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**DEPARTMENT OF THE AIR FORCE**
**AIR FORCE RESEARCH LABORATORY**
**WRIGHT-PATTERSON AIR FORCE BASE OHIO 45433**

5 February 1999

MEMORANDUM FOR US EPA
NCEA (MD-52)
RTP, NC 27711
ATTN: ANNIE M. JARABEK

FROM: AFRL/HEST
2856 G St
Wright-Patterson AFB OH 45433-7400

SUBJECT: Consultative Letter, AFRL-HE-WP-CL-1999-0005, Kinetic Data for Iodide Uptake Inhibition in the Thyroid by Perchlorate (2-week drinking water study)

1. A 2-week drinking water study with ammonium perchlorate was carried out with male Sprague-Dawley rats. Rats were dosed with four levels of ammonium perchlorate (0, 0.011, 0.115, 1.110 and 3.240 mg/kg-day) for two weeks. At the end of the exposure, rats were dosed once by tail vein injection with 33 μg/Kg of $^{125}I$ and non-radiolabeled iodide mixed in physiological saline. Rats were sacrificed at 2h post dosing (n=8), and total, free and bound iodide was measured in serum and thyroid.

2. The data for thyroid and serum is shown in Fig 1 and 2, respectively. Two tables are provided to show exact values for total and bound iodide in thyroid (Table 1) and total and free iodide in serum (Table 2). There is no evidence of inhibition of iodide uptake into the thyroid by perchlorate in this study. It is difficult to postulate why there was no inhibition without the perchlorate concentration in thyroid and serum. Analysis of perchlorate levels in thyroid and serum is in progress. Ninety-five percent of total iodide in thyroid was bound (Fig.1) while 85% of total iodide in serum was free iodide (Fig. 2). There was no difference in body weights among control and treated rats. We will compare perchlorate levels in blood and thyroid between single iv dosed rats and 2-week drinking water rats to see whether there is a difference in perchlorate levels.

3. The technical point of contact for this study is Kyung O. Yu, PhD.

STEPHEN R. CHANNEL, Maj, USAF, BSC
Chief, Operational Toxicology Branch
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Attachment
Two Figures and two tables

Table 1. Total and bound iodide in thyroid gland at 2h post dosing.

| Dose [perchlorate] mg/Kg-day | Total iodide µg/ g thyroid (mean±STD) | % Inhibition | Bound iodide ng/ mL serum (mean±STD) |
|---|---|---|---|
| 0 (control) | 19.91±6.4 | | 18.2±5.9 |
| 0.011 | 18.89±3.9 | 5.1 | 17.3±3.6 |
| 0.115 | 23.39±5.1 | -17.5 | 21.3±5.0 |
| 1.110 | 21.68±8.6 | -9.0 | 19.9±7.6 |
| 3.240 | 19.26±3.4 | 3.0 | 18.1±3.1 |

Table 2. Total and free iodide in serum at 2h post dosing

| Dose [perchlorate] mg/ Kg-day | Total iodide ng/ mL serum (mean±STD) | Free iodide ng/ mL serum (mean±STD) |
|---|---|---|
| 0 (control) | 39.70±8.88 | 33.23±6.88 |
| 0.0107 | 37.98±2.85 | 32.21±2.22 |
| 0.115 | 36.28±4.13 | 30.00±3.49 |
| 1.11 | 45.83±5.53 | 37.79±4.64 |
| 3.24 | 47.16±6.80 | 39.96±5.52 |

