displaced towards the affected side. The presence of a large pulmonary artery, which may even be aneurysmal, on the contralateral side and the absence of the shadow of a normal pulmonary artery at the hilum on the affected side are important signs. The latter feature may be difficult to appreciate on routine films, for the displaced heart may obscure the hilum. Penetrated films and tomograms of the hila are therefore of value. Bronchograms usually show a normal bronchial tree, as in the patient reported here, but in a few of the reported cases the affected lung has been small, in one case unilobar and in others agenetic. Confirmation of the absence of one of the pulmonary arteries can be obtained by angiocardiology.

Summary

A case of congenital absence of the left pulmonary artery occurring asymptotically in a man of 30, associated with a right-sided aorta, is recorded. The literature is reviewed.

REFERENCES

- Ambrus, G. (1936). *J. techn. Meth.*, **15**, 103.
 Bialock, A. (1947). *J. thorac. Surg.*, **16**, 244.
 — (1948). *Surg. Gynec. Obstet.*, **87**, 385.
 Campbell, J. A. (1954). *Radiology*, **62**, 327.
 Döring, N. I. (1914). In *Studien zur Pathologie d. Entwicklung*, **2**, 41. Fischer, Jena.
 Emanuel, R. W., and Pattinson, J. N. (1956). *Brit. Heart J.* In press.
 Findlay, C. W., and Maier, H. C. (1951). *Surgery*, **29**, 604.
 Flynn, J. E., Siebens, A. A., and Williams, S. F. (1954). *Amer. J. med. Sci.*, **228**, 673.
 Fraentzel, O. (1868). *Virchows Arch. path. Anat.*, **43**, 420.
 Jew, E. W., and Gross, P. (1952). *Arch. Path. (Chicago)*, **53**, 191.
 McKim, J. S., and Wigglesworth, F. W. (1954). *Amer. Heart J.*, **47**, 845.
 Madoff, I. M. (1954). *J. thorac. Surg.*, **28**, 161.
 — Gaensler, E. A., and Strieder, J. W. (1952). *New Engl. J. Med.*, **247**, 149.
 Maier, H. C. (1954). *J. thorac. Surg.*, **28**, 145.
 Miller, J. F. (1937). *Amer. J. Dis. Child.*, **53**, 1268.
 Müller, L. (1927). *Z. Kreisl Forsch.*, **19**, 561.
 Nadas, A. S., Rosenbaum, H. D., Wittenborg, M. H., and Rudolph, A. M. (1953). *Circulation*, **8**, 328.
 Read, C. T. (1954). *J. thorac. Surg.*, **28**, 161.
 Steinberg, I., Dotter, C. T., and Lukas, D. S. (1953). *J. Amer. med. Ass.*, **152**, 1216.
 Thomas, H. W. (1941). *J. techn. Meth.*, **21**, 58.
 Waterman, D. H. (1954). *J. thorac. Surg.*, **28**, 162.
 Wyman, S. M. (1954). *Radiology*, **62**, 321.

PLASMA ACTIVITY LEVELS IN RADIO- IODINE TESTS OF THYROID FUNCTION

BY

H. A. HUGHES, B.Sc., A.R.C.S., A.Inst.P.

Physics Department, Western General Hospital, Edinburgh ;
 formerly Physicist to Radiotherapy Department,
 Guy's Hospital

AND

R. M. MILLER, M.B., M.R.C.P.

Consultant Physician, Pembury Hospital, Kent

In an investigation carried out at Sheffield with radio-active iodine (Goodwin *et al.*, 1951 ; Ansell *et al.*, 1953 ; Wayne, 1954) it was found that the most useful single index of thyroid function was the estimation of the 48-hour protein-bound plasma activity, and that measurement of the 48-hour total plasma activity also gave valuable if less definite diagnostic data. It was decided to adopt the latter estimation as a routine test of thyroid function in this hospital as it seemed more suited to the facilities available. The Sheffield workers drew their patients from an iodine-deficient area, and, so far as we are aware, there are very few published results of plasma-activity estimations from other parts of Great Britain ; thus the results described in this paper may be of some interest, as the patients were all drawn from South-east England.

In addition to the 48-hour total plasma activity, the following indices were determined in a limited number of cases: the ratio of total plasma activity at 48 hours and 2 hours (Blondal, 1952 ; Fellingner *et al.*, 1953), the "T" index (Fraser *et al.*, 1953) based on urinary excretion of ¹³¹I, and the 0-24 hours urinary excretion. The last index affords a further comparison between our results and those of the Sheffield workers.

