# Sandwell and West Birmingham Hospitals

**Clinical Biochemistry Department R&D Project in use of CFA**

**Specification for a Continuous Flow Analyser for Red Blood Cell Lysate Enzyme Detection**

**Introduction**

The Department has an interest in measuring enzymes in lysates of red blood cells. Our main application, the enzyme TPMT, sees up to 200 samples a day analysed using manual enzymatic techniques. Here we are considering an R&D initiative to look at the use of Continuous Flow Analysis (CFA) as an alternative approach for the method.

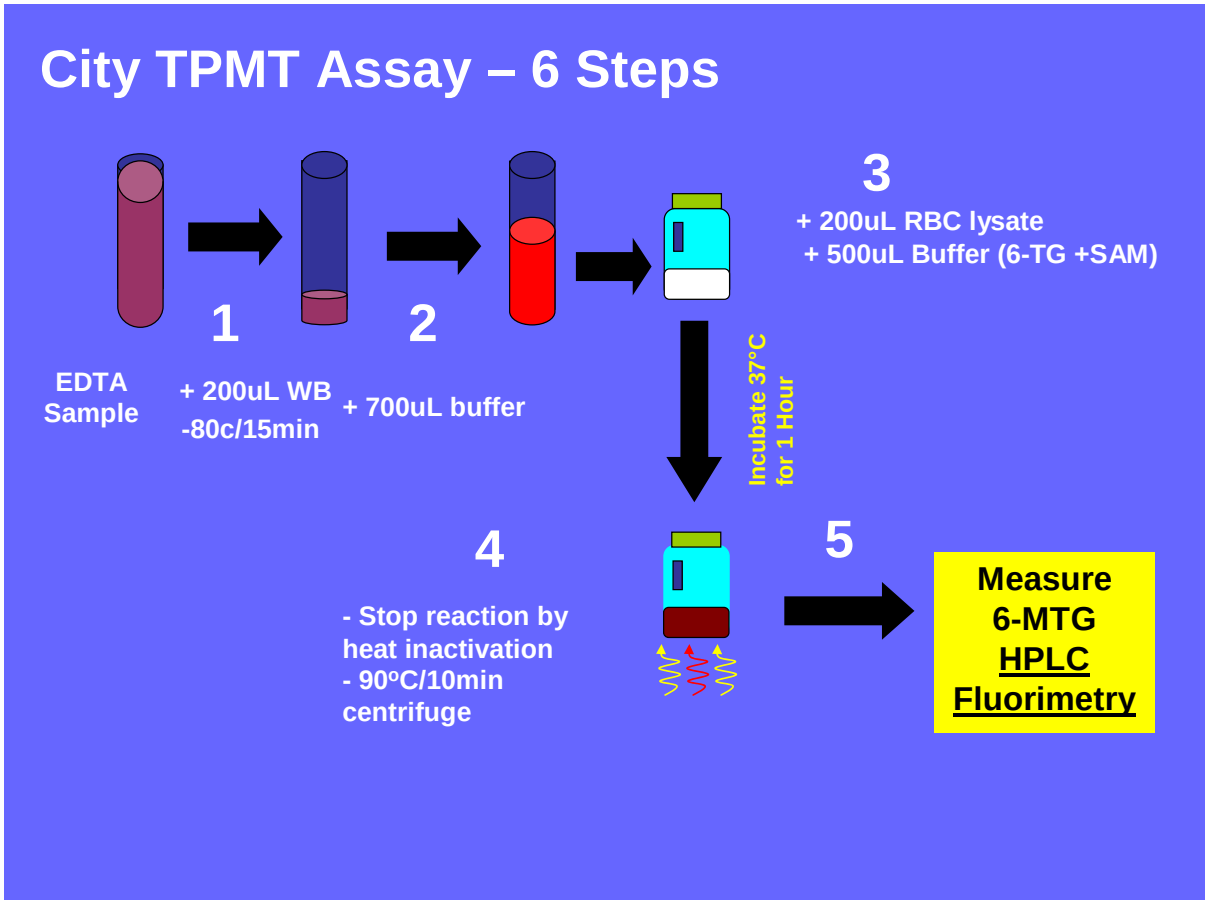


Figure 1: Current enzyme assay

**Proposed CFA Method**

Our concept is to prepare a RBC lysate in the current way (steps 1 & 2 of Figure 1). It will be this lysate that is the starting point for the CFA system

