THE CONVERSION OF GLYCINE INTO SERINE IN THE INTACT RAT*

Sirs:

In an earlier communication we have presented evidence indicating that glycine is converted into serine via condensation with formate or a formate derivative (Scheme I).

\[
\text{CH}_2\text{NH}_2\text{COOH} + \text{HCOOH} \rightarrow \text{CH}_2\text{OHCHNH}_2\text{COOH} \quad (I)
\]

In the present investigation we have studied the physiological formation of this "formate." One possible mechanism is that glycine itself, by deamination and subsequent decarboxylation, gives rise to "formate" (Scheme II).

\[
\text{CH}_2\text{NH}_2\text{COOH} \rightarrow \text{CHO}_2\text{COOH} \rightarrow "\text{HCOOH}" + \text{CO}_2 \quad (II)
\]

We have investigated this pathway by degrading liver serine isolated after the administration of glycine labeled with C\textsuperscript{14} in the methyl position. According to the proposed scheme the \(\alpha\)- and \(\beta\)-carbon atoms of serine are both derived from the methyl carbon of glycine and should contain the isotope.

Four fasted rats weighing a total of 427 gm. were given 5 mm of glycine by stomach tube per 100 gm. After 14 hours the animals were sacrificed. Serine was isolated from the livers and degraded as previously described.\(^1\)

The results of the carbon analyses, shown in the table, are in accord with Schemes I and II. The serine contained C\textsuperscript{14} in both the \(\alpha\)- and \(\beta\)-carbon atoms with almost as much activity in the \(\beta\) as in the \(\alpha\) position.

<table>
<thead>
<tr>
<th></th>
<th>COOH*</th>
<th>(\alpha)*</th>
<th>(\beta)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serine</td>
<td>0</td>
<td>390</td>
<td>319</td>
</tr>
</tbody>
</table>

* Counts per minute per mg. of carbon.

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1 Sakami, W., J. Biol. Chem., 176, 995 (1948).
This experiment indicates that under certain conditions glycine itself is a major source of the formate or formate derivative for its conversion to serine.

The data of Winnick et al.\textsuperscript{3} are in agreement with this hypothesis. Their serine isolated from liver homogenate equilibrated with C\textsuperscript{14}-methyl-labeled glycine contained a small amount of isotope in the β-carbon.

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\textsuperscript{3} Winnick, T., Moring-Claesson, I., and Greenberg, D. M., \textit{J. Biol. Chem.}, 175, 127 (1948).

\textsuperscript{4} With the technical assistance of Jean Lafaye.
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