The influence of oil-soluble iodinated contrast medium (Lipiodol) on child’s thyroid function in mice.

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[Introduction]
Hysterosalpingography (HSG) using oil-soluble iodinated contrast medium (ethiodized oil; Lipiodol) is a common examination for patients with infertility. Lipiodol remains in the body long after the examination, and there are some reports suggesting that Lipiodol induces thyroid dysfunction not only to the mother but also the fetus and the newborn. However, since there are no known mouse models of Lipiodol-induced thyroid dysfunction, we examined the influence of Lipiodol on child’s thyroid function in mice by administering Lipiodol to its mother.

[Materials and Methods]
Twelve-week-old ICR female mice were intraperitoneally administered with Lipiodol once before mating or during pregnancy or after delivery, and the thyroid uptake rate of I-131 (74 kBq/mouse) in their newborn mice was examined 24 hours after oral administration of I-131. The dose of Lipiodol used was either equivalent to that used in humans (10mL/50kgBW=0.2 μL/g BW, iodine amount=96 μg/g BW) or its 1/2 or 1/10 amount.
Lipiodol was diluted with corn oil, and all were set to a total of 10 μL/g BW. The same volume of corn oil was used as a control. When the offspring mice reached 4 weeks of age, serum TSH and FT4 were measured by ELISA method. The number of mice in each experiment was 6 or more.

[Results and Discussion]
When 0.2 mL/g BW Lipiodol or its 1/2, 1/10 amount were administered intraperitoneally before pregnancy (5 days before gestation), thyroid uptake rate of I-131 in 5 day old infants was decreased to 24.4%, 24.0% and 58.7% compared to control, respectively.

It is noteworthy that thyroid uptake of I-131 was suppressed to almost the same degree even in 1/2 dose administration, suggesting that the effect of Lipiodol on the thyroid gland does not change even if the amount of Lipiodol is reduced from 10 mL to 5 mL for HSG.

When 0.2 mL/g BW of Lipiodol was administered to mice during pregnancy (10th gestation) or immediately after birth, thyroid uptake rate of I-131 in 5-day-old neonatal was decreased to 5.8% and 2.4% compared to control, respectively.

Fig. 1 Hysterosalpingography

Fig. 2 Lipiodol administration to mother and I-131 measurement of neonatal thyroid

Fig. 3 Thyroid uptake rate of I-131 in 5-day-old mice

Fig. 4 Thyroid hormone level of 28-day-old female mice

Table 1 Frequency of hypothyroidism following HSG (Reports)

<table>
<thead>
<tr>
<th>object</th>
<th>frequency</th>
<th>remarks</th>
<th>author</th>
</tr>
</thead>
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<tr>
<td>neonatal</td>
<td>5/212 (2.4%)</td>
<td>hypothyroidism after maternal HSG</td>
<td>Satoh M(1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.7%)</td>
<td>congenital hypothyroidism</td>
</tr>
<tr>
<td>mother</td>
<td>4/180 (2.2%)</td>
<td>euthyroid before HSG</td>
<td>Mekaru K(3)</td>
</tr>
<tr>
<td></td>
<td>10/28 (35.7%)</td>
<td>subclinical hypothyroidism before HSG</td>
<td>Mekaru K(3)</td>
</tr>
<tr>
<td></td>
<td>3/22 (13.6%)</td>
<td>euthyroid before HSG</td>
<td>Kaneshige T(4)</td>
</tr>
</tbody>
</table>

As shown in Table 1, occurrence of hypothyroidism in mothers and their children is reported following HSG. This may be a phenomenon often seen in countries with a high iodine uptake as in Japan.

Iodine intake restriction may be needed for pregnant women following HSG who are taking a lot of iodine everyday as well as Japanese during pregnancy and lactation.

[References]
2. Tokyo Health Service Association: Activity Report Tokyo Health Service Association 2010; 38: 133.