

51 year-old male with a papillary thyroid carcinoma


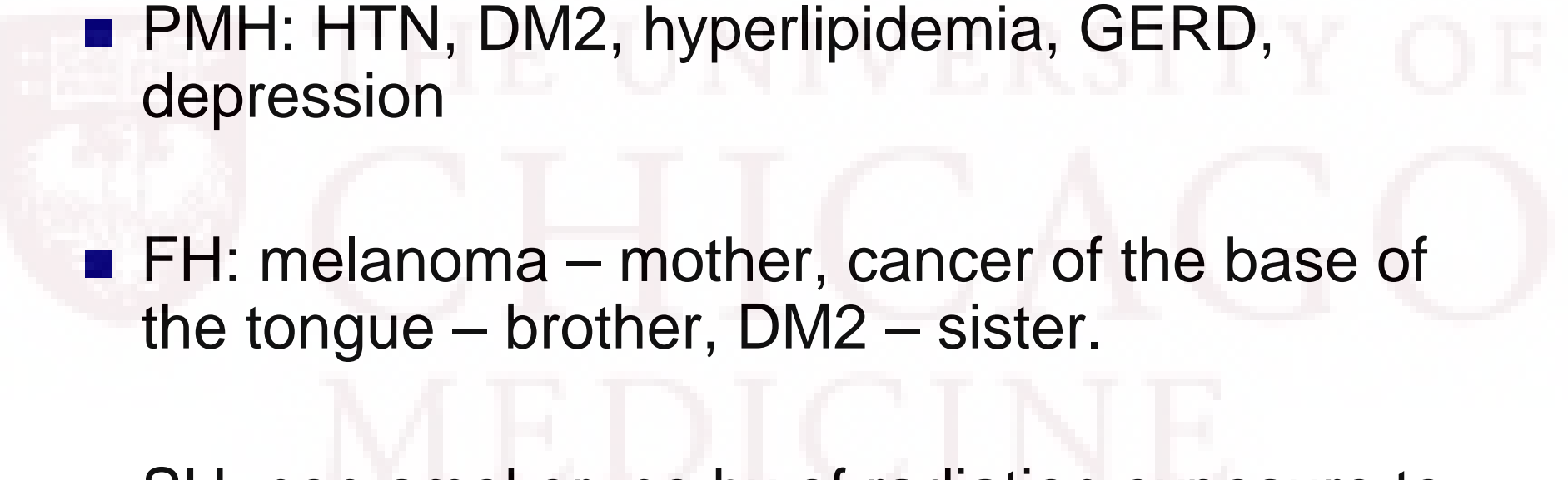
Endorama, 11/14/2013


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2nd year fellow

HPI:

- The pt is a 51 year-old male who was found to have a right-sided nodule in the thyroid gland during the routine physical exam in 07/2013.
- US of thyroid was done and showed 3.7 X 2.3 x 2.2 cm mass with punctate foci.
- FNA revealed a papillary carcinoma

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- PMH: HTN, DM2, hyperlipidemia, GERD, depression
 - FH: melanoma – mother, cancer of the base of the tongue – brother, DM2 – sister.
 - SH: non-smoker, no hx of radiation exposure to the neck
 - Meds: lexapro, metformin, lantus, januvia, crestor, prilosec, multivitamins



Review of systems:

- Constitutional: No weakness or fatigue.
- Eyes: No blurry vision.
- ENT: No thirst. **R sided nodule in the thyroid gland.**
- Respiratory: No shortness of breath, cough.
- Cardiovascular: No chest pain, palpitations.
- Gastrointestinal: No nausea, vomiting, no abdominal pain, diarrhea.
- Musculoskeletal: No myalgias.
- Skin: No rash.
- Neurological: No headache. No peripheral neuropathy.

