

# Use of the CEREBRO specimen tracking system in histology

This article provides an overview of NHS Greater Glasgow and Clyde's experience using the CEREBRO Specimen Tracking System (Leica Biosystems) in Cellular Pathology services

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Table 1: Number of requests per annum

Adult histology	Cervical cytology	Diagnostic (non-gynae) histology	Neuropathology/ paediatric pathology	Andrology
100,000	108,000	12,000	5000	5500

The importance of accurate and efficient processing of irreplaceable Histology specimens is well known. The Cellular Pathology department in NHS Greater Glasgow and Clyde (NHS GG&C) receives an annual workload of circa 100,000 histology specimens; therefore the ability to track an individual specimen through the histology process is only achievable with an electronic tracking system

As part of a laboratory strategy to support a major re-organisation of NHS GG&C's Acute Services (including a £1 billion hospital modernisation programme), Cellular Pathology services were centralised in June 2012 from six sites to a single site located in a new state of the art laboratory building on the Queen Elizabeth University Hospital Campus.

The combined repertoire of the new centralised department is detailed in Table 1.

## Service migration

Centralisation of services from six

Pathology sites to a single site presented both significant challenges and opportunities. The main challenges can be summarised as follows:

- Disparate standard operating procedures on all sites
- Different management structures, training and quality management processes
- Variation in the Histology equipment used across the sites
- Developing optimum working patterns to manage the expected workload
- Staff challenges with transfer to the new site (working patterns, travel arrangements).

Migrating to a single site thus presented key opportunities to harmonise and standardise working practices, and remove inherent inefficiencies and duplication in the service provided across NHSGG&C.

The above challenges were addressed by setting up working groups who reviewed and standardised procedures

prior to service migration to the new lab. This was supported by implementation of a new management structure within Pathology.

## The new NHSGG&C Pathology Department—Histology workflow design Laboratory configuration

The new Histology laboratory was designed in the following functional units to reflect Lean working practices:

- Specimen reception
- Dissection and processing
- Embedding\*
- Microtomy & H&E staining \*
- Special staining
- Immunocytochemistry

*\*Note, Adult and paediatric embedding and microtomy were set up as separate functional units.*

Participation in a new Laboratory Managed Service Contract with Abbott Diagnostics (involving Leica Biosystems as a key third party supplier) enabled a significant volume of new equipment to be procured which was capable



*“Minimising the risk of laboratory transcription errors and therefore improving the quality of service provision for the benefit of the patient was invaluable”*

**Steven Harrower, Histology Service Manager**

of processing an annual workload of >100,000 Histology requests per annum. The equipment was set-up in process-based workstations throughout the above functional units.

As a result of the significant volume of Histology specimens being received on a daily basis, implementation of an electronic tracking system in the new department was critical. Leica Biosystems’ CEREBRO tracking system was procured as part of NHSGG&C’s Laboratory Managed Service Contract.

#### **CEREBRO implementation in NHS GG&C**

##### *Installation and training*

A total of 66 CEREBRO workstations were installed in the new NHSGG&C Pathology department.

One workstation was installed in advance (along with other key pieces of Leica Biosystems equipment) for training purposes. This allowed training to progress while the remaining CEREBRO

workstations (and Histology equipment) were being installed over several weeks.

Due to the size of the Pathology workforce, and the challenge with services being delivered from six separate sites prior to centralisation, a cascade approach to training was agreed between Leica Biosystems and NHSGG&C Pathology management. Four products champions were identified for Advanced/Super-user training, with a further 80 staff members being identified for basic training and/or *Train the Trainer* training (depending on their role in the department). Pathology ‘Trainers’ were responsible for undertaking subsequent cascade training.

The optimum training schedule was developed between Leica Biosystems and NHSGG&C Pathology Management. One of the key challenges in developing this was the large number of staff to be trained, with the requirement to travel from their existing department to the new department for training. Detailed

planning was required in establishing the training schedule (particularly the timing and the selection of attendees at each session) to ensure minimal disruption to continued service delivery in the six existing Pathology Departments.

A total of 16 training sessions were delivered over several weeks, with approximately five to six people attending each session. All staff received a training handbook and signed competence paperwork that was recorded in the department’s internal compliance systems.

