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EXPERIENCES WITH THE RADIOCHROMIUM METHOD FOR DETERMINATION OF RED CELL VOLUME¹

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The use of radioactively labeled red cells for the determination of the red cell volume (Rbc) has gained wide acceptance since its introduction by Hahn & Hevesy (1940). Of the procedures currently in use, the method of Sterling & Gray (1950), utilizing autogenous cells labeled with radioactive sodium chromate (Cr^{51}), meets most adequately the basic requirements for blood volume measurement by the dilution principle: a) that the "indicator", in this case tagged cells, can become evenly distributed in the entire blood volume within a reasonable period, and b) that none of the tag is lost from the circulating blood during mixing. The rate of loss of Cr^{51} from the tagged cells is so slow that the lapse in time between their injection and the estimation of their dilution in the subject's

blood is not critical, as is the case with P^{32} (Sterling & Gray 1950). In subjects without hemolytic disorders, the apparent volume of distribution of cells labeled with Cr^{51} even 24 hours after injection is no more than 5 per cent greater than the volume estimated within an hour of the injection (Sterling & Gray 1950; Nomof, Hopper, Brown, Scott & Wennesland 1954; Mollison & Veall 1955).

One of the principal disadvantages of using either Cr^{51} or P^{32} is that the cells must be tagged *in vitro*, which in clinical studies means that the subject must be available at least an hour before the actual measurement. More important, however, is the possible effect on accuracy of damaging the cells by processing them *in vitro*. As will be shown, this is not an important source of error in volume determinations (Wennesland, Shepherd, Nomof, Brown, Hopper & Bradley 1957), except in patients with hemolytic tendencies. Greater care in tagging is required if the cells are to be used for studies

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