Material

Eighty patients were investigated, their clinical condition being assessed in terms of the classification used by Fraser *et al.* (1953). They were divided into three groups: (1) Ten patients with marked hyperthyroidism—five with severe toxic goitre and five with severe exophthalmic Graves's disease. (2) An intermediate group of 20 patients—11 with mild toxic goitre and 9 with mild exophthalmic Graves's disease. (3) A group of 50 patients sent to hospital with suspected hyperthyroidism but subsequently judged on clinical grounds to have normal thyroid function.

Patients with mild hyperthyroidism or normal thyroid function form the majority of our series, as we felt that

TABLE I

	B.M.R. (%)	24-hour Urinary Excretion (%)	"T" Index	48-hour Total Plasma Activity (% Dose/ litre)	48: 2- hour Ratio
<i>Results of Tests in Normal Group (50 Cases)</i>					
Range ..	-17 to +74	21.9-70.5	1.55-20.6	0-0.57	0-0.28
No. in range	16	14	12	44	16
Mean ..	14.8	47.3	6.46	0.15	0.05
S.D. ..	18	15.2	5.72	0.14	0.06
<i>Results of Tests in Intermediate Group (20 Cases)</i>					
Range ..	-1 to +90	6.2-61.0	1.68-167	0-1.88	0-2.98
No. in range	13	11	10	18	11
Mean ..	36	26.2	27.76	0.69	0.69
S.D. ..	27	16.2	48.52	0.57	0.83
<i>Results of Tests in Toxic Group (10 Cases)</i>					
Range ..	+37 to +63	3.2-17.9	11.1-37.7	0.72-3.0	0.93-5.75
No. in range	4	5	5	10	4
Mean ..	47.8	11.5	26.8	2.06	2.93
S.D. ..	10.2	4.6	9.8	0.84	1.97

TABLE II.—Atypical Cases*

Case No.	Sex	B.M.R. (%)	24-hour Urinary Excretion (%)	"T" Index	48-hour Total Plasma Activity (% Dose/ litre)	48: 2- hour Ratio	Diagnosis
16	F	+34	9.7	49.2	1.31	0.88	Mild exophthalmic Graves's disease
18	F	+35	16.5	8.54	1.88	1.18	Mild toxic goitre
24	F	+65	6.2	16.7	1.4	2.98	" "

* These cases have been placed in the intermediate group.

TABLE III

	B.M.R. (%)	24-hour Urinary Excretion (%)	"T" Index	48-hour Total Plasma Activity (% Dose/ litre)	48: 2- hour Ratio
<i>Intermediate Group—Subgroup A (10 Cases*), Mild Toxic Goitre</i>					
Range ..	+2 to +81	8.8-39.7	4.22-25.5	0.05-1.88	0.01-1.18
No. in range	5	5	4	9	5
Mean ..	36	23.0	11.24	0.70	0.45
S.D. ..	26	13.1	8.10	0.79	0.44
<i>Intermediate Group—Subgroup B (8 Cases†), Mild Exophthalmic Graves's Disease</i>					
Range ..	-1 to +90	23.3-61.0	1.68-6.05	0-1.34	0-0.32
No. in range	5	4	4	8	4
Mean ..	34	39.4	3.36	0.54	0.14
S.D. ..	31.7	14.7	1.63	0.48	0.12

* Atypical Case 24 omitted. † Atypical Case 16 omitted.

TABLE IV.—Comparison of Results

Clinical Group	24-hour Urinary Excretion (%)		“T” Index		48-hour Total Plasma Activity (% Dose/litre)			48:2-hour Ratio		
	Present Series	Goodwin <i>et al.</i> (Sheffield)	Present Series	Fraser <i>et al.</i> (Hammer-smith)	Present Series	Goodwin <i>et al.</i>	Blondal (Royal Cancer Hospital)	Present Series	Blondal	Fellinger <i>et al.</i> (Vienna)
Euthyroid	47.3	46.0	6.46	5.15	0.15	0.12	0.69	0.05	0.16	0.06
Mild toxic goitre ..	23.0	24.2	10.4	39.5	0.77	0.95		0.86		0.76
Grade I thyrotoxicosis ..										
Mild exophthalmic Graves's disease ..	39.4		3.36	49.65	0.54			0.14		
Severe toxic goitre + Severe exophthalmic Graves's disease } ..	11.5	13.0	26.8	45.5	2.06	1.56	2.4	2.93	2.25	3.75
Severe toxic goitre ..										
Severe exophthalmic Graves's disease ..										
Severe exophthalmic Graves's disease ..				59.8						

these borderline cases would be most likely to show up any differences in the ^{131}I indices due to geographical factors. It is also in this type of case that a new diagnostic test is of most value.

The methods used for administration of the radioactive iodine and measurement of plasma activity followed the practice of Goodwin *et al.* (1951). A B.M.R. estimation was performed in some cases, using the standard Benedict-Roth method.

Results

Table I shows the results of B.M.R. estimation and the various ^{131}I indices for the three groups of patients.