Physical exam:

- Vitals: BP 137/82, Pulse 77, Resp 20, Ht 190.5 cm, Wt 110.088 kg, BMI 30.3 kg/m², SpO₂ 99%.
- Constitutional: No acute distress.
- Neck: Supple. **3-4 cm right sided nodule.**
- Cardiovascular: Regular rhythm and rate. No murmurs appreciated. Intact distal pulses.
- Respiratory/Chest: Normal respiratory effort. No wheezes or crackles.
- Gastrointestinal/Abdomen: Normoactive bowel sounds. Soft, nontender, nondistended. No hepatomegaly.
- Musculoskeletal/extremities: No edema.
- Neurological: Alert and oriented to person, place, and date. Normal deep tendon reflexes.
- Skin: Skin is warm and dry. No acanthosis nigricans noted.

Labs:

137	101	12	205
4.1	25	1	

6.3	14.3	207
	42.5	

Ca 8.8 (8.4-10.2 mg/dL)

Total Protein 6.6 (6-8.3 g/dL)

Albumin 4.5 (3.5-6 g/dL)

Total Bilirubin 0.4 (0.1-1 mg/dL)

Alk Phos 62 (30-120 U/L)

AST 35 (8-37 U/L)

ALT 55 (8-35 U/L)

HA1C 7.1%

TSH 3.39 (0.3-4 mcU/mL)

Free T4 0.78 (0.9-1.7 ng/dL)