##### *CEREBRO configuration*

The CEREBRO specimen tracking system involves a series of workstations at each stage of the Histology process which recognise a unique identifier (assigned at accessioning). The associated hardware includes 2D barcode scanners and touchscreen PCs. The system has been configured in NHSGG&C Cellular Pathology to operate on an ‘on-demand’



basis, linking to cassette printers and label printers.

From a user perspective, the workstations are very user friendly. The touchscreen icons are clear and intuitive. A comprehensive 'notes' function is available, allowing easy recording of routine and/or special requests, for example levels 1–3 required with full face on level 3.

The system automatically updates as each activity is performed with highly visual green tick boxes as pots, cassettes and slides are completed. Clear visuals are also used to indicate the stage the pot/block/slide is at: for example, open and closed pots and cassettes, labelled slides, microscope icon when the slide is released to the Pathologist.

The search functionality in CEREBRO is invaluable – the user simply inserts the unique identifier and a full history of the case is provided. This allows the exact location of the case to be established and enables urgent cases to be expedited if required.

### **Benefits associated with use of the CEREBRO system**

#### *Efficiency of automated sample tracking*

Prior to the introduction of CEREBRO, NHSGG&C Pathology tracking systems consisted of manual procedures including physical checks to establish the exact location of tissue blocks. There was a heavy reliance on the LIMS system to determine the current stage of each specimen but this was limited and time consuming. The CEREBRO system has delivered enormous benefits as it is now possible to find the exact location of a

block or slide at the touch of a button – this allows urgent cases to be prioritised and also enables prompt resolution of any queries.

#### *Quality and audit processes*

Each CEREBRO workstation requires user log-in. All users have unique log-in details enabling accurate recording of the operators undertaking each stage of the process. This enables prompt investigation of any queries with the individuals involved, and is also useful in both vertical and horizontal audits. CEREBRO provides full details of each stage of the process including date, times and user ID.

#### *Improved patient safety*

A significant advantage of the CEREBRO system is the requirement to scan prior to each step. Printed cassettes and labels are produced, which reduces errors associated with the former manual transcription/labelling processes. Cassettes and slides are scan-readable, reducing any potential error when typing an item identifier into either CEREBRO and/or other LIMS systems and databases. This ensures the slide produced for Pathologist interpretation is for the correct patient and prevents adverse clinical incidents.

#### *Planning*

CEREBRO has a powerful 'Reports' section that can extract information on the number of outstanding cases at each stage of the process. This can be configured to 'specialty' team level to enable team awareness of the number

of cases awaiting embedding and microtomy. We have not fully utilised this functionality in our department as yet. The department can also access CEREBRO's raw data, which can help monitor turnaround times for stages of the technical process.

#### *Risk mitigation and quality assurance*

Before CEREBRO implementation, quality and checking processes required intensive staff involvement and concentration. An element of manual quality checking remains (for example, receipt of specimens continues to rely on staff visually matching request forms to specimen pots/ensuring minimum data requirements are met, and visual block checking also remains) but the majority of the required checks are achieved as a result of mandatory scanning at each stage. This reduces the possibility of any mix-ups or misidentification occurring throughout the process. CEREBRO will produce an audible alarm for any mismatches at any stage of the process; for example, slide and block mis-match.

#### *Workflow standardisation*

Implementation of the CEREBRO system has enabled process standardisation. Regardless of which surgical specialty is involved, the core Histology processes followed are identical. This delivers benefits in terms of staff training and cross-team working.

#### *Improved productivity*

The CEREBRO tracking system significantly reduces the time required for tracking the location of blocks or slides, and also the time for investigating incidents, thus improving productivity. In addition, CEREBRO has 'Report' functionality which details the volume and type of work undertaken by each operator. This is expected to enable robust monitoring of productivity however has not yet been implemented fully in our department.

#### *Adaptability of CEREBRO*

There is some flexibility in CEREBRO to match the requirements for an individual department and, with input from laboratory staff, Leica Biosystems has been able to make amendments

to CEREBRO to complement the department's workflow.

