Unanesthetized hypertensive rats were given 2,3-dimercaptopropanol intramuscularly at daily intervals. Reduction of blood pressure to normotensive levels occurred for 2 and 3 hr but not for 4; no permanent hypotensive effect was attained unless pyruvic acid was also given, in which case the rats died after several days with hypotensive levels of pressure.

A further property of sulfhydryl compounds of interest to the problem of hypertension lay in their ability to render rats insensitive to many naturally occurring pressor substances. The material employed to explore this action was, in most experiments, β-mercaptopropionic acid; other similar compounds, with the exception of cysteine, also exhibited this activity. A pressor dose of one of several naturally occurring or closely allied amines was inactive in an animal previously prepared by the intravenous injection of some sulfhydryl substances. The antipressor effect could be overcome only by giving excessively large doses of the pressor agent. The action of the following pressor amines was abolished or markedly depressed by prior injection of β-mercaptopropionic acid: norepinephrine, epinephrine, arterenone, tyramine, angiotonin (hypertensin), and pherentasin, the pressor substance obtained from human hypertensive blood (*4*). The action of the following was not inhibited: isoamylamine, phenethylamine, and tryptamine. It will be remembered that all the compounds inhibited by the sulfhydryl substance (except angiotonin, the formula of which has not yet been discovered), contain either hydroxyl or carbonyl groups; those not affected do not contain these groups. The order of magnitude of inhibition is shown in Table 2. Inhibition of pressor action occurred in both hypertensive and normotensive rats, the blood pressure of the latter being unaffected by the sulfhydryl compound (Fig. 1).

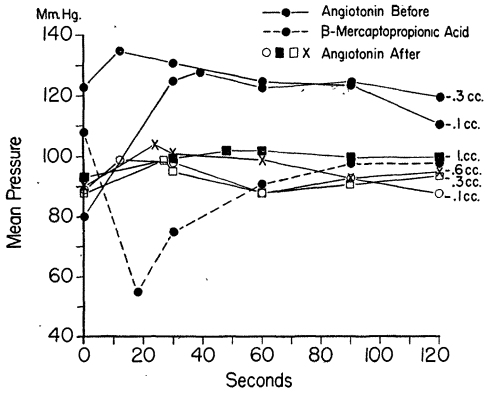

FIG. 1. Suppression of response in the rat of a pressor agent (in this case angiotonin or hypertensin) by a sulfhydryl compound. The lines indicate mean blood pressure calculated from Hamilton manometric photokymographs. Injections were made at zero time. Note the almost complete inhibition of the response to the pressor substance, even in larger doses, after the injection of the sulfhydryl compound (in this case β-mercaptopropionic acid neutralized to pH 7.4 with sodium bicarbonate). The solution of angiotonin (hypertensin) was adjusted to such a strength that 0.1 cc gave a minimal pressor reaction. These curves are typical of those obtained with other pressor agents. Pulse pressure was relatively unchanged by the sulfhydryl compounds and by the pressor agents subsequently injected.

Lowering of blood pressure in chronic renal hypertensive dogs was obtained by both 2,3-dimercaptopropanol given intramuscularly and β-mercaptopropionic acid given intravenously. In one experiment reduced glutathione appeared to cause a slight effect. The durations of the changes were short (2–4 hr), and were sometimes followed by hypertensive reactions. In hypertensive patients, 2,3-dimercaptopropanol given in doses of 100–150 mg intramuscularly also lowered blood pressure temporarily (1½–4 hr), although the usual response of normal subjects is elevation of blood pressure (*5*). Repeated doses apparently caused depression of blood pressure for several days in a few subjects. As in dogs, occasionally hypotensive responses were followed by hypertensive ones. Cysteine in doses as high as 2.0 g intravenously exhibited little or no effect.

From these experiments it appears that the administration of certain sulfhydryl compounds of simple molecular structure can cause temporary lowering of blood pressure in experimental and human hypertension without affecting normal blood pressure similarly. Furthermore, the pressor action of a number of naturally occurring amines is markedly depressed. The application of these findings to the control of human hypertension deserves further study.

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The Distillation of Lithium Metal

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If a piece of lithium is heated in air in a glass test tube, the metal first darkens because of the temperature-accelerated reaction with the nitrogen, oxygen, and other constituents of the air. At, or a little above, the melting point (*1*) 186° C, a spectacular reaction with the glass occurs. The test tube grows red, then white hot. In a short time, the bottom falls out of it and the metal burns with a brilliant white flame, like that of magnesium. It has been reported (*2*) that the lithium in this reaction reduces the SiO_2 and silicates of the glass to form lithium silicide. Attempts to purify Li on a laboratory scale by distillation in glass have usually ended in failure, accompanied by a fireworks display similar to that described above. It is the purpose of this paper to show how a glass system can be used to carry out this process.

