

RADIATION PROTECTION FOR EVERYONE

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DYSFUNCTION OF THE SALIVARY AND LACRIMAL GLANDS AFTER RADIOIODINE TREATMENT: PRELIMINARY RESULTS OF A SELF-CONTROLLED STUDY IN FRANCE

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AMAREXIA: A Bressand

The START study

CONTEXT

- **10 000** incident cases of thyroid cancer per year (*SpF 2019*)
- **Therapy** for differentiated thyroid cancer (in 80-85% of the cases) :
➔ **Thyroidectomy + complementary radioiodine capsule (^{131}I)**



Salivary glands: ability to concentrate radioiodine

Possible **inflammation** >> **Changes in saliva production** >> **Impacts** quality of life and nutrition...

But

➔ **inaccurate incidence** of salivary disorders,

➔ **no dose-response relationship,**

➔ **no calculation of the dose** actually received by the salivary glands in ^{131}I using dosimeter measurements (\neq to administered activity)

➔ **no identified clinical or genetic factors** to define at-risk patients

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OBJECTIVES

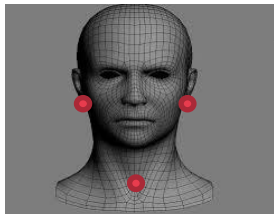
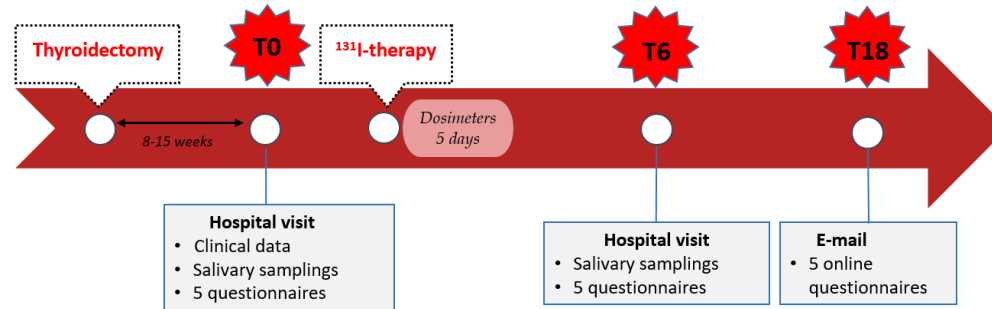


- To estimate **salivary dysfunctions incidence** after ^{131}I therapy
- To **characterize patients at risk** of developing post-treatment dysfunctions using clinical, biomolecular and biochemical factors
- To **validate a dosimetric method** to calculate the dose actually received at the salivary gland level
- To **estimate a dose-response relationship** between exposure of salivary glands to ^{131}I and salivary dysfunctions
- ... allowing the delivered activity **to be adapted to the expected risk of salivary dysfunctions**

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METHODS (1/2)

- Population** : 139 patients, candidates for a ^{131}I -therapy for differentiated thyroid cancer (at Pitié-Salpêtrière hospital, Paris)
 - 2 groups : 45 patients treated by 1.1 GBq (30 mCi)
 - 94 patients treated by 3.7 GBq (100 mCi)



Dosimetry

- ✓ 3 external thermoluminescent dosimeters positioned at T0 (immediately before ^{131}I intake), removed 5 days later
- ✓ Dosimetric reconstruction → calculation of the dose precisely received by the salivary glands

The START study

METHODS (2/2)

• Outcomes: lacrimal & salivary dysfunctions

✓ Questionnaire (E. Moreddu, 2017)

- 1) "Have you noticed any tension or swelling (discomfort) in the parotid gland?" → YES or NO
- 2) "Have you had any pain in the parotid gland?" → YES or NO
- 3) "Have you noticed a lack of saliva since the ¹³¹I-therapy?" → YES or NO

✓ Saliva samples

4) Samplings before and after the stimulation of salivary glands → Unstimulated and stimulated flows (mL/min)

5) Dichotomization (Ericsson and Hardwick, 1978):

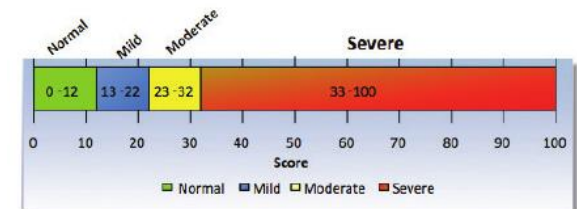
- If unstimulated saliva flow < 0,25 mL/min → Non-normal unstimulated saliva flow rate,
- If stimulated saliva flow < 1 mL/min → Non-normal stimulated saliva flow rate

✓ Dry eyes (OSDI© questionnaire) = score calculated from 12 questions

6) If score ≥ 12 → Dry eyes

• Other factors of interest

- ✓ Quality of life (MOS SF-36)
- ✓ Nutrition (EVA of ingesta)
- ✓ Anxiety and depression symptoms (HAD scale)
- ✓ Saliva biochemical composition
- ✓ Genetic variants