Anti-TPO AB neg

TG AB neg

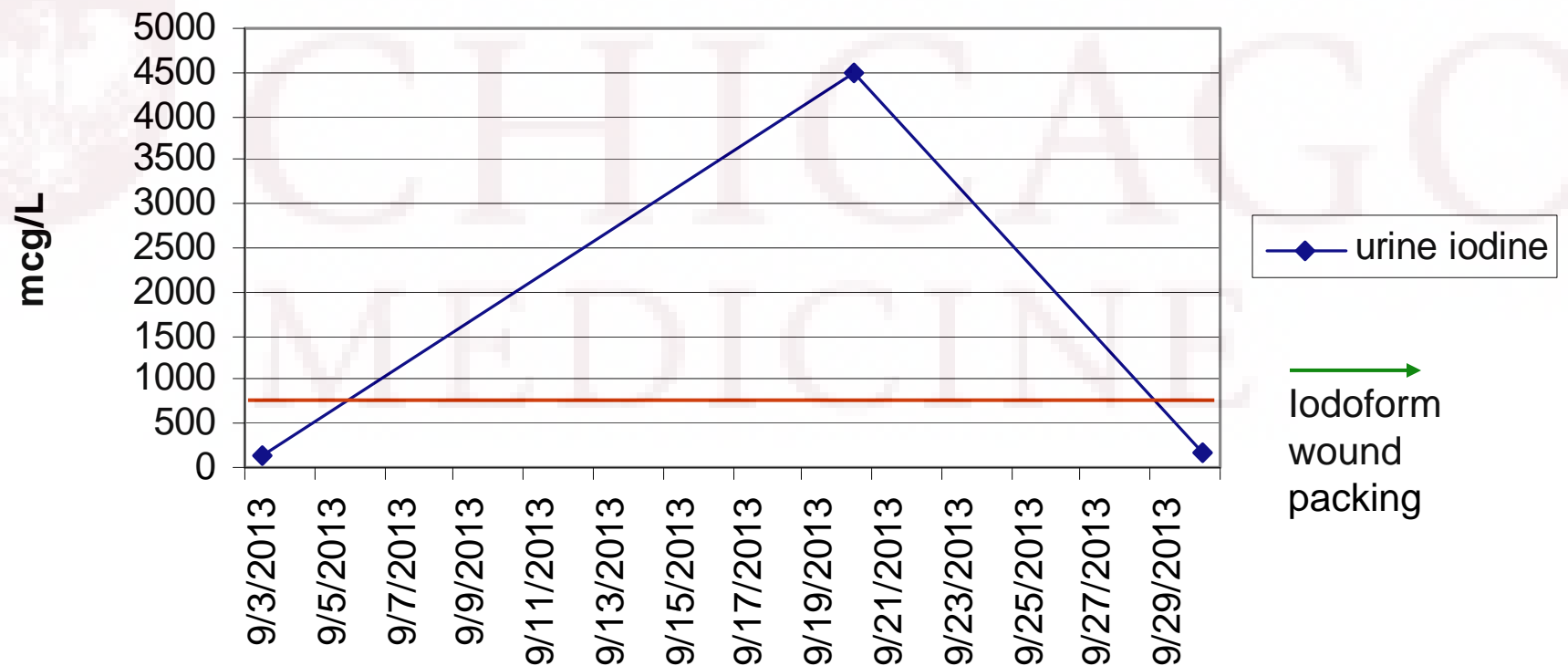



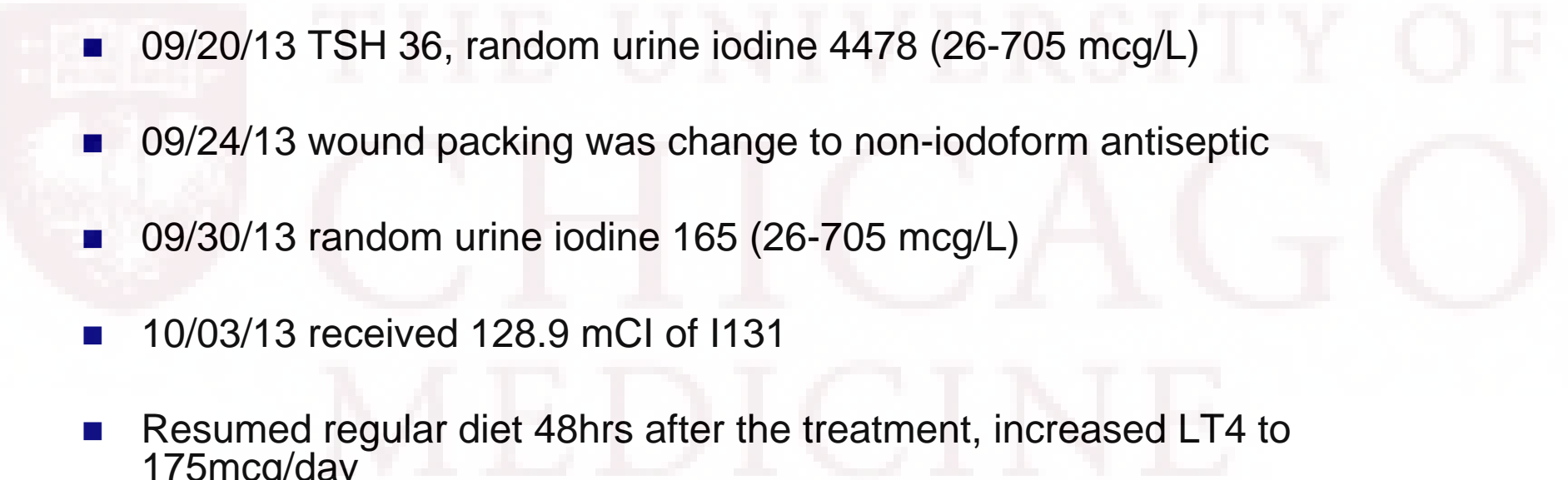
HPI:

- Total thyroidectomy with neck dissection was done on 08/28/2013.
- Surgical pathology revealed: pT3, N1a, 3.0 x 2.2 x 1.5 cm lesion extending through the majority of the right lobe, capsule not involved, metastases to Level VI (pretracheal, paratracheal and prelaryngeal/delphian) lymph nodes, 8/9 nodules are affected.

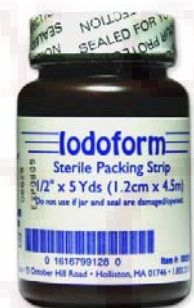
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- Postop started LT4 125mcg/day
 - 09/03/13 TSH 16.37, random urine iodine 133 (26-705 mcg/L), started low iodine diet and LT4 was changed to QOD as a preparation for RAI treatment
 - 09/03/13 drain from the neck removed
 - Developed a swelling on the left side of his neck
 - 09/12/13 50cc aspirated, few cocci, wound was packed with iodoform, started iodoform packing of the wound daily, started augmentin

urine iodine



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- 09/20/13 TSH 36, random urine iodine 4478 (26-705 mcg/L)
 - 09/24/13 wound packing was change to non-iodoform antiseptic
 - 09/30/13 random urine iodine 165 (26-705 mcg/L)
 - 10/03/13 received 128.9 mCi of I131
 - Resumed regular diet 48hrs after the treatment, increased LT4 to 175mcg/day
 - 10/10/13 post therapy scan: no metastatic disease, residual functioning thyroid tissue in the right thyroid bed

