Oxidation of Parenterally Administered C^{14}-labeled Tripalmitin Emulsions[1]

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The question whether long-chain fatty acids can be utilized when administered by routes other than the gastrointestinal tract has aroused considerable interest in recent years. Dunham and Brunschwig (*2*) failed to observe protein-sparing effects in 9 of 11 dogs when a highly emulsified fat was injected intravenously for periods as long as one month. The emulsions used, however, were quite toxic. McKibbin, *et al.* (*4*), on the other hand, have drawn the conclusion that intravenously administered emulsions of fat are utilized, for not only did they find weight improvement and nitrogen retention in 2 dogs, but, in addition, they were unable to account for a considerable portion of the infused fat by finding it stored in an unmodified form. Meng and Freeman (*5*) also noted a gain in body weight in dogs that received fat emulsions intravenously, but they point out that such results furnish no direct proof of fat utilization.

The use of radioactive carbon provides for the first time a direct method for determining whether an animal can convert parenterally administered fatty acids to CO_2. Palmitic acid containing C^{14} in the sixth carbon atom

$$C_{10}H_{21}C^{14}H_2CH_2CH_2CH_2CH_2COOH \qquad (I)$$

(I) was synthesized as described in an earlier communication (*1*) and then esterified with glycerol by a modification of the method of Feuge, *et al.* (*3*). An emulsion of the tripalmitin was prepared with glycerol monostearate as the stabilizer and the fat dispersed into particles of less than 2 μ by means of supersonic energy. One or

TABLE 1

RECOVERY OF C^{14} IN THE EXPIRED CO_2 OF A RAT INJECTED INTRAVENOUSLY WITH A FAT EMULSION CONTAINING TRIPALMITIN IN WHICH THE PALMITIC ACID WAS LABELED WITH C^{14}*

Interval (hrs)		0–2	2–4	4–6	6–19	19–24	Total
C^{14} in expired CO_2	Rat 1	7.2	10.2	8.6	20.6	4.3	50.9
	Rat 2	6.4	13.7	7.7	24.2	4.5	56.5

* The values recorded are percentages of the total injected radioactivity.

1.5 cc of this emulsion containing 25 mg of tripalmitin was then injected into the foot vein of fasted rats weighing 175 gm. The expired CO_2 was collected and its C^{14} determined. Typical results are shown in Table 1.

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In the first 2 hrs approximately 7% of the injected C^{14} was found in the expired CO_2, and at the end of 24 hrs about one-half of the radioactivity was exhaled. The maximum rate of $C^{14}O_2$ exhalation was observed between the 2nd and 4th hrs. These results indicate that about one-half of the administered palmitic acid had been metabolized in 24 hrs.

The data presented here justify the conclusion that emulsified fat introduced directly into the blood stream is available for caloric purposes. Further evidence that parenterally administered emulsified fat pursues a normal metabolic path was provided by the finding that about 50% of the injected C^{14}-labeled fatty acids recovered in the liver had been incorporated into phospholipids at the end of 24 hrs.

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Life Cycle of *Postharmostomum laruei* McIntosh 1934 (Trematoda: Brachylaemidae)

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The adult trematode, *Postharmostomum laruei* McIntosh 1934 (Brachylaemidae), has been experimentally developed in this laboratory in the deer mouse, *Peromyscus maniculatus* (various subspecies), as the final host.

McIntosh (*1*) described the adult, specimens of which he obtained from the cecum of the chipmunk, *Tamias striatus lysteri* (Richardson). The metacercaria and adult of this species were described by Miller (*2*) in an abstract of an unpublished doctoral dissertation, in which he named this species *Brachylaima (Postharmostomum) sexconvolutum.* An examination of Miller's thesis, however, shows conclusively that his material included at least two species. Apparently aware of the synonymy and without referring directly to his published abstract, Miller (*3*) reported on the growth rate of this parasite, now referring to it as *Postharmostomum laruei* McIntosh.

My interest in the completion of the life cycle of this species was aroused when the metacercarial stages of the parasite were encountered repeatedly during examination of land snails in the vicinity of Ann Arbor, Michigan. The metacercariae are found within the pericardial cavity of the following land snails: *Anguispira alternata, Polygyra thyroides, P. profunda, P. multilineata, P. fraudulenta, P. hirsuta, Gastrodonta ligera,* and *Zonitoides ar-*

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