ON THE CONVERSION OF PALMITIC ACID LABELED WITH RADIOACTIVE CARBON TO GLUCOSE BY THE ALLOXAN-DIABETIC RAT*

Sirs:

Although it is now well established that the carbon of lower fatty acids can be incorporated into the glucose molecule,\textsuperscript{1-3} such a conversion for the carbon of long chain fatty acids has not hitherto been demonstrated.

Palmitic acid labeled at its 6th carbon\textsuperscript{4} was used in this investigation. 50 mg. of this fatty acid dissolved in 1 cc. of corn oil were administered by stomach tube to alloxan-diabetic rats and the urine of these animals collected for the next 24 hours. The rats had access to food. The urinary glucose was isolated as the osazone, which was then converted to the osotriazole derivative. The results obtained with four rats are recorded in the table. The purity of the osazones and osotriazoles was established by the determination of nitrogen content, melting point, and the demonstration of identical specific activities for these two compounds (see the table).

Since it has been shown that the carbon of CO\textsubscript{2} can be incorporated into glucose,\textsuperscript{1, 2} the excretion of radioactive glucose by fed alloxan-diabetic rats

\* Refers to counts per minute per mg. of glucose carbon of the 24 hour urine sample.
\dagger Refers to counts per minute per mg. of CO\textsubscript{2} carbon of the 24 hour CO\textsubscript{2} sample.
\ddagger Specific activity.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline
\textbf{C\textsuperscript{14} administered as} & \textbf{Rat No.} & \textbf{24 hr. excretion} & \textbf{Per cent of C\textsuperscript{14} recovered} & \textbf{Specific activities\* of urine glucose} & \textbf{Specific activity\dagger of expired CO\textsubscript{2}} & \textbf{S.A. CO\textsubscript{2} carbon} & \textbf{S.A. glucose carbon} \\
\hline
& & \textbf{Urine glucose} & \textbf{Expired CO\textsubscript{2}} & \textbf{Urine glucose} & \textbf{Expired CO\textsubscript{2}} & \textbf{Osazone} & \textbf{Osotriazole} \\
\hline
\textbf{Palmitic acid} & 1 & 4.0 & 12.0 & 3.9 & 32.9 & 123 & 132 & 520 & 4.1 \\
& 2 & 0.9 & 7.5 & 2.5 & 29.7 & 364 & 370 & 734 & 2.1 \\
& 3 & 7.7 & 14.9 & 6.5 & 23.7 & 106 & 108 & 306 & 2.0 \\
& 4 & 6.8 & 13.6 & 6.7 & 26.6 & 126 & 124 & 377 & 2.9 \\
\hline
\textbf{Bicarbonate} & 5 & 3.7 & 15.2 & 4.4 & 73 & 157 & 152 & 920 & 6.0 \\
& 6 & 6.9 & 17.6 & 6.9 & 72 & 126 & 134 & 784 & 6.0 \\
\hline
\end{tabular}
\caption{Results of the experiment.}
\end{table}

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injected with NaHCO\textsuperscript{14}O\textsubscript{3} was also investigated. 1 cc. of isotonic saline containing 0.028 mm of NaHCO\textsuperscript{14}O\textsubscript{3} was injected intraperitoneally into each of two alloxan-diabetic rats. The results of this experiment are recorded in the table.

The absolute amounts of radioactivity found in urinary glucose were small in both experiments. In order to assess the rôle of CO\textsubscript{2} in the conversion of palmitic acid to glucose, the values for the ratio of specific activity of CO\textsubscript{2} carbon to specific activity of glucose carbon obtained in the two experiments were compared.

The ratio for the CO\textsubscript{2} fixation experiment was 6.0. This indicates that 1 of every 6 atoms, or about 16 per cent of the glucose carbon excreted by the alloxan-diabetic rat, was derived from bicarbonate carbon. This value is in good agreement with those reported by Solomon \textit{et al.} for the fixation of carbon dioxide in glycogen by the normal rat.\textsuperscript{6}

The fact that the values for this ratio in the palmitic acid experiment were much lower than 6 is of particular significance. This suggests that a process other than carbon dioxide fixation is involved in the incorporation of the 6th carbon of palmitic acid in glucose.

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