Three results are atypical in some way or other; these are shown in Table II, all three patients having been placed in the intermediate group. Case 16, diagnosed as mild exophthalmic Graves's disease, and Case 24, diagnosed as mild toxic goitre, are obviously grossly toxic as judged by all ^{131}I indices, and may represent errors in clinical assessment or be explained by a hypersensitivity of the patients to normal thyroid hormone levels (Reiss *et al.*, 1952). Case 18 is also grossly toxic as judged by plasma activities, but falls into the normal range of “T” index, which could be explained by a failure in accurate assay of activity.

These atypical results account for the extremely high coefficient of variation on measured indices in the intermediate group.

Intermediate Group.—This group has been subdivided into patients with mild toxic goitre but no exophthalmos (subgroup A) and those with some exophthalmos but few other symptoms or signs of toxicity (subgroup B). The first of these subgroups is possibly comparable to the “Grade I thyrotoxicosis” of the Sheffield workers. Cases 16 and 24, which were atypical on all indices, have been omitted from the analysis of these subgroups shown in Table III. There is a tendency for those patients without exophthalmos to show greater toxicity as judged by the ^{131}I indices than those with exophthalmos. This is not surprising, since the exophthalmos is thought to be of pituitary origin.

Comparison of Results

Table IV shows how the measured values of the “T” index, 0-24-hour urinary excretion, 48-hour total plasma activity, and the 48:2-hour ratio compare with those of other workers.

(a) “T” Index.—Although the mean value for normal subjects is comparable to that of Fraser *et al.* (1953), those for mild and severe thyrotoxicosis are much lower. This is probably because the level of toxicity in our cases was lower.

(b) 0-24-hour Excretion.—The values in all groups agree well with those of Goodwin *et al.* (1951), if it is assumed that our classification of mild toxic goitre is comparable with their Grade I thyrotoxicosis.

(c) 48-hour Total Plasma Activity.—There is again good agreement between our figures and those of the Sheffield group. The few normal cases quoted by Blondal (1952) have a much higher mean than our own.

(d) 48:2-hour Ratio.—The agreement between our results and those of Blondal (1952) and of Fellinger *et al.* (1953) is good.

Discussion

The 48-hour total plasma activity will give reliable results in the diagnosis of hyperthyroidism as judged by the group of patients investigated. The probability that the values of this activity in normal subjects can exceed 0.4 or 0.5% per litre are 3.5% and 0.6% respectively. Thus a value of 0.4% or less is almost certainly indicative of normal thyroid function. Values less than 0.7% per litre are unlikely to occur in thyrotoxicosis ($P \approx 8\%$). The sensitivity of the test is such that an accurate assessment of function cannot be obtained in borderline patients, but there is evidence that a gradation of 48-hour plasma activity exists throughout the intermediate group. This gradation also exists in the case of the “T” index, although the numbers investigated in this way are not sufficient to warrant any accurate assessment by this means.

There seems to be extremely good agreement between our results and those of other workers, in particular with those in Sheffield, which suggests that the influence on ^{131}I indices of the iodine deficiency occurring there is small.

Summary

The results are reported of an investigation of the thyroid function of 80 patients in South-east England, using radio-iodine.

The 48-hour total plasma activity was found to be a useful and reliable test of thyroid function.

We wish to acknowledge the encouragement and interest of Dr. A. B. Wayte in this work.

REFERENCES

- Ansell, G., Macgregor, A. G., Miller, H., and Wayne, E. J. (1953). In *Radioisotope Techniques*, 1, 52. H.M.S.O., London.
 Blondal, H. (1952). *Brit. J. Radiol.*, 25, 260.
 Fellinger, K., Mannheimer, E., and Vetter, H. (1953). *Wein. Z. inn. Med.*, 34, 359.
 Fraser, R., Hobson, O. J. G., Arnott, D. G., and Emery, E. W. (1953). *Quart. J. Med.*, 22, 99.
 Goodwin, J. F., Macgregor, A. G., Miller, H., and Wayne, E. J. (1951). *Ibid.*, 20, 353.
 Reiss, M., Haigh, C. P., Hemphill, R. E., Maggs, R., Reiss, J. M., and Smith, S. (1952). *J. Endocrinol.*, 8, 1.
 Wayne, E. J. (1954). *British Medical Journal*, 1, 411.

Representatives of Cambodia, Laos, Thailand, and Vietnam proposed at a recent conference sponsored by W.H.O. that their countries' malaria control programmes should be merged in an effort to rid the Indo-Chinese peninsula of its most costly disease. The conference recommended the establishment of an antimalaria co-ordination board for this purpose, and that neighbouring states should be invited to join the scheme. The conference also made various recommendations about the employment, grading, and salaries of malaria workers and the standardization of methods for malaria control.