

PROGRESS REPORT: METABOLISM OF DEXTRAN

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Since its introduction as a plasma substitute by Ingelman<sup>(1)</sup> dextran has been used extensively in some European countries. Because of the possibility of long time damage to the body, which has occurred with some other materials used as plasma expanders, it is desirable to study the metabolic fate of dextran. The preparation of the C<sup>14</sup>-labeled dextran used for this purpose has been described earlier.<sup>(2,3)</sup> For the animal experiments the dextran was tagged with 110 µc of C<sup>14</sup> per g. For man a six per cent isotonic solution of dextran (6 µc per g) was used.

In all of our experiments quantitative recoveries of urine, feces, and exhaled carbon dioxide have been made in order to determine the total C<sup>14</sup> eliminated following the intravenous injection of tagged dextran. At death organ and muscle specimens are taken for determination of C<sup>14</sup> retention.

For the purpose of quantitatively collecting exhaled carbon dioxide and separated excreta, the rat experiments were set up as shown in Figure 1. This arrangement immobilizes the lower part of the animal but allows the upper body free movement.

An early observation that specific activity measurements on CO<sub>2</sub> taken as spot checks before feeding were higher than those taken after feeding led us to divide the rat experiments into two groups. One group was allowed a normal food intake, while the other was maintained on a subsistence diet. A third group, given a normal diet and allowed unrestricted activity, is also under observation, at the present time.

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Some of the data already collected are shown in Figures 2, 3, and 4. Cumulative CO<sub>2</sub> excretions are represented by Figure 2. Dextran metabolism in a rat allowed a normal food intake with restricted activity is shown in Figure 3; while Figure 4 represents an animal on a subsistence diet and restricted activity.

Although the data are not sufficiently complete to permit more than tentative conclusions concerning the metabolism of dextran, it appears that:

- 1) Dextran is metabolized similarly by the rat, dog, and man.
- 2) The rates of dextran excretion and metabolism depend on the metabolic needs of the animal.
- 3) About 50 per cent of injected dextran is excreted as such during the first three days, while a large part of that remaining in the animal is oxidized to CO<sub>2</sub> over a longer period of time.
- 4) After intravenous administration no dextran, nor any of its metabolic products, is excreted by way of the intestine.

#### LITERATURE CITED

1. Ingelman, B. 1947. Dextran and its use as a plasma substitute. Acta Chem. Scand., 1:731-8.
2. Scully, N. J., J. Skok, W. Chorney, R. Watanabe, and G. Kostal. 1951. Biosynthesis of C<sup>14</sup>-labeled dextran. ANL-4625. Pp. 173-175.
3. Scully, N. J., J. Skok, W. Chorney, R. Watanabe, G. Kostal, H. Stavely, J. K. Dale, A. R. Stanley, and T. Craig. 1951. Biosynthesis of C<sup>14</sup>-labeled dextran. ANL-4676. Pp. 84-88.

Figure 1. Apparatus for collection of exhaled  
carbon dioxide and separated excreta.

Figure 2. Cumulative  $C^{14}O_2$  excretion.

- (1) Rat - fed, unrestricted activity
- (2) Dog - fed, restricted activity
- (3) Rat - starved, restricted activity
- (4) Rat - fed, restricted activity
- (5) Man - fed, restricted activity

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Figure 3. Dextran metabolism in a rat  
allowed a normal food intake  
with restricted activity.

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Figure 4. Dextran metabolism in an animal  
on a subsistence diet and restricted  
activity.

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