

THE POSSIBLE TRANSPLACENTAL ACTION
OF VEGETABLE OIL ON ORGAN CULTURES
OF MOUSE EMBRYONIC LUNG TISSUE

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Morphological changes in organ cultures of embryonic lung tissue of line A mice after receiving various doses of vegetable oil showed that its prolonged administration under physiological conditions has no effect on the cultures. Parenteral injection of the vegetable oil, particularly intraperitoneal injection, led to the development of hyperplastic changes in the epithelium. Administration of the same dose but subdivided into fractions led to hyperplasia of the epithelium in isolated cases only. The transplacental effect of vegetable oil must therefore be taken into account when the carcinogenic activity of substances used in oily solutions is assessed.

For many years the writer has studied the transplacental action of carcinogenic agents using organ cultures of embryonic lung tissue as the experimental model [1-3, 6, 7]. Assessment of the influence of the solvent is extremely important when substances are tested for their carcinogenic activity, particularly if the latter is low [7]. Special experiments were accordingly carried out to examine this problem.

EXPERIMENTAL METHOD

Experiments were carried out on line A mice after receiving various doses of vegetable oil by different methods and for different periods of time. Intragastric administration of sunflower oil began 2-3 weeks before copulation and continued throughout pregnancy in a daily dose of 0.1 ml. The oil was injected subcutaneously during the second half of pregnancy and the dose and number of injections varied (Table 1). The embryonic lungs of the experimental and control (intact) mice were explanted as organ cultures and studied on the 4th-21st day of the experiment.

TABLE 1. Transplacental Effect of Vegetable Oil in Organ Cultures of Mouse Embryonic Lung Tissue

Method of administration of oil	Total dose (in ml)	Sessional dose (in ml) and number of doses given	No. of cultures	Morphological examination					
				normal		degenerative changes		hyperplasia of the epithelium	
				abs.	%	abs.	%	abs.	%
Control (intact)	—	—	73	56	76,7	17	23,3	0	0
By the intragastric route	4,0—6,0	0,1×40 (60)	180	60	33,3	120	66,7	0	0
Intra-peritoneally	0,75	0,25×3	35	17	48,6	17	48,6	1	2,8
Intra-peritoneally	1,0	0,25×4	15	4	26,6	10	66,6	1	6,6
Intra-peritoneally	1,0	1,0×1	148	98	66,2	34	22,9	16	10,8
Subcutaneously	1,0	1,0×1	347	256	73,8	73	21,0	18	5,19

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EXPERIMENTAL RESULTS

Prolonged intragastric administration of sunflower oil to the mice had no effect on the corresponding organ cultures (Table 1). However, subcutaneous and intraperitoneal injections led to the development of diffuse hyperplasia of the epithelium on the 4th day of culture. In isolated cases this hyperplasia changed into the focal type on the 7th-11th day of the experiment. Subsequently the hyperplastic changes in the cultures gradually subsided. Quantitatively the original hyperplastic changes varied significantly depending on the scheme of the experiment (Table 1).

Prolonged administration of vegetable oil under physiological conditions (by the intragastric route) thus had no effect on the corresponding organ cultures of embryonic lung tissue. After parenteral (subcutaneous and, in particular, intraperitoneal) injection of the oil into pregnant mice, however, the cultures developed hyperplastic changes of the epithelium. The amount of these changes depends not so much on the total dose as on the sessional dose of the oil. It must be emphasized that the changes arising under these circumstances were only diffuse hyperplasia, i.e., the first and the least specific stage of precancerous changes [4]. With increasing duration of the experiment the changes gradually subsided and did not progress as was the case with the action of carcinogenic agents [6].

Various explanations can be suggested for the results. Subcutaneous and intraperitoneal injection of vegetable oil leads to inflammatory changes that may affect both the mother and the fetus. Parenteral injection of relatively large doses of vegetable oil unquestionably causes a disturbance of metabolism. It was shown 40 years ago that the subcutaneous injection of sunflower oil into mice was followed by loss of the "antiblastic" properties of the spleen, although these properties were restored a few months later [5].

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