



Improvements in our Thyroid Function Tests

December 2019

In early December, Melbourne Pathology will be returning to the Roche Elecsys platform for free thyroid hormone measurement. Roche fT4 and fT3 offer us several performance advantages, but the most positive change you'll see will be in our turnaround time, which will markedly improve.

Method differences

Recent Australian proficiency testing surveys show that the analytical imprecision of our Roche platform is as good as any. However you will notice changes in fT4 and fT3 values, because free thyroid hormone measurement is not standardised and significant differences exist across platforms. These differences are observed within the normal reference interval, but are exaggerated in the hyperthyroid range.

Method differences in hyperthyroidism

The Abbott Architect method we have run for the last two years is one of the lowest fT4 methods in use. Abbott fT4 tends to plateau in the hyperthyroid range and often gives the appearance of a T3-dominant toxicosis in severe hyperthyroidism. The Roche method gives higher values for fT4, and in moderate and severe hyperthyroidism can be more than two-fold greater than the Abbott values. The Roche method also gives higher values for fT3. Some examples appear below, as well as a table of expected equivalents.

	Mild hyperthyroidism		Moderate hyperthyroidism		Severe hyperthyroidism	
	Roche	Abbott	Roche	Abbott	Roche	Abbott
TSH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
fT4	29.3	22	61.6	34.7	>100	40.8
fT3	5.7	4.9	19.3	15.1	46.1	>46

Adult Reference Intervals

	Roche	Abbott
TSH (mU/L)	0.5-5.0	0.4-3.4
fT4 (pmol/L)	11.0-22.0	9.0-19.0
fT3 (pmol/L)	3.1-6.3	2.6-6.0

Expected fT4 values (pmol/L)

Roche fT4	5	10	15	20	25	30	35	40
Architect fT4	4	8	12	16	19	21	24	26

Roche fT4	45	50	55	60	65	70	75	80
Architect fT4	27	29	30	31	32	33	34	35

Expected fT3 values (pmol/L)

Roche fT3	2	4	6	8	10	12	14
Architect fT3	2	4	5	6	8	9	10

Roche fT3	16	18	20	25	30	35	40
Architect fT3	12	13	14	18	21	24	28

To give you continuity in monitoring your patients with hyperthyroidism, we will dual report Architect free thyroid hormones the first time we measure Roche fT4 and fT3 for your (hyperthyroid) patients.

Method differences in thyroxine replacement

Method differences in fT4 measurement are also apparent in patients on thyroxine replacement. It is not uncommon for adequately replaced, euthyroid patients to show elevated fT4 when measured with the Roche method, even as high as 30 pmol/L. This is more pronounced when blood is collected at peak serum thyroxine concentrations, which occur approximately 2 hours post-dose. Withholding the morning thyroxine dose prior to blood collection can help to minimise this, but is not essential. Dose adjustment in primary hypothyroidism should be made on the TSH result only, and an elevated fT4 in the context of a normal TSH should **not** trigger thyroxine dose adjustment.

Patients on adequate thyroxine replacement

	Roche	Abbott	Roche	Abbott	Roche	Abbott
TSH	0.70	0.58	0.88	0.82	3.92	2.92
fT4	23.8	15.4	29.3	22	26.1	17.9

Adult Reference Intervals

	Roche	Abbott
TSH (mU/L)	0.5-5.0	0.4-3.4
fT4 (pmol/L)	11.0-22.0	9.0-19.0

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MELBOURNE
PATHOLOGY

Quality is in our DNA

Improvements in the Roche TSH assay

Our Roche TSH assay has been re-formulated and is now resistant to biotin interference. For patients with multiple sclerosis on 300 mg biotin daily, TSH results will no longer show a negative interference. However other Roche assays can still be affected by biotin, including fT4 and fT3, and we recommend that biotin is withheld for 3 days prior to testing in order to minimise the risk of interference.

Please contact us on 9287 7737 if you have any questions about biotin, or any other form of interference.



Dr Christina Trambas

BSc (Hons), MBBS, FRCPA, PhD, MAACB, FAACB
Chemical Pathologist

A graduate of The University of Melbourne, Dr Trambas trained in Chemical Pathology at The Alfred Hospital and Melbourne Pathology before being awarded her fellowship of the Royal College of Pathologists of Australasia (RCPA) in 2017. Prior to entering Medicine,

Dr Trambas completed a Bachelor of Science with Honours and a PhD in Immunology at The University of Tasmania, and undertook a Post-Doctoral Fellowship at The Dunn School of Pathology at Oxford University, where she studied the cell biology of natural killer cells.

Dr Trambas commenced as a Chemical Pathologist at Melbourne Pathology in early 2017 and has wide-ranging interests in the field, including cardiac troponins and cardiovascular risk assessment, and is the Chair of the RCPA Troponin Working Party. Dr Trambas also has a special interest in assay interferences, and has recently published a number of papers on biotin interference in streptavidin-based immunoassays.



Associate Professor Ken Sikaris

BSc(Hons), MBBS, FRCPA, FAACB, FFSc
Director of Chemical Pathology

A University of Melbourne graduate, A/Prof Sikaris trained at the Royal Melbourne, Queen Victoria, Prince Henry's and Heidelberg Repatriation Hospitals. He obtained fellowships from the Royal College of Pathologists of Australasia (RCPA) and the Australasian

Association of Clinical Biochemists (AACB) in 1992 and 1997 respectively.

A/Prof Sikaris was appointed Director of Chemical Pathology at St Vincent's Hospital in 1993 and Medical Director of Dorevitch Pathology in 1998 before starting at Melbourne Pathology in 2003. He specialises in Prostate Specific Antigen, cholesterol and quality assurance and is Chair of the RCPA QAP Key Incident Monitoring Program for Australasia.

A NATA-accredited laboratory assessor, he is also founding Fellow of the RCPA Faculty of Science where he is Principal Examiner in Pathology Informatics.

A/Prof Sikaris is a Principal Fellow of the Department of Pathology at Melbourne University and lectures to undergraduates, GPs and a variety of specialist groups across Australia and overseas. He is also Director of Chemical Pathology at Melbourne Pathology.