been clearly established. Other experiments (*5*) have shown that the administration of 5-HT to pregnant mice leads to a rise in the 5-HT content of the fetus, and it is possible that this high local concentration may be responsible for the abnormal development. Although the doses of 5-HT that we used in the present experiments were large, it has been found (*6*) that even with a dose of 2 mg the fetuses usually die when the level of 5-HT in the placenta is only three times its normal value (*7*).

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Fatness of the Total Body as Estimated from Measurements on the Eviscerated Carcass

Abstract. *In mice of the genetically obese strain with body fatness below 28 percent, fatness of the eviscerated carcass equaled fatness of the total body. Above 28 percent, the two values diverged with the eviscerated carcass being the higher. In the fattest individuals the prediction of total body fatness from measurements made on the eviscerated carcass may be in error by +6.5 percent-fatness. When total body fatness exceeded about 25 percent, visceral depots no longer participated proportionately, and probably did not participate at all in further fat accretion.*

Alterations in the fat content of the mammalian body may reflect changes in nutrition, activity, environmental temperature, psychic stress, and many other factors. Hence, it is not surprising that total body fatness is a datum of central importance in studies of gross body composition. To avoid its direct determination by the tedious and time-consuming technique of extracting the total body, this datum is usually estimated from simple measurements made on something less than the total body. For example, total body fatness is estimated from the density or specific gravity of the eviscerated carcass (*1*), chemical analysis of the 9-10-11 rib cut (*2*), and, qualitatively, from the thickness of skin-folds which include the subcutaneous fat layer (*3*). The assumption implicit in the use of such devices is that the particular measurement (for example, fatness of the eviscerated carcass) is positively correlated with whole body fatness by a regression line passing through the origin and possessing a slope of 1.0.

Rathbun and Pace (*1*), using the guinea pig, derived a hyperbolic regression equation which enabled them to predict fat fraction of the eviscerated carcass from specific gravity of the eviscerated carcass with a precision adequate for most purposes. Furthermore, they demonstrated the equivalence between fat fraction of the whole body and fat fraction of the eviscerated carcass in the fatness range covered by their sample (3 to 22 percent). Their results enabled them to derive an equation relating total body fatness to specific gravity of the eviscerated carcass. Subsequently, this equation, with minor modifications, has been widely used for prediction purposes, although the specific assumption of equivalence between fat fraction of total body and eviscerated carcass has not been validated for other species and other ranges of body fatness. Data presented below on obese mice show that fatness of the eviscerated carcass is greater than fatness of the total body, specifically in individuals with more than about 25-percent body fat. In such animals the use of existing equations to predict total body fatness from measurements made on the eviscerated carcass may result in appreciable error.

Twenty-two congenitally obese, hyperglycemic mice, and 22 normal littermates, all females, were obtained from the R. B. Jackson Memorial Laboratory. They were permitted free access to Purina chow until 197 days of age. Under these conditions the obese individuals all had between 55- and 60-percent body fatness and the normal individuals, between 7 and 25 percent. For approximately 90 additional days the caloric intake of

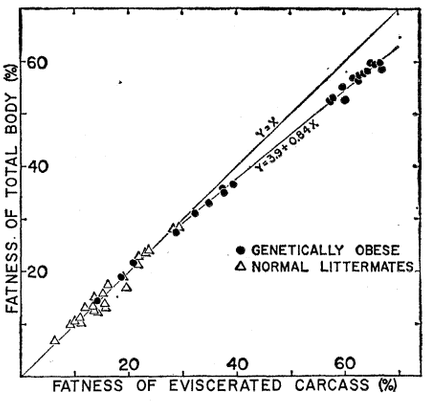

Fig. 1. Relationship of fatness of the total body to fatness of the eviscerated carcass. The straight line diverging from the bisector was fitted by the method of least squares.

nine obese mice was restricted by limiting availability of food to 3 hours per day. This regimen extended the range of fatness in that group downward to 15 percent. After sacrifice each animal was depilated with barium sulfide and eviscerated. Fat fractions of the minced viscera and eviscerated carcass were determined separately by extraction with petroleum ether (bp 35° to 55°C) at room temperature by the method of Hastings and Eichelberger (*4*). Further technical details have been presented elsewhere (*5*).

In Fig. 1, relating fatness of the total body to fatness of the eviscerated carcass, the trend is satisfactorily described by the function $y = x$ throughout the range from 6- to about 28-percent fatness. These results corroborate those of Rathbun and Pace on guinea pigs (*1*). However, as fatness increases beyond 28 percent, the fatness of the eviscerated carcass becomes progressively greater than that of the total body. This segment of the plot also appears to be linear but with a slope, however, of 0.84. If one attempted

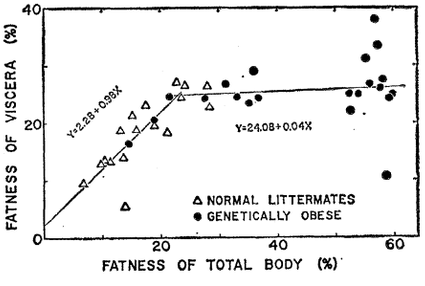

Fig. 2. Relationship of fatness of the viscera to fatness of the total body. The lines were fitted by the method of least squares as described in the text.

to predict total body fatness from a measurement (say, specific gravity) made on an eviscerated carcass with 67-percent fatness, the error incurred would be +6.5-percent fatness. The error would be progressively smaller on leaner animals.

