

## **NORMAL VALUES FOR THYROIDAL RADIO IODINE UPTAKE IN EGYPT**

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### **INTRODUCTION**

The thyroid uptake of radioiodine has been widely used as a clinical index of the functional state of the thyroid gland. Numerous modifications of the test procedure have lowered the radiation dose delivered to the patient and enhanced the convenience and accuracy of the assay.

Normal values vary considerably from one part of the world to another even in the same area, the mean normal value is liable to changes (Pittman 1969), This work is an attempt to study the normal range for thyroidal radio-iodine uptake in Egypt based on kinetic studies of iodine metabolism and to investigate the causation of goiter which is increasing in Egyptians (Paul Chaliongui 1965, Megahed, El-Haddad et al., 1977).

### **EXPERIMENTAL**

The details of the instrumentation and procedure used in our laboratory have been published elsewhere (Abdel Wahab et al, 1974) and are fairly Standard. The previous normal values in this centre was determined (Megahed et al, 1993) and the values are represented in Fig 1. Eighty subjects were selected among the patients of Kasr - EL - Aini, Hospital and University students and staff aged 18-61 Years. For every person short history was obtained. The clinical chart was fully examined to exclude thyroid disease, serious hepatic cardiac or renal diseases and exposure to x-ray contrast media or other, known sources of iodine drugs that might alter thyroidal function.

#### **1- Thyroidal Radio Iodine Uptake:**

One hundred and twenty clinically Euthyroid subjects were selected among the patients of Kasr El-Aini the subject was given an oral dose of 10 uci I 131 as sodium iodine. The uptake after 2,4 and 24 - hours was determined,

**2- Thyroxine estimation in serum:** Determination of serum free tetraiodo - thyroxine, triiodothyroxine (T3) were done (Becter & Schicha, 2002).

**3- Iodine content of Dietary food and Water Supply:** Determination of dietary iodine content in 10 meals was carried out by obtaining trays of food identical to those sent to the patients at Kasr El-Aini Hospital. The food was homogenized and prepared for microiodine determination. Iodine content of water was also carried out on samples of water collected from the River Nile at different places behind and in front of the High Dam at Aswan, opposite Assiut and opposite Cairo Also tap water was analyzed for its iodine content.

Microdetermination of iodine was carried out using radio - iodine I- 131 tracer technique as reported by Roben et al (1950) and Het 2 et al (1983).

4- Study of the thyroid gland iodine clearance and renal clearance of iodine in 40 normal subjects was also studied (Table 2).

**RESULTS**

The results obtained are shown in Tables 1,2,3 & Fig 1

**Table (1)**  
**Free T4, T3 In normal subjects**

Free T4	Free T3
3.88 $\pm$ 0.65	5.30 $\pm$ 0.25
Normal Free T3: 1.5-7.0 PMOL/L	
Normal Free T4 7-25 PMOL/L	

**Table (2)**  
**Iodine metabolism in Normal subjects**

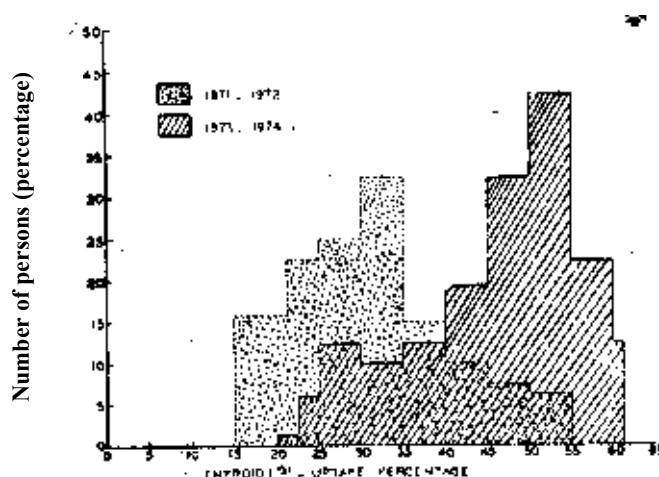
I-131 2hr	Thyroidal 4thr	Uptake% 24hr	Gland Ioidne clearance ml/min	Renal clearance of Iodine ml/min	Uninary excretion of Iodine ug/day
Up to 15	10-4- $\pm$ 2	20-62 $\pm$ 3.0	27.6 $\pm$ 0.4	32.2 $\pm$ 2.1	46 $\pm$ 0.20

- 24 hour I-131 uptake mean value is 36.55 $\pm$ 6.00.

**Table 3**  
**Iodine content of Investigated materials**

Sample type	Total Iodine Content
1. Daily food Breakfast	60 $\pm$ 10 ug
Lunch	45 $\pm$ 20 ug
Supper	60 $\pm$ 10 ug
2- Bread (100 grams)	55 $\pm$ 10 ug
3- Water:	
River Nile, Behind High Dam	0.29 $\pm$ 7 ug/100ml
In front of High Dam	0.20 $\pm$ 3 ug/100ml
Opposite Assiut	0.23 $\pm$ 2 ug/100ml
Opposite Cairo	0.20 $\pm$ 2 ug/100ml
4- Tap water (Cairo)	0.18 $\pm$ 2ug/100ml

Note: Result for each analysis was repeated three times, and the values are means  $\pm$  Standard deviation.



**FIG. I—Representative diagram showing the distribution of normal <sup>131</sup>I-thyroidal uptake**

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## **DISCUSSION**

The normal values for thyroidal I-131 uptake observed in our department last year were approximately 20-62 percent. However the values determined in 1991/92 15-55 per cent. Evaluation of the various aspects of Iodine metabolism in 40 persons of this group revealed them to be relatively deficient with iodine.

The urinary iodine excretion of 46 ug/ day seems to be relatively low. These values are far less than in the literature (Pittman et al 1969, De Groot, 1966) & Francois Delanige (2002).

The Thyroid iodine clearance in normal subjects was relatively high it was 27.6+ 0.4 ml/min and renal clearance was 32.2+ 2.0 ml/min.

The relatively high thyroidal iodine clearance tends to keep the thyroid I-127 uptake at a relatively high level despite the large quantity of iodine presented to the gland by the blood (Oddie, 1967). A second thyroidal mechanism for maintaining hormonal secretion at a normal rate is the diminished leakage of iodide like material from the gland (De Groot 1966, Hetzel 1983, Francois Delarige 2002).

There is no guarantee the I-127 intake will remain at this level all the time and accordingly the mean iodine intake might change. The uptake of radio iodines is reciprocally related to the average daily ingestion of iodide. When the mean daily intake falls below 50 ug of iodide, the uptake by the thyroid gland at 24- hours usually exceeded 60%.

The above results could explain the slightly increased thyroidal radioiodine uptake by the relative lack of iodine 127 and the dietary iodine determination confirmed food as the main source of I-127. Determination of the iodine content in the River Nile behind and in front of the High Dam at Aswan showed slightly low figure in the latter samples (Table 3). However, this difference cannot materially explain the changing radio Iodine uptake standard.

As Paul Ghalioungi (1965) previously presented, there is no definite evidence of iodine deficiency in Egyptian waters compared to the internationally published standards (WHO group, 1953 & WHO<UNICEF and ICCIDD, 1994). Even these latter figures do not appear to be universally accepted and the causation of goiter involves many more factors than the mere concentration of iodine in water.

The high I-131 uptake, low urinary I-131 clearance rule out the part played by the dietary goitrogens.

The fact still remains that goiter is not uncommon in Egypt and the advisability of iodination of salt got to be considered.

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