

# Cardiac drug monitoring reference materials

Cardiac drugs are used for the treatment of angina, arrhythmias and congestive heart failure. There are several indications for measuring cardiac drugs: they have a narrow therapeutic index, the clinical presentation of under- and over-medication are similar, to assist with dose adjustments and to monitor adherence.

Antiarrhythmics are traditionally divided into four classes according to the Vaughan Williams classification. Class I: sodium channel blockers (procainamide, disopyramide, quinidine, lidocaine, mexiletine, flecainide, propafenone), class II: beta blockers (propranolol, atenolol), class III: potassium channel blockers (amiodarone, sotalol) and class IV calcium channel blockers (verapamil, diltiazem). This is an over simplification in that many of the antiarrhythmic agents have multiple modes of action. Other agents that do not fall neatly into the classification have been assigned the miscellaneous class V: (adenosine, perhexiline, digoxin, digitoxin).



Cardiac drugs differ in their requirement for monitoring. Class I agents have significant toxicity and therapeutic drug monitoring (TDM) significantly increases the safety with which they can be administered. Class II are generally safe and do not normally require TDM. Of the agents in class III, monitoring is important for amiodarone but considered of little value for sotalolol. Class IV drugs are normally monitored by haemodynamic effects.

The cardiac glycosides, digoxin and digitoxin, used to treat congestive heart failure, are widely prescribed and therapeutically monitored.

LCG offers an extensive collection of cardiac drugs. Those showcased here focus on antiarrhythmics that are frequently monitored in current TDM practice. If you require a cardiac drug that is not listed here please contact your local office.

## Reference materials

| Product code                   | Description  | Unit 1 | Unit 2 |
|--------------------------------|--|--------|--------|
| <b>Adenosine</b>               |  |        |        |
| LGCFOR0784.00                  | Adenosine  | 10 mg  |        |
| TRC-A280402                    | Adenosine-13C5   | 2.5 mg | 25 mg  |
| <b>Amiodarone</b>              |  |        |        |
| LGCFOR0697.00                  | Amiodarone Hydrochloride                                       | 10 mg  |        |
| LGCAMP0697.00-01               | Amiodarone Hydrochloride, 1.0 mg/ml (as free base)             | 1 ml   |        |
| TRC-A632952                    | Amiodarone-d4 Hydrochloride                                    | 2.5 mg | 25 mg  |
| CERA-083                       | Amiodarone-d4 Hydrochloride, 100 µg/ml (as free base)          | 1 ml   |        |
| LGCFOR0697.03                  | Desethyl Amiodarone Hydrochloride                              | 10 mg  |        |
| LGCAMP0697.03-01               | Desethyl Amiodarone Hydrochloride, 1.0 mg/ml (as free base)    | 1 ml   |        |
| TRC-D288733                    | Desethyl Amiodarone-d4 Hydrochloride                           | 1 mg   | 10 mg  |
| CERD-056                       | Desethyl Amiodarone-d4 Hydrochloride, 100 µg/ml (as free base) | 1 ml   |        |
| <b>Digitoxin &amp; Digoxin</b> |  |        |        |
| TRC-D445950                    | Digitoxin  | 50 mg  | 500 mg |
| CERD-067                       | Digitoxin, 1.0 mg/ml   | 1 ml   |        |
| LGCFOR0212.00                  | Digoxin  | 10 mg  |        |
| LGCAMP0212.00-01               | Digoxin, 1.0 mg/ml   | 1 ml   |        |
| TRC-D446577                    | Digoxin-d3   | 2.5 mg | 25 mg  |
| <b>Disopyramide</b>            |  |        |        |
| LGCFOR-0108.00                 | Disopyramide   | 10 mg  |        |
| CERD-054                       | Disopyramide, 1.0 mg/ml  | 1 ml   |        |
| TRC-D493452                    | Disopyramide-d14 Tosylate Salt                                 | 1 mg   | 10 mg  |
| <b>Flecainide</b>              |  |        |        |
| TRC-F389990                    | R-(-)-Flecainide   | 1 mg   | 10 mg  |
| TRC-F389995                    | S-(+)-Flecainide   | 1 mg   | 10 mg  |
| TRC-F390000                    | Flecainide   | 100 mg | 1 g    |
| TRC-F390002                    | Flecainide-d3  | 1 mg   | 10 mg  |

| Product code     | Description  | Unit 1 | Unit 2 |
|------------------|--|--------|--------|
| <b>Lidocaine</b> |  |        |        |
| LGCFOR0102.00    | Lidocaine  | 10 mg  |        |
| LGCAMP0102.00-01 | Lidocaine, 1.0 mg/ml   | 1 ml   |        |
| TRC-L397802      | Lidocaine-d10 Hydrochloride                                  | 5 mg   | 50 mg  |
| LGCFOR0102.05    | Norlidocaine (Monoethylglycinexylidide Hydrochloride (MEGX)) | 10 mg  |        |
| TRC-N713502      | Norlidocaine-d5 Hydrochloride                                | 1 mg   | 10 mg  |
| TRC-G625290      | Glycinexylidide (GX)   | 250 mg | 2.5 g  |
| TRC-G625292      | Glycinexylidide-d6   | 2.5 mg | 25 mg  |
| TRC-H943820      | 3-Hydroxylidocaine   | 1 mg   | 10 mg  |
| TRC-H943822      | 3-Hydroxylidocaine-d5  | 1 mg   | 10 mg  |