These data suggest the possibility that adipose depots associated with the viscera achieve a limiting value in the region of 28-percent fatness beyond which additional fat may not be accommodated, leaving further fat accumulation to depots associated with the eviscerated carcass. This hypothesis is tested in Fig. 2, where visceral fatness is plotted against total body fatness.

Inspection suggests a complex function with a "break." In Fig. 1 the intercept (24.4 percent) of $y = 3.9 + 0.84\ x$ with $y = x$ is seen to coincide with a small interruption in the data. Using this as the "break" point, two different regression lines were calculated, namely, one for individuals with total body fatness below 24.4 percent and another for those above. The first intercepts the ordinate close to the origin and has a slope (0.98) not statistically different from 1.00. The slope of the second (0.04) is not statistically different from that of a line parallel to the abscissa. The scatter is greater than that in Fig. 1, particularly in the obese mice that had free access to food, where the range of ordinate values appears to be greater than can be accounted for solely by methodological errors. In spite of its genetic purity this group shows an increased biological variability in visceral fatness which we are unable to explain. The obese mice on a restricted diet (nine individuals to the left) have a more restricted range of ordinate values.

In general, Fig. 2 supports our initial hypothesis that in the region of 24- to 28-percent total body fatness, there is a limiting value, below which visceral depots participate proportionately in fat storage, and above which additional fat is not accommodated in these depots. In spite of the statistical finding that the slope of the regression curve above the break is not significantly different from zero, an element of doubt is introduced by the wide range of ordinate values in the individuals at the right. Because the one very low value ($y = 10.6$) may exert an inordinate weight, we have recalculated the regression line omitting that point. The slope becomes 0.105 and there are still 85 chances out of 100 that our sample came from a population with a slope of zero.

It should be noted that the viscera constitute less than one-fifth of the total body weight in these animals. Consequently, the difference between proportionate fat storage and no fat storage by the viscera causes only a small alteration in the slope of the function in Fig. 1.

Finally, it should be re-emphasized that our findings apply only to female mice of the genetically obese strain. The desirability of experimental verification in other populations is evident (*6*).

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Sodium Bicarbonate: Increase in Survival Rate of Rats Inhaling Oxygen

Abstract. *The injection daily of 50 milliliters of 0.15*M *sodium bicarbonate per kilogram of body weight significantly decreased the mortality rate of rats inhaling 95- to 98-percent oxygen. This treatment did not prevent the occurrence of degenerative changes in the germinal epithelium of the testes.*

It has been shown previously (*1*) that intraperitoneal injection of sodium bicarbonate or tris (hydroxymethyl) aminomethane (THAM) significantly delays the appearance of convulsions in mice exposed to high pressures of oxygen (up to 4.7 atmospheres absolute). Furthermore, these buffers increased significantly the 24-hour survival rate after the animals were removed from a high oxygen environment.

Elevated mortality rates and lung damage (*2*) are observed when animals are exposed for several days to concentrations of oxygen greater than 70

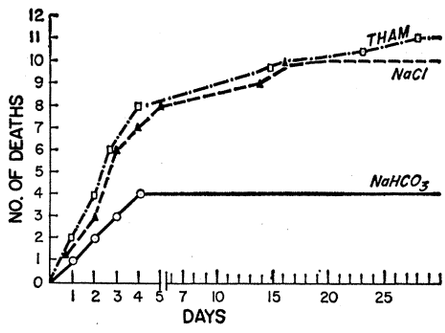

Fig. 1. Mortality rate during one month of rats breathing 95- to 98-percent O_2. Most of the deaths occurred in the first 4 days. There was a significant increase in survival rate of the animals treated with $NaHCO_3$.

to 80 percent. Testicular changes have been noted in rodents exposed to high pressures of oxygen (*3*) or exposed for several weeks to pure oxygen (*4*). The present experiment was designed to assess the effects of THAM and $NaHCO_3$ on survival and on changes in the gonads of rats exposed to 95- to 98-percent oxygen for a period of 4 weeks.

Male albino rats (Sherman strain) weighing 180 to 270 g were placed in glass aquariums which were then sealed and flushed with oxygen. A continuous flow of 3 to 4 liters of oxygen per minute was maintained. Gas was removed from the aquariums with a blower and circulated through containers filled with soda lime and silica gel before it was returned to the tanks. This insured the removal of carbon dioxide and excessive moisture from the system. Samples of the gas from the aquariums were analyzed frequently with an infrared carbon dioxide analyzer and a Beckman oxygen analyzer. Water and food were constantly available.

Three groups of 12 rats were studied. The first group was injected intraperitoneally with 50 ml of 0.15*M* $NaHCO_3$ per kilogram of body weight. The second group was injected intraperitoneally with an equal volume of 0.3*M* THAM titrated to *p*H 8.55 with HCl. This titration to a lower *p*H is necessary to avoid severe peritoneal irritation. The control group received an equal volume of isotonic saline. A fourth group (six rats) was similarly injected with an equal volume of chlorpromazine solution (15 mg/kg). Chlorpromazine protects against convulsions and increases the survival rate of animals exposed to hyperbaric