- Iodine absorption after topical administration
- Does it affect RAI uptake
- How long does it stay in a body





Iodine

- is a topical germicidal agent effective against a wide spectrum of organisms including bacteria, viruses, fungi and protozoa.
- Iodine is available as solutions and alcoholic tinctures and as iodine compounds such as iodophors.

Wound dressing containing iodine

Table 1 Wound dressings containing iodine (adapted from Boothman, 2010⁸)

Product	Distributor	Iodine form	Available iodine content	Description
Braunovidon® ointment/ ointment gauze	B Braun	PV-1	10% per 100g ointment	Colloidal ointment base
Inadine®	Systagenix	PV-1	1.0% w/w	Knitted viscose mesh
Iodosorb®	Smith & Nephew	Cadexomer iodine	0.9% w/w	Matrix dressing
Iodosorb® ointment	Smith & Nephew	Cadexomer iodine	0.9% w/w	Macrogol ointment base
Iodosorb® powder	Smith & Nephew	Cadexomer iodine	0.9% w/w	Cadexomer iodine beads
Iodoflex®	Smith & Nephew	Cadexomer iodine	0.9% w/w	Macrogol ointment base with gauze backing
Iodozyme®	ArchiMed	Iodine	<0.04% w/w	Hydrogel dressing
Repithel®	Mundi-Phama	PVP-1	0.3% w/w	Liposome hydrogel

Note: % w/w describes the percentage solution

Iodine absorption from the skin

- Case reports show that iodine can be absorbed from topical iodine application to surgical wounds, after vaginal instillation, application to the eye, after an application to the umbilical cord and an inch of surrounding skin of neonates, application to decub ulcers.
- absorption is enhanced when the compound is applied to denuded skin, mucosal surfaces with high absorptive capacity or extensive areas of intact skin.
- Data in dogs showed that 12% of the applied iodine was available for utilization by the body, with 88% evaporated.¹

Iodine absorption from the skin:

- Sixty-eight patients with thyroid carcinoma undergoing total thyroidectomy received a single skin disinfection with either povidone-iodine ($n = 47$) or chlorhexidine gluconate, a noniodine containing biguanide ($n = 21$).
- Urine iodine was measured on admission, preop day, day 1, 3 and 5 after surgery.

