

**Table 1 – Sampling Requirements for Commonly Requested Therapeutic Drugs:**

| Therapeutic Drug  | Timing of Sample Collection  | Tube Type <sup>†</sup>             | Approximate Turnaround | Half life   | Time to Steady State | Target Range(s)  | Symptoms of Toxicity   |
|---|--|------------------------------------|------------------------|-------------|----------------------|--|--|
| <b>Lithium</b><br>( <i>Lithium citrate, Lithium carbonate, Li-liquid, Priadel, Camcolit, Liskonum</i> ) | <b>At least 12 HOURS</b> after last lithium dose taken   | Serum<br>(brown lid <sup>†</sup> ) | 1 working day          | 18-36 hours | 3-7 days             | 0.4 – 1.0mmol/L  | Confusion, tremor, ataxia, muscle weakness, slurred speech, hypothyroidism and renal dysfunction                                       |
| <b>Digoxin</b><br>( <i>Lanoxin</i> )  | <b>At least 6 HOURS</b> after last digoxin dose taken.<br>Please provide details of any other medications, particularly STEROIDS and DIGOXIN ANTIDOTES (e.g. DigiFab®)                         | Serum<br>(brown lid <sup>†</sup> ) | 1 working day          | 36-48 hours | 5-7 days             | 0.5-1.0µg/L  | Headaches, fatigue, insomnia, cardiac arrhythmia, bradycardia, visual disturbances, vomiting, diarrhoea.                               |
| <b>Theophylline</b><br>( <i>Aminophylline, Phyllocontin</i> )   | Directly before next dose (i.e. trough level).<br>Please seek advice from the duty biochemist in patients on slow-release or IV preparations.  | Serum<br>(brown lid <sup>†</sup> ) | 1 working day          | 3-13 hours  | 2-3 days             | 10 – 20 mg/L<br>(Adults only)  | Headaches, nausea, palpitations, tremor, seizures, cardiac arrhythmia  |
| <b>Carbamazepine</b><br>( <i>Tegretol, Carbagen</i> )   | Directly before next dose (i.e. trough level)  | Serum<br>(brown lid <sup>†</sup> ) | 1 working day          | 12 hours    | 2-6 days             | 4 – 12 mg/L  | Blurred vision, dizziness, ataxia, SIADH, neutropenia, rashes  |
| <b>Phenytoin</b><br>( <i>Epanutin</i> )   | Directly before next dose (i.e. trough level)  | Serum<br>(brown lid <sup>†</sup> ) | 1 working day          | 7-42 hours  | 7-35 days            | 5-20 mg/L  | Seizures, nystagmus, ataxia, nausea, vomiting and tremors.   |
| <b>Valproate</b><br>( <i>Depakote, Convulex</i> )   | Directly before next dose (i.e. trough level).<br>Note that valproate measurements are NOT useful for assessing clinical efficacy, but may assist in investigations of overdose or compliance. | Serum<br>(brown lid <sup>†</sup> ) | 1 working day          | 8-20 hours  | 2-4 days             | 50-100 mg/L<br>To be used as a guide only (no well-established therapeutic range). | Nausea, vomiting, confusion, dizziness, ataxia, hallucination, respiratory depression, tachycardia, hypotension, hypo- or hyperthermia |

<sup>†</sup>Please note that tube colours only apply if using Sarstedt Vacuettes for specimen collection.

**For further information, or to discuss testing of a drug which is not featured in Table 1, please contact the duty biochemist: 01904 726366**

### When are therapeutic drug levels required?

For the majority of medications in routine use, measurement of serum drug levels is not required. However, drug levels may provide a useful adjunct to clinical features for medications with one or more of the following characteristics:

- There is a narrow interval between therapeutic and toxic concentrations of the drug
- Drug efficacy cannot be gauged using routine clinical assessments (e.g. blood pressure, liver function testing, visible symptoms)
- The dose of drug given does not correlate well with the resulting concentration of drug in serum (drug absorption or activity is easily affected by other factors e.g. other medications, diet, illness)
- The concentration of drug in serum correlates well with its therapeutic (or toxic) effects on the body, and can be interpreted easily with the use of target ranges.
- A reliable laboratory test is available for the measurement of serum drug levels.

Table 1 shows a list of medications which meet these criteria and are tested in the biochemistry department (Therapeutic Drugs for Monitoring or TDMs).

### Specimen Collection Requirements

Because drugs are absorbed, metabolised and cleared by the body, the concentrations of a drug in a serum sample will depend on the time interval between ingestion of a drug and collection of a sample (i.e. how long the body has had to 'process' the drug). As this could complicate the interpretation of results, the laboratory provides target ranges derived by measuring serum drug concentrations at specific time intervals after administration. **The ranges are therefore only applicable when samples have been collected after these intervals.** Table 1 shows the amount of time that you **MUST** leave between dosing and sample collection in order to be able to apply the laboratory range with confidence.

### Interpretation of Laboratory Results

The drugs tested by the laboratory require monitoring because they typically behave differently in different patients; some patients have been known to display toxic effects at near '-normal' drug concentrations. This means that results **all TDM results MUST be interpreted in the context of clinical symptoms.** The target ranges in table 1 provide a guide to assist dose adjustment but should not supplant clinical judgement.