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As early as 1900 Kahlbaum (*3*) reported that he had successfully distilled Li in a glass system. This reference, which appeared in a rather obscure Swiss journal, seems to have been largely overlooked by subsequent workers. The trick is to keep liquid Li from coming into contact with the glass; the dilute vapor apparently does not react readily. (Whether this is due to the concentration of Li (*g*, Li/cm^3) being less, or whether the rapid reaction of the liquid metal with glass is due to the ubiquitous oxide and nitride impurities, is not known.) Kahlbaum carried out the distillation at a few hundredths of a micron pressure by putting the Li in a silver crucible inside a glass system. The glass walls, on which the vapor condenses, must be kept relatively cool; and this requires a rather delicate heat balance and careful dimensioning of the system, so that the heat applied to the bottom of the tube does not cause an excessive temperature rise in the glass walls, above the metal crucible, where the distillate is collected. The ideal way to carry out this step is by induction heating (which does not raise the temperature of the nonconducting glass significantly). Using a G-E 2-kw electronic heater, operating at about 500–600 kc, and a Type 347 stainless steel cup (instead of silver), a beautiful Li mirror can be deposited on a Pyrex glass tube. In this process, care must be taken to prevent spattering of the liquid Li on the glass walls, particularly upon initial melting; and for this purpose it has been found convenient to weld a "chimney" with baffles over the metal cup. It should be noted that because of the low molecular weight of Li vapor, this and other welds must be extremely tight, and to test this, an He mass spectrometer leak detector has been most useful.

To distill larger quantities of Li, a stainless steel "cold finger" about 1.5 cm in diameter was sealed into a large ground-glass joint by the use of Fernico. This was fitted to the glass distilling tube, about 4 cm in ID and 35 cm long, and cooled with dry ice (solid CO_2). In this way the distilled product collected largely on the metal tube and could subsequently be readily scraped off in an argon atmosphere dry box without contamination by glass or Li-glass reaction products. Although the exact rate of heat input to the steel cup is difficult to estimate because the efficiency of coupling of the work coil to the system is unknown, the following conditions are quoted for the guidance of workers who may attempt to repeat this experiment: current 0.35 a, pressure 0.01 to 0.05 μ, temperature 450° to 500° C. Under these conditions, a distillation rate of about 1 g of Li/hr was achieved, and it has been found convenient to distill 1–2 g at a time in the system.

The resulting Li, on exposure to air at room temperature, does not react and darken rapidly as a freshly cut surface of commercial Li will, but retains a shiny and metallic luster for 10 hr or more. We have also observed in this laboratory that the rate of reaction of distilled sodium with air is markedly less than that of more impure material. The effect of traces of impurities on the corrosion of other metals is well known; thus, for example, it is reported (*4*) that, whereas 99.95% pure zinc dissolves completely in 10% HCl at room temperature, in the same time under identical conditions, "chemically pure" zinc (99.99%) loses 53% by weight and "spectroscopically pure" zinc (99.999% or better) loses only 0.02%. Similarly, in a study of the dissolution rate of aluminum in NaOH solutions, Streicher (*5*) found that under identical conditions (0.3N NaOH, 23° C, specimen area 40.5 cm^2, test period 240 min), a sample containing 0.0005% Fe as the principal impurity lost only 115 mg, whereas one containing 0.84% Fe lost 1075 mg. The observations noted above on the reactions of purified alkali metals with air are consistent with these large effects of impurities on corrosion rates in electrolytic systems.

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An Instrument for Dynamic Vital Capacity Measurements[1]

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The vital capacity has been used for the clinical evaluation of pulmonary function for more than 100 years without any modification (*1*). It is recognized that this test cannot give any indication of defects of distribution or diffusion of gases. Even now, however, it is widely employed in efforts to evaluate ventilatory function concerned with the exchange of air between the outside atmosphere and the lungs. The use of the vital capacity in this connection is based on the misconception that the effectiveness of ventilation is solely dependent on the stroke volume, or the amount of air that can be moved by a single maximal effort of all the muscles of respiration (*2*).

Interest in applied clinical pulmonary physiology has been greatly stimulated during the past 20 years by the rapid advances in thoracic surgery and phthisiotherapy. During this time it has been increasingly

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