|                   |                                      |        |       |
|-------------------|--------------------------------------|--------|-------|
| <b>Mexiletine</b> |                                      |        |       |
| LGCFOR0146.00     | Mexiletine Hydrochloride             | 10 mg  |       |
| TRC-M340802       | Mexiletine-d6 Hydrochloride          | 1 mg   | 10 mg |
| TRC-H948020       | 4-Hydroxymexiletine Hydrochloride    | 2.5 mg | 25 mg |
| TRC-H948022       | 4-Hydroxymexiletine-d6 Hydrochloride | 1 mg   | 10 mg |

|                    |                         |       |        |
|--------------------|-------------------------|-------|--------|
| <b>Perhexiline</b> |                         |       |        |
| TRC-P287320        | Perhexiline Maleate     | 10 mg | 100 mg |
| TRC-P287322        | Perhexiline-d11 Maleate | 1 mg  | 10 mg  |

|                     |                                 |       |  |
|---------------------|---------------------------------|-------|--|
| <b>Procainamide</b> |                                 |       |  |
| LGCFOR0550.00       | Procainamide Hydrochloride      | 10 mg |  |
| LGCAMP0550.03-01    | N-Acetylprocainamide, 1.0 mg/ml | 1 ml  |  |

|                    |  |       |       |
|--------------------|--|-------|-------|
| <b>Propafenone</b> |  |       |       |
| TRC-P757495        | (R)-Propafenone                        | 5 mg  | 50 mg |
| TRC-P757496        | (S)-Propafenone                        | 5 mg  | 50 mg |
| LGCFOR0405.00      | Propafenone Hydrochloride              | 10 mg |       |
| TRC-P757502        | Propafenone-d5 Hydrochloride           | 1 mg  | 10 mg |
| TRC-H952455        | (R)-5-Hydroxypropafenone Hydrochloride | 1 mg  | 10 mg |
| TRC-H952460        | (S)-5-Hydroxypropafenone Hydrochloride | 1 mg  | 10 mg |
| LGCFOR0405.01      | 5-Hydroxypropafenone Hydrochloride     | 10 mg |       |
| TRC-H952452        | 5-Hydroxypropafenone-d5 Hydrochloride  | 1 mg  | 10 mg |

|                  |                         |        |       |
|------------------|-------------------------|--------|-------|
| <b>Quinidine</b> |                         |        |       |
| TRC-Q685000      | Quinidine               | 10 g   | 100 g |
| TRC-Q685002      | Quinidine-d3            | 1 mg   | 10 mg |
| TRC-D292140      | O-Desmethylquinidine    | 2.5 mg | 25 mg |
| TRC-Q685015      | Quinidine N-Oxide       | 2.5 mg | 25 mg |
| TRC-Q685017      | Quinidine-d3 N-Oxide    | 1 mg   | 10 mg |
| TRC-H953240      | (3R)-Hydroxyquinidine   | 1 mg   | 10 mg |
| TRC-H953230      | (3S)-3-Hydroxyquinidine | 1 mg   | 10 mg |

## High order reference materials

| Product code                   | Description  | Pack size |
|--------------------------------|--|-----------|
| Plasma calibrators lyophilised |  |           |
| ERM®-AC200                     | Digoxin, Purity 98%, Uncertainty 0.5 %             | 500 mg    |
| ERM®-DA201                     | Digoxin, Fresh Frozen Serum, Low Level: 0.8 ug/kg  | 1 x 1 ml  |
| ERM®-DA200                     | Digoxin, Fresh Frozen Serum, High Level: 2.0 ug/kg | 1 x 1 ml  |

## Matrix materials

| Product code                   | Description                                   | Pack size    |
|--------------------------------|---|--------------|
| Serum calibrators lyophilised  |   |              |
| Amiodarone, Desethylamiodarone |   |              |
| REC-20013                      | Amiodarone ClinCal® Calibrator (Single Point) | 1 x 3 ml     |
| REC-9909                       | Amiodarone ClinCal® Level 0-3                 | 4 x 1 x 2 ml |

| Serum control lyophilised      |   |              |
|--------------------------------|---|--------------|
| Amiodarone, Desethylamiodarone |   |              |
| REC-20080                      | Amiodarone ClinChek® Control Level I    | 10 x 3 ml    |
| REC-20081                      | Amiodarone ClinChek® Control Level II   | 10 x 3 ml    |
| REC-20082                      | Amiodarone ClinChek® Control (Bi-level) | 2 x 5 x 3 ml |

## Proficiency testing scheme

| Analyte                                  | Matrix | Distribution frequency | Pack size |
|--|--------|------------------------|-----------|
| Cardiac Drugs Proficiency Testing Scheme |        |                        |           |
| Amiodarone                               | Serum  | Monthly                | 1 x 2 ml  |
| Desethylamiodarone                       | Serum  | Monthly                | 1 x 2 ml  |
| Flecainide                               | Serum  | Monthly                | 1 x 2 ml  |
| Digoxin                                  | Serum  | Monthly                | 4 x 2 ml  |

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