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RESULTS (1/3)

- Characteristics of the study population**



Variables	N(%)
Gender	
women	99 (71.22)
men	40 (28.78)
Age (years \pmsd)	47.07 (14.1)
BMI	27.06 (6.04)
Histology	
Follicular	20 (14.39)
Follicular & papillary	4 (2.88)
Papillary	115 (82.73)
TNM tumor stage	
Tx-T2	101 (73.19)
T3	33 (23.91)
T4	2 (1.45)
Nx-N0	77 (55.40)
N1	61 (43.88)
TSH elevation protocol	
L-thyroxin replacement stop	49 (35.25)
rTSH	90 (64.75)
Family history of thyroid cancer	
No	117 (84.17)
Yes	22 (15.83)
Salivary disorders history	
No	132 (94.96)
Yes	7 (5.04)
Systemic disease comorbidity	
Type 2 diabetes	5 (3.60)
Dyslipidemia	6 (4.32)
Diagnosed hypertension	28 (20.14)

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RESULTS (2/3)

	Before ¹³¹ I	After ¹³¹ I	p-value
Average flow of unstimulated saliva^a (mL/min)	0.78 (0.5)	0.73 (0.4)	0,21
Average flow of stimulated saliva^a (mL/min)	2.17 (0.9)	1.94 (0.8)	<0,01
Feeling of swelling/discomfort in the parotid gland^b			1,00
No	105 (84.7)	105 (84.7)	.
Yes	19 (15.3)	19 (15.3)	.
Pain in the parotid gland^b			0,80
No	110 (88.7)	111 (89.5)	.
Yes	14 (11.3)	13 (10.5)	.
Feeling of dry mouth^b			0,01
No	103 (83.1)	87 (70.2)	.
Yes	21 (16.9)	37 (29.8)	.
Non-normal unstimulated saliva flow rate^b			0,63
No	110 (88.7)	110 (89.4)	.
Yes	14 (11.3)	13 (10.6)	.
Non-normal stimulated saliva flow rate^b			0,37
No	116 (93.6)	112 (91.1)	.
Yes	8 (6.5)	11 (8.9)	.
Dry eyes from ODSDI questionnaire^b			0,51
No	100 (81.3)	86 (71.7)	.
Yes	23 (18.7)	34 (28.3)	.

^amean(sd) with paired T-test; ^bN(%) with McNemar test



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RESULTS (3/3)

	30 mCi group	100 mCi group	Total	p-value
Feeling of swelling/discomfort in the parotid gland				0,44
No	40 (95.24)	75 (91.46)	115 (92.74)	.
Yes	2 (4.76)	7 (8.54)	9 (7.26)	.
Pain in the parotid gland				0,33
No	40 (95.24)	74 (90.24)	114 (91.94)	.
Yes	2 (4.76)	8 (9.76)	10 (8.06)	.
Feeling of dry mouth				0,93
No	33 (78.57)	65 (79.27)	98 (79.03)	.
Yes	9 (21.43)	17 (20.73)	26 (20.97)	.
Non-normal unstimulated saliva flow rate				0,75
No	40 (95.24)	76 (93.83)	116 (94.31)	.
Yes	2 (4.76)	5 (6.17)	7 (5.69)	.
Non-normal stimulated saliva flow rate				0,78
No	40 (95.24)	78 (96.3)	118 (95.93)	.
Yes	2 (4.76)	3 (3.7)	5 (4.07)	.
Dry eyes from ODSDI questionnaire				0,24
No	29 (76.32)	69 (85.19)	98 (82.35)	.
Yes	9 (23.68)	12 (14.81)	21 (17.65)	.
Sum of the above complaints				0,60
0 complaint	23 (54.76)	44 (53.66)	67 (54.03)	.
1 complaint	15 (35.71)	29 (35.37)	44 (35.48)	.
2 complaints	2 (4.76)	4 (4.88)	6 (4.84)	.
3 complaints	1 (2.38)	5 (6.1)	6 (4.84)	.
4 complaints	1 (2.38)	0 (0)	1 (0.81)	.

N(%) with Chi² test

The START study

CONCLUSIONS

➤ Preliminary results ...

- Towards a **decrease in salivary gland activity after ^{131}I -therapy** (with decreased flow rates and a higher number of patients with the sensation of dry mouth),
- **Low incidences** of salivary and lacrimal disorders based on objective and subjective measures,
- **No statistical difference** in incidences between the two groups of 30 and 100 mCi.

➤ The 6-month follow-up has just finished, and the 18-month follow-up is underway

➤ Perspectives:

- To characterize patients at risk for salivary and lacrimal gland dysfunctions,
- To assess the dose-response relationship between the dose received at the salivary glands and the outcomes,
- To evaluate the consequences of salivary and lacrimal gland dysfunctions on **quality of life and nutritional status in the long term.**

Thanks!



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