Iodine absorption after topical administration

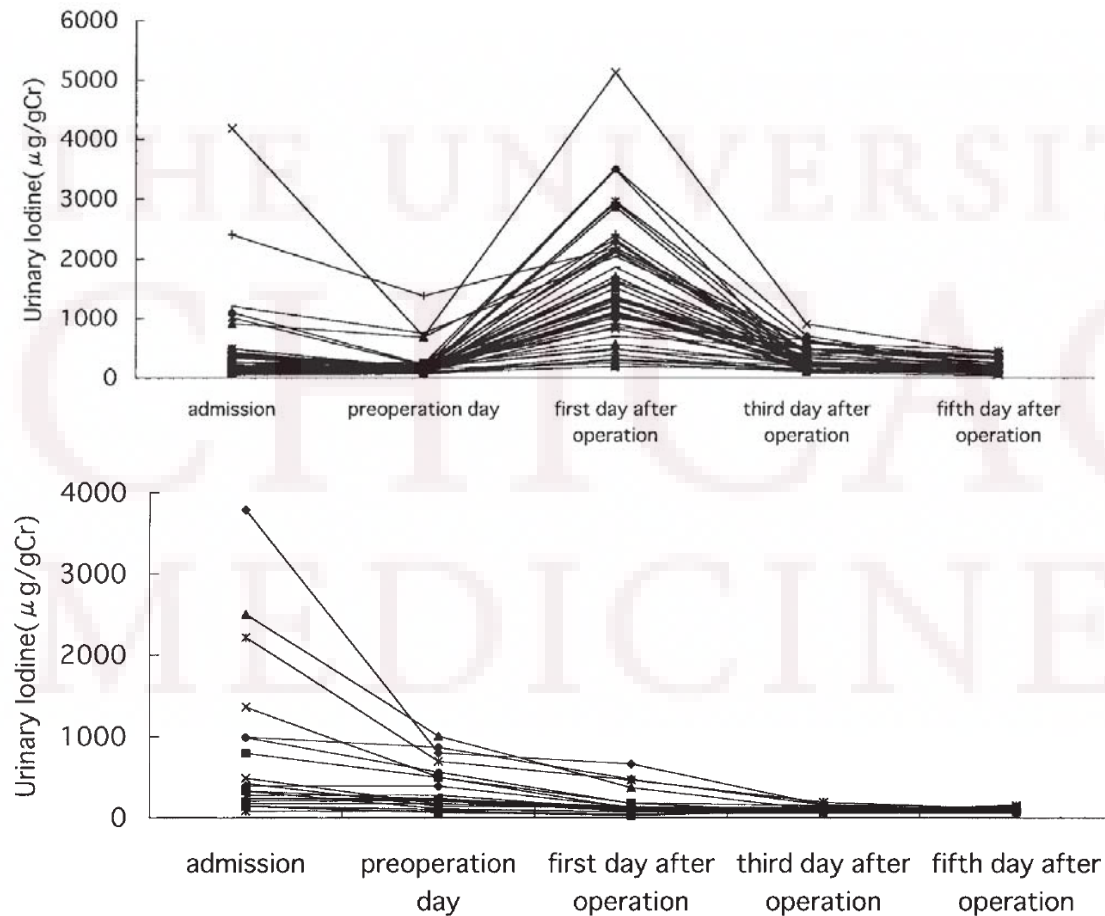


FIG. 2. The level of urinary iodine (μg /g of creatinine [Cr]) after chorhexidine skin preparation.

Transcutaneous iodine absorption in adult patients with thyroid cancer disinfected with povidone-iodine at operation. Tomoda C, Kitano H, Urano T, Takamura Y, Ito Y, Miya A, Kobayashi K, Matsuzuka F, Amino N, Kuma K, Miyauchi A. Thyroid. 2005 Jun;15(6):600-3.

Iodine absorption after topical administration

TABLE 1. URINARY IODINE LEVELS BEFORE AND AFTER USAGE OF STERILIZING SOLUTION

<i>Sampling time</i>	<i>Povidone iodine (group A)</i>	<i>Chlohexidine gluconate (group B)</i>	<i>p value</i>
Admission day	428.3 ± 690.3 (83–4182)	587.8 ± 819.41 (59–3787)	0.1779
Preoperation day	205.2 ± 230.7 (62–1381)	301.5 ± 271.9 (64–1008)	0.0891
First day after operation	1504.7 ± 984.9 ± (193–5120)	176.6 ± 169.5 (29–667)	< 0.0001
Third day after operation	319.7 ± 189.3 (85–904)	99.7 ± 39.1 (54–193)	< 0.0001
Fifth day after operation	177.8 ± 107.5 (44–451)	96.2 ± 26.5 (55–153)	0.0004

Values indicate $\mu\text{g/g}$ of creatinine (Cr).

Results are expressed as mean \pm standard deviation (SD).

Data in parentheses indicate the range of distribution.

Does it affect RAI uptake?

Mice were administered with 0.1 ml of povidone-iodine solution either once or twice (one day apart).

This was followed by injection of I125 110 KBq. Blood samples were collected and then thyroid gland was harvested.

