

Estimation of Total Body Chloride in Young Infants by Radiobromide Dilution.* (20518)

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A number of recent reports have indicated the usefulness of bromine as a "tracer" for chlorine in isotopic dilution experiments, for the radio-isotopes of chlorine possess inherent disadvantages. Earlier studies indicated that the bromide ion is distributed in body fluids and tissues of animals in proportion to chloride with the exception of brain and cerebrospinal fluid(1,2). More recently Gamble and associates have found that the volumes of distribution of Cl^{38} and Br^{82} are quite similar in man(3).

Values for total body chloride in adults have been established at an average of 31.6 meq/kg body weight for males and 28.6 meq/kg for females(4). This study of total body chloride in newborn infants was undertaken for the purpose of establishing normal values in this age group and for comparison with data obtained by others by direct carcass analysis.

Methods. Radiobromine⁸², obtained from Oak Ridge National Laboratories, was administered intravenously in doses approximating 2 μC /kg body weight according to the method of Barnett and Fellers(5). An equilibration period of 24 hours was employed, during which the subjects consumed their usual milk formulas and fluids and the urine was collected quantitatively. The subjects were normal infants 2 to 16 days of age. They were weighed at the beginning and end of the equilibration period and the average value used for purposes of calculation. Total body chloride was computed as follows:

$$\text{Total body Cl} = \frac{\text{Br}^{82} \text{ administered} - \text{Br}^{82} \text{ excreted}}{\text{Serum Br}^{82}/\text{serum Cl}}$$

Serum chloride was determined by a micro-

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TABLE I. Total Body Chloride in a Series of Infants.

Age, days	Sex	Wt, g	Height, cm	Total Cl, meq	meq/kg
2	♂	2095	44	133.2	63.6
10	♂	2140	44.5	126.0	58.9
16	♂	2255	42	113.1	50.2
6	♂	2325	46	117.1	50.3
2	♀	2395	44	126.5	52.8
5	♂	2480	49	119.2	48.0
12	♀	2545	50	104.9	41.2
6	♀	3070	50	134.4	43.8
					Avg = 51.1

modification of the method of Van Slyke and Hiller(6). Radioactivity measurements were made with an end-window Geiger counter with appropriate corrections for self-absorption, resolving time and radioactive decay.

Results. Results of determination of total body chloride in 8 normal infants are tabulated in Table I, with the subjects arranged according to weight. The average value of 51.1 meq/kg body weight is considerably greater than that reported for adults using comparable methods. Despite the rather wide range of the values, in none of our subjects did the value approach those noted for adult subjects(4).

Comparison with carcass analysis. Whereas no information is available on total body chloride as determined by direct whole body chemical analysis in adults, a number of newborn infants have been studied by earlier workers. These observations can be used to test the validity of the bromide dilution method as a measure of total body chloride. A total of 11 carcass analyses have been reported for subjects in the same general weight range as those reported in this paper, the average value for total body chloride being 49.2 meq/kg with a range of 40.9 to 54.4 meq/kg(7-11). This value and range of values are strikingly similar to those obtained by bromide dilution, and offer considerable support to the hypothesis that the method is

valid for young infants.

On theoretical grounds, one would expect the isotopic dilution values to be somewhat less than those obtained by carcass analysis since bromide⁸² equilibration in brain and cerebrospinal fluid is not complete at the end of 24 hours(12), yet precise data with which to evaluate the error involved are lacking. On the other hand, total body chloride progressively decreases as body weight increases during growth(13) and since the average weight of our subjects is approximately 480 g less than that of the subjects quoted above the 2 groups are not strictly comparable. According to equations developed by one of us (G.B.F.) from published data on carcass analysis it can be predicted that the average total body chloride for our group of subjects should have been 53.2 meq/kg. or 2.1 meq/kg more than the values observed.

Conclusion. 1.) Values for total body chloride, as determined by radiobromine⁸³ dilution, averaged 51.1 meq/kg body weight for a series of normal newly born infants. Total body chloride, on a per kilogram basis is far higher in young infants than adults. 2.) Values obtained by this method show excellent agreement with those obtained by earlier

workers employing direct chemical analysis. Therefore, the bromide dilution method would appear to be valid for the measurement of total body chloride in young infants.

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Effects of Cortisone on Thiamine-Deficient Young Rats.* (20519)

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Large doses of cortisone may increase requirements for vit. B₁₂ and other factors in the young rat(1-3) and baby pig(4). Pre-existent deficiencies of vit. B₁₂ in these species were aggravated by cortisone injections, resulting in reduced body growth and survival rate. These detrimental actions of cortisone

were largely counteracted in young rats by increasing vit. B₁₂ intake at least 10 times above normal requirements (to 200 µg per kilo of diet). Addition of small amounts of aureomycin to the diet further enhanced the beneficial effects of vit. B₁₂, and both supplements were accompanied by increases in food intake and greater efficiency in converting food into body weight gains. It was the purpose of the present study to determine the effects of large doses of cortisone on requirements for thiamine by the young rat.

Methods and results. Exp. 1. Fifty-three young male Carworth rats were divided into

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