DRUG	HALF LIFE (approx) (HOURS)	TIME TO STEADY STATE	SAMPLE TIMING	TARGET RANGE	COMMENTS
DIGOXIN	Adults 38-77	6-13 days	At least 6 hours after last dose	0.8 - 2.0 µg/L	1) Half life increased in renal and/or CCF 2) Hypokalaemia potentiates toxicity
PHENYTOIN*	ADULTS 20-40 But highly variable and dependent on dose	Variable 1-2 weeks (dose dependent)	Trough sample	5 – 20 mg/L (Albumin-adjusted)	1) Half life increased in chronic hepatic dysfunction 2) Bioavailability varies betweeen manufacturers
PRIMIDONE	Adults 10-12	2-2.5 days	Immediately	No range for parent drug	Measure Phenobarbitone
SODIUM VALPROATE	Adults 6-17 Children 4-14	3 days 2 days		50 – 100 mg/L	Not routinely available. May be used to assess compliance
CARBAMAZEPINE	Adults and children 5-27	2 weeks or more (1 week after adjusted dose)	Before Oral	4 – 12 mg/L	Threshold for toxicity may be reduced in multiple anticonvulsant therapy[1]
PHENOBARBITONE	Adults 50-120 Infants/Children 40-70	10-25 days 8-15 days	Dose	10 – 40 mg/L	Alkaline urine may increase the rate of elimination
LITHIUM	Adults 14-24 (up to 36 in the elderly)	2-4 days	12- 14 hours post dose	Aim for: 0.6 – 0.8 mmol/L normally 0.8 – 1.0 mmol/L if patient has relapsed previously on Li or has sub-syndromal symptoms	1) Half life increased in renal dysfunction 2) Note that not all tablet preparations are slow release[2]
THEOPHYLLINE	Adults (>16yrs): 8.7 (mean average) Neonates Premature 30 Full term 24	2 days 6 days 5 days	Oral Dosing: 6-7 hours after slow release preparation 2 hours after syrup	10 – 20 mg/L	1) Half-life reduced by up to 50% in smokers 2) Half life increased in hepatic failure

* See additional notes on Phenytoin reporting

Phenytoin reporting.

All phenytoin results are reported in the following panel, with an Adjusted Phenytoin value, calculated using the Scheiner-Tozer equation (see below) to take into account the effect of protein binding.

Albumin	…	g/L	(35-50)
Phenytoin	…	mg/L	(5-20)
Adjusted Phenytoin	…	mg/L	(5-20)

Albumin-adjusted phenytoin is a better guide to biologically active phenytoin than total levels when albumin is reduced. Interpret results with caution if albumin less than 20g/L or in the presence of other factors that may influence phenytoin binding (eg other highly protein-bound drugs, uraemia, hepatic impairment and pregnancy).

Scheiner-Tozer Equation

To adjust to an albumin concentration of 40g/L:

$$\text{Adjusted Phenytoin} = \frac{\text{Phenytoin}}{\frac{(\text{Alb} \times 0.9)}{40} + 0.1}$$

Telephoning Raised Phenytoin Levels

Adjusted phenytoin greater than 25 mg/L will be phoned.

References

1) Clinical Chemistry 1998; 44 (5): 1085 – 1095
2) Guidelines to Monitoring Lithium: A statement of good practice 1998
see also
3) NICE guidelines for bipolar disorder (July 2006)
4) Fedler C and Stewart MJ. Plasma total phenytoin: a possibly misleading test in developing countries. *Ther Drug Monit*. 1999, **21**: 155-160

For Lamotrigine, Gabapentin, Topiramate and Vigabatrin see: Syva Drug Monitor Vol 2: issues 2, 5 and 10