Table 2. Effects of povidone-iodine application to mouse skin on ^{125}I uptake by the thyroid gland

Group	Radioactivity (counts/0.1 min)		
	Thyroid	Blood/g	Thyroid/Blood
1	197292.3 \pm 50022.0 (3)	48725.0 \pm 9494.2 (3)	4.20 \pm 1.44 (3)
2	15722.6 \pm 2851.2 (3)**	71205.0 \pm 15616.8 (3)	0.22 \pm 0.02 (3)**
3	19421.3 \pm 6166.7 (3)**	54713.3 \pm 20508.4 (3)	0.40 \pm 0.15 (3)**

Values are the means \pm S.E.M. The number of mice is indicated in parentheses. Povidone-iodine was applied one time/one day (group 2) or two times/two days (one time/one day for two days; group 3) on the skin with 10 mm². Group 1 are the intact controls. ^{125}I was intraperitoneally injected 2 hr after the povidone-iodine application. The blood was collected from the jugular vein under ether anesthesia and the thyroid gland was subsequently removed. ^{125}I in the blood and thyroid was counted for 0.1 min in a γ -ray counter. Radioactivity and the ratio of thyroid/blood were significantly different ($p < 0.01$) in group 1 from those in groups 2 and 3 (Student's *t*-test).

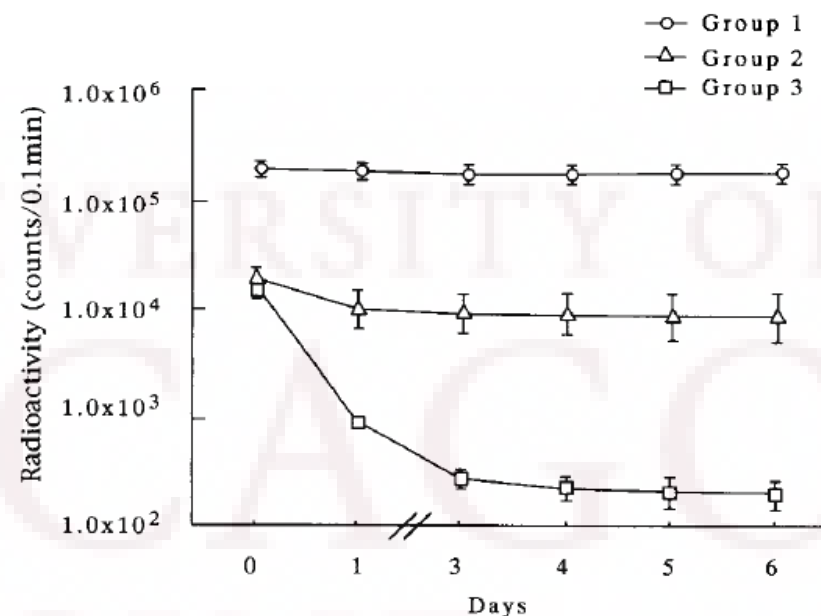


Fig. 1. Reduction in ^{125}I in mouse thyroid gland during the fixing procedure for tissue preparation. Povidone-iodine was applied one time/one day (Group 2) or two times/two days (one time/one day for two days; Group 3) on the skin with 10 mm². Group 1 are the intact controls. ^{125}I was intraperitoneally injected 2 hr after the povidone-iodine application. Radioactivity was significantly different ($p < 0.01$) on all the days examined in group 1 from that in groups 2 and 3 (Student-Neuman-Keuls test).



Take home points:

- Topical iodine can be absorbed from the skin
- It should be avoided in patients anticipating RAI treatment
- Levels of iodine are normalizing within 3-5 days after the last topical iodine application

References:

- Nyiri, W., Jannitti, M., About the fate of free iodine upon application to the unbroken animal skin. An experimental study. J. Pharmacd. Exp. Ther., 45:85-107, 1932.
- Transcutaneous iodine absorption in adult patients with thyroid cancer disinfected with povidone-iodine at operation. Tomoda C, Kitano H, Uruno T, Takamura Y, Ito Y, Miya A, Kobayashi K, Matsuzuka F, Amino N, Kuma K, Miyauchi A. Thyroid. 2005 Jun;15(6):600-3.
- ¹²⁵I uptake competing with iodine absorption by the thyroid gland following povidone-iodine skin application. Furudate S, Nishimaki T, Muto T. Exp Anim. 1997 Jul;46(3):197-202.
- Iodine absorption after topical administration. Dela Cruz F, Brown DH, Leikin JB, Franklin C, Hryhorczuk DO. West J Med. 1987 Jan;146(1):43-5.