



# COSCEN

Conseil d'Orientation pour le Suivi  
des Conséquences des Essais Nucléaires

## **Studies on thyroid cancer performed by INSERM Unit 605**

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Since 1994, the National Institute for Public Health and Medical Research underwent the study of medical consequences of nuclear tests performed by France at Mururoa et Fangataufa.

Two major reasons led us to study general population rather than cohorts of participants to nuclear tests: A our opinion, general population, and, in particular children born during the tests, are the main public health issue in case of atmospheric nuclear tests. The second one is that the design and the realization of the studies

concerning the populations could be considered independently of the military authorities. Lastly, a study including the population born in Polynesia had the advantage of also including the Polynesian participants in the nuclear tests, if they had had a cancer. Initially, thanks to the data of the Polynesian Cancer Registry, it was shown that, during the years 1990, the incidence rate of cancers of thyroid was approximately twice higher among Polynesians than at the Hawaiians and Maoris of New-Zealand of the same age and sex.

As it is the case for all cancers, a great number of factors influence the risk of cancer of the thyroid one. The only means of proving the role of a particular factor, in our case the nuclear tests, was to make a study of the case-control type, i.e. a study comparing the whole of the factors of risk in cases of cancer of thyroid with those these same factors among Polynesians of same age and sex who did not have cancer of thyroid, called controls. This in order to be able to control for the other factors and to investigate the role of the nuclear tests.

In collaboration with the Polynesian Cancer Registry, the "Direction of the Public Health", the Institute of Research on the Development (IRD) of Tahiti, and all the endocrinologists of Tahiti, we realized between 2002 and 2005 a study out of 229 Polynesians (almost all the cases of thyroid cancer diagnosed in French Polynesia in this period) who had had a cancer of thyroid of thyroid diagnosed between 1984 and 2002 before the 15 years age. These cases were women for 88% of them, and only 26 cases were men. They were paired with 337 controls of same sex, and age. Two Polynesian investigators carried out the majority of the interviews. The questions carried on all factors of potential, environmental or behavioral risks of thyroid cancer it.

### **Work in Mururoa**

In our study, only 10 cases of cancer of thyroid and 12 controls had worked in Mururoa and Fangataufa during the tests, including 4 cases and 5 controls during the atmospheric tests. This very small proportion is explained by the low number of men in our study. The statistical analysis did not show significant increase in the risk of cancer of thyroid among Mururoa workers, but it however highlighted an increase of a few cases, nonsignificant and which does not make it possible to conclude but the need for a medical follow-up shows.

### **Nuclear Fallouts**

In our study, the estimate of the amount of ionizing radiations received by the thyroid of the populations due to the fallout is based on the data of the questionnaires (successive places of dwelling and of school during the period of the tests, origin of the drink water, food), and on the contamination of the air, water and food. It was thus necessary for us to obtain data making it possible to estimate these contaminations. The only data we were able to obtain were those which France had given to the United Nations during the period of the atmospheric tests. From these data, and of a reconstitution of the fallouts of each nuclear test, we estimated the radiation dose received by each thyroid cancer case and control. This work was done by Vladimir Drozdovitch, physicist who has performed the dosimetry of the studies performed by IARC about the consequences of Chernobyl accident.

Our estimate of the average dose to thyroid was 3 mSv, similar in thyroid cancer cases and controls, including 2 mSv received in average during childhood. For the Polynesians who had received before age the 15 years, an amount of 10 mSv or more,

i.e. 10 thyroid cancer cases and 9 controls, the risk of cancer of thyroid was multiplied, in an almost significant way ( $p=0.1$ ) by 2.1.

When adjusting on other risk factors, these results were confirmed (see table).

Radiation dose to the thyroid before the age of 15, due to the atmospheric nuclear tests performed by France in French Polynesia between 1966 and 1974.

Dose (mSv)	Thyroid cancers (n=229)		Controls (n=371)		Relative risk of thyroid cancer *		P-value
	N	%	N	%	RR	95% CI	
< 1	148	64.6%	239	64.1%	1 (ref)		
1 – 9.9	71	31.0%	125	33.5%	1.1	(0.6 – 1.8)	
> 10	10	4.4%	9	2.4%	3.0	(1.0 – 9.6)	0.06

\* ajusté sur l'ethnie, le niveau d'étude et l'index de masse corporelle.

These results are quite higher than unexpected due to the value radiation dose estimations. They may reflect the bad quality of our radiation dose estimation, or a specific susceptibility to radio induced thyroid cancer in French Polynesian Populations

### Other risk factors

Among the other risk factors for thyroid cancer, our study shown that the number of children and the obesity had a major importance.

### Conclusion

Our study shows that the nuclear tests carried out by France most probably increased the number of thyroid cancer in French Polynesia, but this in a very limited way. According to our current estimate, among all the thyroid cancers having occurred in French Polynesia between 1985 and 2002, approximately ten was due to the nuclear tests.

## **Perspectives**

The low power of our study and its difficulty to be definitive is due to the small size of the population living near the nuclear test area during the tests. This study must be continued and our estimate of the radiation doses must be still improved using the data in possession of the army, in particular the reports of the tests in possession of the SMSR, of which we continue to ask for the declassification. Lastly, it is necessary to complete the genetic study in order to study possible subpopulations more sensitive to radiations

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