyethylene tubing to a water manometer.

Male rabbits, approximately 2.3 kg in weight, were used throughout.

*Results and discussion.* Maximal contractions were induced by a constant dose of NOR added to the organ bath. Both preparations, the segment of aorta and the helically cut aortic strip, were made to contract under isotonic conditions: the segment at predetermined constant intraluminal pressure, and the strip at constant tension maintained by a hanging weight. Several tests of contraction were made at pressures and tensions increased stepwise. As the applied tension increased, the extent of the contraction became smaller (see Figure, a and b).

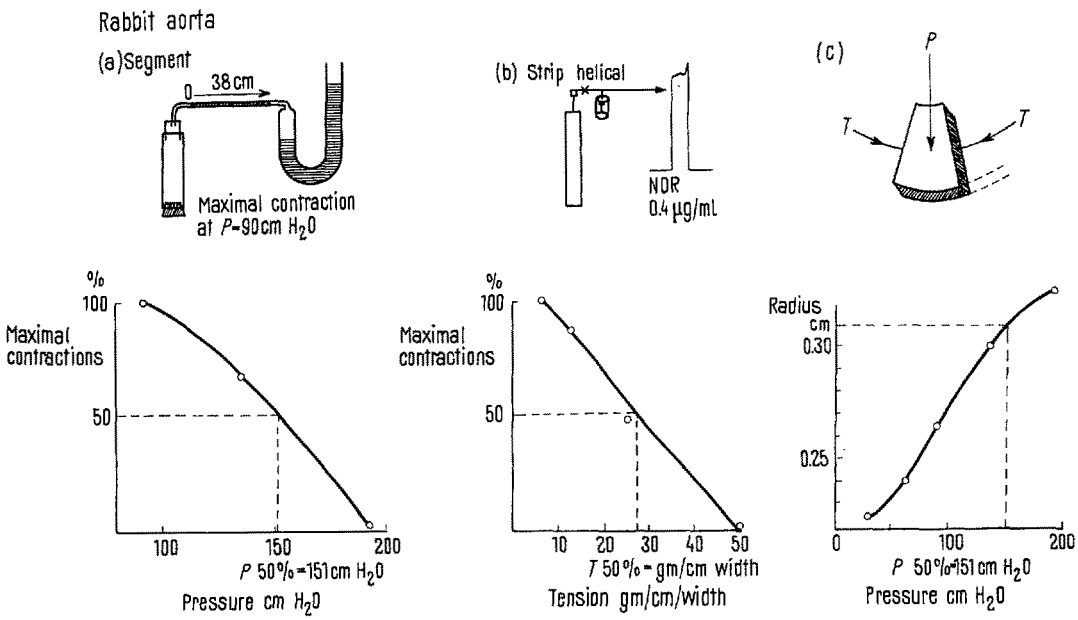
First we determined on the segment the pressure value, $P_{50\%}$, at which the extent of the isotonic contraction is half of the maximum. Then the segment was cut helically into a 4 mm wide strip and suspended in an organ bath. Again this tissue, extended by a weight, was contracted maximally with NOR, and the tension at which the extent of the contraction becomes half of the maximum, $T_{50\%}$, was determined. $P_{50\%}$ and $T_{50\%}$ are a pair of equivalent values of intraluminal pressure and of circumferential tension, respectively, which maintain the arterial tube in equilibrium at a time when the maximal contractile ability of the artery is lowered to half (see Figure and Table).

A longitudinally cut strip of aorta suspended in Ringer's solution does not contract at all upon addition of NOR. Consequently only the diameter decreases when a segment of aorta is made to contract. Thus, helically, not longitudinally cut strips are comparable with the segment of this artery.

It can be seen in the Table that the '$r$ functional' $= k$ values are approximately 25% smaller than the measured radius. Both $r$ values were used in experiments in which data collected on segment and strip were compared. We found on isolated aortic strip that contracting substances increase the Young's modulus of elasticity. Then analogous measurements were performed on segments of artery, and values of tension, $T$, experimental, and $T'$, from $P \cdot r = T$, were employed for calculation of Young's moduli (to be published)[4].

| Experiment No. | $P_{50\%}$ $cmH_2O$ | $T_{50\%}$ g/cm | '$r$ functional' $= k$; $r_{50\%}$ from $r = T_{50}/P_{50}$ | $r$ measured |
|---|---|---|---|---|
| 1 | 134 | 23.3 | 0.20 | 0.27 |
| 2 | 139 | 33 | 0.24 | 0.30 |
| 3 | 140 | 27.5 | 0.20 | 0.30 |
| 4 | 152 | 25 | 0.16 | 0.29 |
| 5 | 157 | 39.2 | 0.25 | 0.33 |

[4] Supported by MRC of Canada, No. MA-2046.




Pressure and equivalent tension in arterial tubing. Segment and helically cut strip of rabbit aorta. The thoracic aorta of a rabbit was examined first as a segment, then as a helically cut strip. On the left, pressure vs. maximal contraction curve of a segment of artery is reproduced. Upon maximal contraction induced with NOR, fluid extruded from the artery filled a 38 cm long segment of the thin polyethylene tubing. In the middle, on a strip cut helically from the segment, maximal contraction height is represented as a function of the $T$ tension. On the right lower curve, intraluminal pressure and the actual radius are represented. The radius was measured by means of a binocular microscope. Figures obtained in 5 such experiments are seen in the Table.

*Résumé.* $P = T/r$, une loi de Laplace, est d'habitude appliquée pour exprimer la relation entre la pression intraluminale ($P$) et la tension intramurale ($T$) d'un vaisseau de rayon $r$. Sur un segment tubulaire, et sur une bande hélicale de l'aorte du lapin, nous avons mesuré deux valeurs équivalentes, $P_{50\%}$ et $T_{50\%}$, obtenues lorsque la contraction causée par la noradrénaline est réduite de moitié. Ainsi la valeur de $r$, calculée en utilisant l'equation $P = T/r$, est environ 75% de la valeur mesurée.

M. WURZEL and R. ROACH

*Department of Physiology, Faculty of Medicine, University of Ottawa (Ontario, Canada), July 11, 1966.*

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## CONGRESSUS

### USA

### Second International Congress for Stereology

*in Chicago (Illinois, USA), April 8-13, 1967*

Problems of quantitative histology, metallurgy, mineralogy: Volume fractions, problem of size, numbers of particles per unit volume, length per unit volume, surface area in unit volume.

The deadline for submitting titles and abstracts of papers and demonstrations will be December 1, 1966.

Further information from International Society for Stereology, 2020 W. Ogden Avenue, Chicago (Illinois, USA).

### France

### The First International Congress of the Transplantation Society

*in Paris, June 27–30, 1967*

Programme: Mechanism of graft rejection; methods of immuno-depression; genetics of transplantation; transplantation antigens; organ transplantation; bone marrow transplantation; cancer as homograft.

Co-chairmen: Prof. Ag. J. Dausset; Prof. J. Hamburger; Prof. G. Mathe. Secretariat: Prof. Jean Dausset, Hôpital Saint Louis, Place du Dr. Fournier, Paris 10e (France).

### Switzerland

### 8th International Embryological Conference

*in Interlaken (Berne), September 3–9, 1967*

sponsored by the Editorial Board of the Journal of Embryology and Experimental Morphology on the occasion of the 11th meeting of the Editorial Board: Prof. F. E. LEHMANN and Prof. R. WEBER.

Further information about this meeting may be obtained from Dr. A. S. G. CURTIS, Department of Zoology, University College, Gower Street, London W.C.1., U.K.