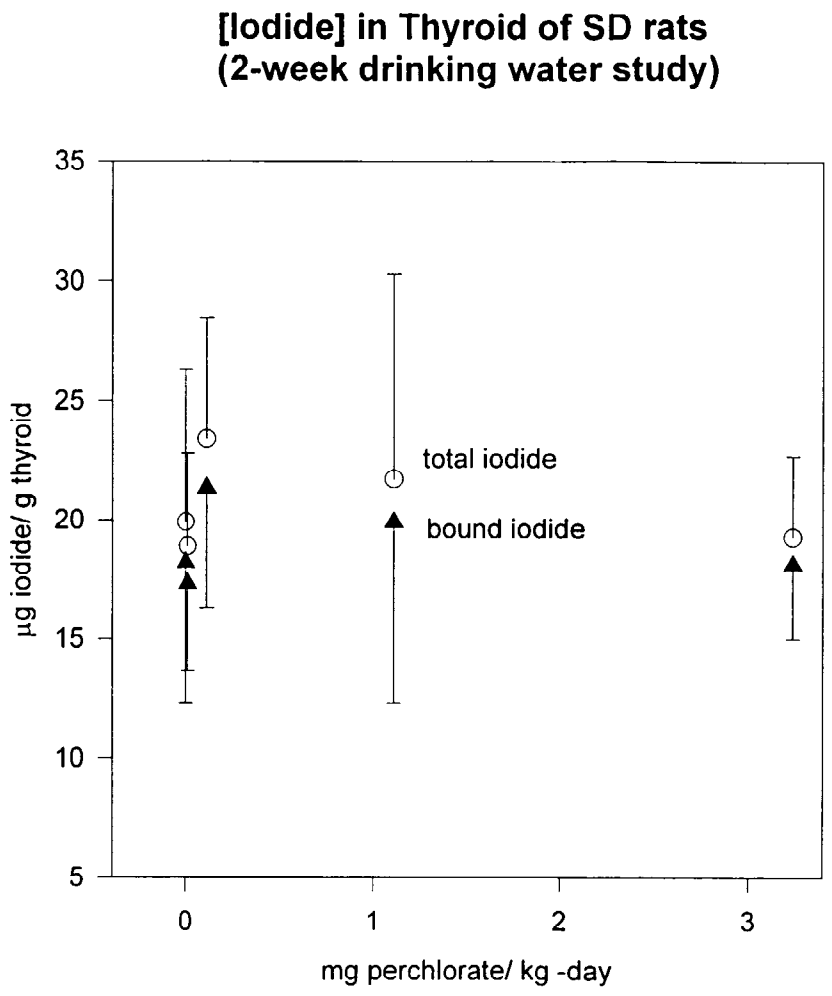
[Iodide] in Thyroid of SD rats
(2-week drinking water study)
35
30
25
20
15
10
5
µg iodide/ g thyroid
total iodide
bound iodide
0
1
2
3
mg perchlorate/ kg -day

Fig. 1

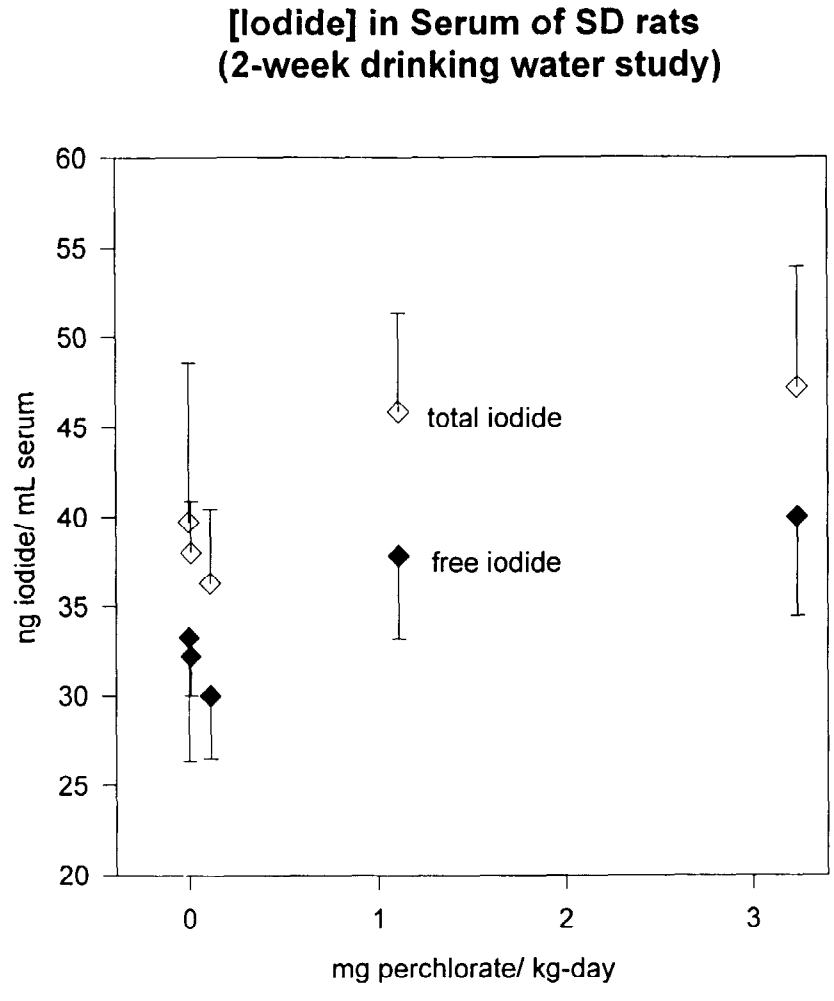
[Iodide] in Serum of SD rats
(2-week drinking water study)
60
55
50
45
40
35
30
25
20
ng iodide/ mL serum
total iodide
free iodide
0
1
2
3
mg perchlorate/ kg-day

Fig. 2