### Challenges associated with use of the CEREBRO system

#### *Scanning delays/reduced productivity*

Significant challenges were observed in the first six months in our new laboratory as the staff initially found the scanning system to be very slow. Unfortunately, no pre-implementation quantitative data is available on blocks cut per hour, however staff perception was that the additional scanning steps resulted in a reduced cutting rate per hour in comparison to what they could achieve pre-CEREBRO. This ultimately manifested

#### *Manual procedures for tissue processing*

The current version of CEREBRO does not automatically scan cassettes into the tissue processor, resulting in a gap in traceability. NHSGG&C Pathology resolved this with Leica Biosystems's assistance by implementing a manual procedure in which each individual case is barcoded into a stand-alone module at the end of each working day. This is, however, very labour-intensive.

#### **Next steps**

A new version of CEREBRO (version 2.0) is available, which provides a range of additional functionality that will help improve efficiency in our Histology

*“The end-to-end process and operator data available from CEREBRO is invaluable”*

**Morag McNulty, Core Histology Manager**

as a deterioration in our turnaround times – although we consistently met targets for cancer/urgent cases, our turnaround time for reporting routine cases deteriorated during the summer of 2012. Leica Biosystems have attempted to rectify this problem and reduce the time between physical scanning and system recognition, and although an improvement has been observed, staff members continue to express concerns regarding scanning delays.

#### *Issues with LIMS interface*

The interface between our LIMS system (Telepath) and CEREBRO is currently unidirectional requiring any changes at block or procedure level to be made in Telepath. Lack of a bidirectional interface has caused delays and disruption in our workflow. The inability to edit CEREBRO directly forces staff to leave their CEREBRO workstation and access a Telepath workstation to make any changes. There are also limitations with the existing interface as procedures cannot be deleted from the LIMS system. There are also occasions when there are long delays in the time taken for a specimen to be transferred from LIMS to CEREBRO which decreases productivity.

laboratory. One key example of the expected benefits is the inclusion of a tissue processing module that will enable automatic traceability of the cases processed in each tissue processor. This will remove the need for the highly manual and labour-intensive process described above. Other benefits include an archive module and a specimen discard module.

Collaboration is ongoing between Leica Biosystems and NHSGG&C to implement CEREBRO version 2.0. Initial familiarisation training has already taken place, as has some limited user acceptance testing. A detailed Project Plan is currently in development between Leica Biosystems and NHSGG&C to deliver a robust and detailed user acceptance testing and training framework.

Implementation of a bi-directional interface remains a high priority. It is expected that some of the current issues being experienced between Telepath (LIMS) and CEREBRO v1.1 will be resolved by software upgrades available in CEREBRO v2.0. Plans are in development to deliver the bidirectional interface required in NHSGG&C Pathology following expected successful implementation of CEREBRO v2.0 in 2016.

### **Summary**

Implementation of the CEREBRO system in NHSGG&C Pathology has resulted in both significant benefits and challenges.

The ability to successfully track a single case in a workload of >100,000 requests per annum is invaluable and allows urgent cases to be located, retrieved and expedited very quickly. Benefits have also been delivered in terms of quality assurance, risk reduction and audit processes. The ability to generate workload reports from the system is also expected to deliver significant benefits in terms of planning staff deployment and assessing staff productivity. CEREBRO provides the department with increased confidence that, despite our massive workload, our Pathologists are interpreting the right slide from the right patient.

However, there have been concurrent challenges with system implementation. The requirement to scan at each step, whilst providing robust quality, audit and tracking data, is undeniably multiple additional steps in the process, which adds to the time taken to process a case. Delays between scanning and system recognition is a continuing source of frustration for staff. In addition, the lack of a bidirectional interface prevents editing directly in CEREBRO, with all editing required in LIMS with unidirectional flow to CEREBRO. As a result, the full benefits of CEREBRO have not yet been realised in our department.

Despite the challenges noted above, the experience of CEREBRO in NHSGG&C is largely positive. Overall, the benefits of using the system outweigh the problems, and it is widely recognised by all staff that a department of our size would simply be unable to operate without it. Returning to our previous archaic tracking systems is unthinkable. The remaining challenges with CEREBRO are expected to be minimised or resolved during 2016 as CEREBRO version 2.0 will be implemented which has enhanced scanning capabilities, and positive progress has been made regarding a bidirectional interface. The latter, once implemented, will allow us to reap the full range of benefits that CEREBRO undoubtedly offers. ♦