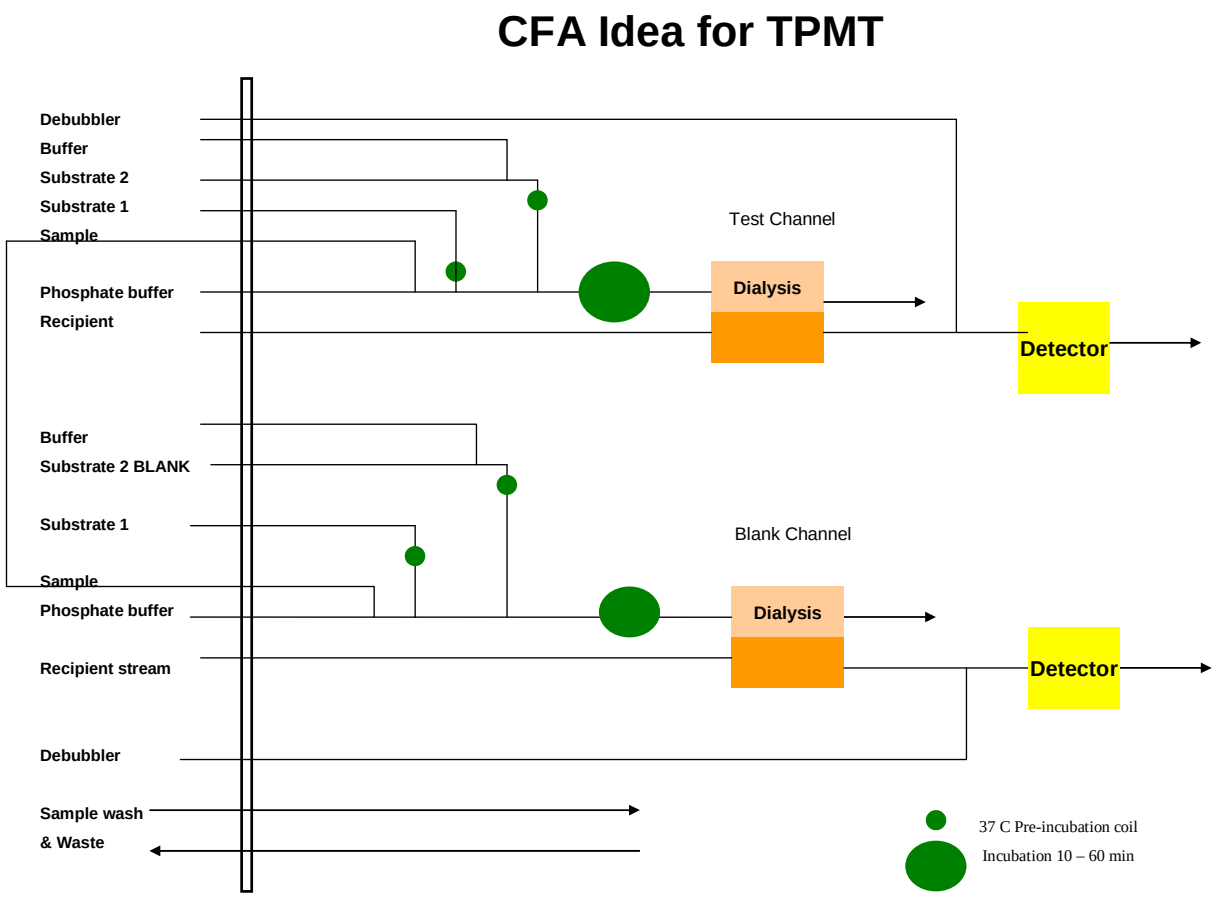


Figure 2: Simplified CFA approach

A key theoretical advantage of a CFA methodological approach is the potential to automate everything after the production of the lysate. There are many factors that will require R&D input to produce a successful method. In particular we need to decide if UV or fluorescence detection is the best approach as our product can be detected by both. We are also aware that we will need to have some form of blank or initialising channel to overcome background and possible drug interference. We know, especially using fluorescence, that we have plenty of sensitivity on our current method and that the 1 hour incubation could be cut down considerably.

**Continuous Flow Analyser - Specification for Tender**

**Summary**

- Our requirement is for a developmental CFA to undertake the appropriate R&D to look at the feasibility of a CFA approach to our current manual TPMT assay.
- The system needs to enable us to undertake this research which will include changing a number of components as we undertake our method development.

**1. The Analytical System Required**

| Components | Features | Comment |
|---|---|---|
| Auto Sampler | • Minimum of 150 positions<br>• Tube type: Our current tubes are 75mm x 13 mm in size but we can use smaller tubes if required. Our tubes are bar coded and any form of sample bar code reading would be an advantage – either automatic or manual. | Our final solution may have a sampler with more than 200 positions. |
| Pump | • Minimum of 24 pumping lines | |
| Chemistry module | • **Incubation:** We need 37°C incubation with ability for varying incubation for up to 1 hour. We need pre warming or reagents in some way but the stock reagents can be at ambient temperature<br>• **Dialysis modules:** The ability to have 2 dialysis units – for test and blank line. We would need to have sufficient dialysis to see approximately 20% transfer into the recipient stream of our compound (Mol Wt. 182).<br>• Reaction coils, connectors, tubing; We need a range of consumables such that we can develop our methods appropriately. Please specify what you will supply in this package. | As we are purchasing this first machine as an R&D tool we are looking to be able to change most parameters on the system locally. |
| Detectors | • UV Detection – 2 channel<br>• Fluorescence – 2 channel for blank correction. | Current application:<br>UV at 292 nm<br>Ex. 315 Em. 390 |
| Computer control | • Ability to control all aspects of the analytical system<br>• Ability to manipulate data including to take test and blank signals, and compute differences.<br>• Ability to link to LIMS system so that worksheets can be downloaded and data transmitted. | |

**2. Installation, Training & Technical Advise**

Please state if the equipment will be fully installed and tested by the company. Please state the training you offer on use of hardware and software and any associated costs. We are not asking for specific application support but please define ongoing technical support in relation to general CFA principles and practice and itemise any associated costs.

**3. Service and Support**

Please state the warranty period and the options for service contracts once the warranty has expired.

**4. Cost of Spares and Consumables**

Please supply a full list of consumable prices.

**5. Intellectual Property and Commercialisation**

We have a track record of innovating new methods in our NHS laboratory. This current initiative is looking at clinical applications that we believe are relevant for modern CFA platforms in a clinical setting. If our initial R&D project is successfully applied and shows significant advantages over current methods then we would intend to move over to a CFA method.

Our current methods carry a CE mark and we would intend to CE mark our new methods as well prior to routine use. This would require the procurement of several systems to undertake our routine analysis. We would be interested in a longer term business partnership for an equipment supplier who was interested in working on the commercialisation of the Intellectual Property that the method developments of this work may generate.

**Jonathan Berg**
**6th January 2014**