a highly significant increase of 38·8% in brain noradrenaline over those receiving only the amine (Table 1). Experiments still in progress indicate that DMSO plus dopamine intensify fixed staring and catatonia that occur after administration of this amine alone, although the associated amine brain levels have not yet been determined.

Results indicate that DMSO, a solvent having both polar and nonpolar characteristics, facilitates entry of adrenaline, noradrenaline and possibly dopamine across the blood-brain barrier. The occurrence of this phenomenon may, in part, be related to the ability of this solvent, acting as a carrier of biogenic amines, to traverse both aqueous and lipid phases or components of the barrier. These findings may have significance in conditions requiring brain amine replenishment.

Food and Drug Administration,
Bureau of Drugs, Division of Drug Biology,
Washington, D.C. 20204, *U.S.A.*

JOSEPH P. HANIG
J. MICHAEL MORRISON, JR.
STEPHEN KROP

January 13, 1971

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The involvement of plasma free fatty acids in (+)-amphetamine-induced hyperthermia in rats

Both hyperthermia and increased levels of plasma free fatty acids (FFA) are seen in animals after the administration of amphetamine. Gessa, Clay & Brodie (1969) attributed the hyperthermia in rats to a peripheral site of amphetamine's action, *viz.*, the increased plasma FFA. However, Hill & Horita (1970) reported hyperthermia in rabbits to be due to its central action. In mice, low doses of amphetamine cause *hypo*thermia and large doses *hyper*thermia (McCullough, Milberg & Robinson, 1970). The former is attributed to a central component and the latter to a peripheral component of amphetamine's activities. Since the question of the mechanism of amphetamine-induced hyperthermia is still unanswered, we now report that an increase of plasma FFA is not an integral part of the hyperthermic response.

Male Wistar rats (Harlan Industries, Indianapolis), 175–200 g were housed six per group in a cage (50 × 80 × 40 cm). After determining rectal temperatures with a thermistor probe (TRI-R), desipramine (10 mg/kg, i.p. of the salt) was administered, 15 min later (+) amphetamine (4·0 mg/kg, i.p. base), was administered. Rectal temperatures were read at 30 and 60 min after the drug was given. Orbital sinus

blood was obtained immediately after measurement of body temperatures. The serum was collected and frozen until assay. FFA was extracted by the method of Dole (1956) and determined by the copper-soap method (Duncombe, 1969).

The results are shown in Fig. 1. Amphetamine increased both body temperature and plasma FFA. Desipramine potentiated the hyperthermia observed after amphetamine. This confirmed previous findings (Jori & Garattini, 1965). Desipramine antagonized the increase of FFA normally found with amphetamine. Since the plasma FFA was not increased in rats pretreated with desipramine, hyperthermia could occur without FFA release. This action of desipramine is not unexpected

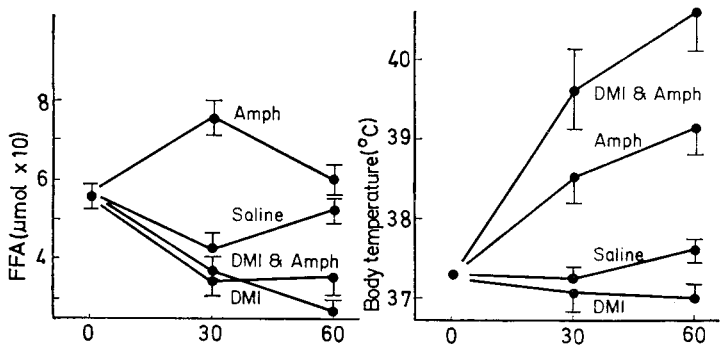

FIG. 1. Effect of desipramine on amphetamine-induced hyperthermia and plasma free fatty acid levels. DMI = desipramine. Amph = amphetamine. Values represent the mean ±s.e. from six rats.

since Finger & Page (1966) reported on its antilipolytic effects. Also, desipramine antagonizes the release of noradrenaline from adrenergic nerve endings by indirect-acting sympathomimetic amines (Brodie, Costa & others, 1968). We therefore have concluded that increased plasma levels of FFA are not required for the hyperthermic response to amphetamine. But we have not differentiated between a peripheral and central site of amphetamine's action.

The Lilly Research Laboratories,
Eli Lilly and Company,
Indianapolis, Indiana 46206, *U.S.A.*

CHARLES MATSUMOTO
WALTER N. SHAW

December 22, 1970

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