The year is winding up as being a good one for the Histology Group of SA. With meetings attracting numbers like 37 people, we have reason to believe that we are reaching an audience that wants to be educated and entertained. Our speakers to date have been generous of their time, none more so than the gregarious Dr Barbara Koszyca whose talk on the pathology of dementia was both stimulating and educational.

We are all looking forward to the National Histology Conference in Hobart in November, especially as we are spruiking for the chance to host the next national conference in Adelaide in 2019. With about 280 registrations to date, the Hobart conference is already a great success. We offer our congratulations to their organising committee for doing so well.

Our last function for the year is the dinner at Le Riad Restaurant on the 4th December. A banquet style menu has been arranged and we will post it out soon and the cost will be $40.

*Alex Szabo*
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To understand where we are now, we must first understand where we came from... and Georgina endeavored to bestow this knowledge to the keen Histo SA meeting attendees. She scriptures took us back to the earliest written documents – the Egyptian– which are evidence of the human desire to understand the causes of death and disease. Dating as far as 2650 BCE, documents exist that describe conditions which compare to diseases we recognise today, such as cancer. Next, Georgie schooled us on Ancient Greek and Rome medical history which saw many developments in the understanding of Pathology. Hippocrates proposed the causal factors to be natural, rather than based on superstition and the will of the Gods. A century later, Alexandrian scientists were in the swing of dissecting human cadavers to advance knowledge of diseases. Meanwhile, in Ancient Rome human dissection was not performed as it was unlawful. Despite this, the Romans still made their mark in medical history. They published over 1000 books and treatises describing cancers, tumours and diseases! We were enlightened on the development of organised health care in the Byzantine Age (figure 1) and the advances in medicine throughout the Islamic Golden Age. The Renaissance saw case histories and autopsies recorded and journals published describing disease classification based on symptoms and signs (figure 2).

Fast forward to the mid 1800’s and we come to the dawn of modern pathology. When the title “Pathologist” comes to mind, most would also have the image of someone looking down a microscope in mind... and to imagine that this was the same back in the mid-19th century is astounding! From the addition of Haematoxylin for nuclear staining in 1865, to paraffin embedding in 1869 and the use of formaldehyde as a fixative in 1893, the foundations of Anatomical Pathology were truly set well before any of the meeting attendees were even born!

Figure 1. Saints Cosmas and Damianos performing a leg transplantation. Painting from the early 1500s.

Figure 2. Mondino de’ Luzzi during an anatomical demonstration.
Alongside the advances of Pathology were also advances in Surgery, which Georgina was careful not to undermine. These advances took off in the late 1800’s with the commencement of local resections for cancer and the introduction of anaesthesia and aseptic techniques. Following the discovery of X-rays and radium, the primitive beginnings of Radiotherapy blossomed (figure 3). This technique has continued to date, although there have been many changes to the methods employed. More recently, in the mid to late 20th century, was the addition of chemotherapy, hormonal therapy, electron microscopy, sentinel node resection and lymph node mapping. To date, there are also several targeted antibody therapies for specific cancers, such as Herceptin in HER2 positive breast cancers (figure 4).

Now that we understood where we came from, it was time to be educated on where we are now. The first big advance in Anatomical Pathology was the discovery and use of antibodies to target proteins in histological and cytological specimens – i.e. Immunohisto/cyto-chemistry. Then came the introduction of the FISH probes (fluorescein labelled antibodies) to detect chromosomal alterations (figure 5). Heading into the future is the possibility of using molecular studies to aid diagnosis, prognosis and predictive response to therapy – leading to personalised and targeted therapy. However, this is limited by cost – so while Molecular might be the future... it might still be limited. IHC can act as a surrogate marker in certain tumours and is more cost effective. Ongoing research, development of targeted treatment options and adoption of this precision medicine by the health system, tax payers and patients will likely determine the role of molecular vs. surgical pathology in the future.

Rebecca Dyer – Clinpath Laboratories
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Here you will also find information on all our upcoming events.

Cryptic Corner

“It sounds like an exhaust pipe issue”

Answer on page 18!
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Garrick Wilson
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In the histology lab, we often encounter numerous failures or unexplained changes with our stains performance. Mike Rentsch, who co-founded Australian Biostain in 1988, has shared his plethora of knowledge and skills regarding staining techniques. The Australian Biostain company, which is based in rural Victoria, specialises in the formulation of customised and standardised stains and fixatives for diagnostic pathology. The Haematoxylin and Eosin (H&E) stain is the core stain performed on all histology specimens for disease diagnosis. Any special stains further requested are based on a H&E outcome.

The H&E utilises the acidic and basic properties of the cell’s nucleus and cytoplasm, giving rise to the blue (haematoxylin) and pink (eosin) hues, respectively. It is important that these nucleic and cytoplasmic properties of the cell are stained distinctively for a pathologist to make a diagnosis. Variations to the H&E staining techniques will subsequently cause variations in the contrast and shades of the pink and blue. Haemotoxylin is a compound of the Haematoxylin campechium tree (figure 6); staining of the nuclei is due to the aluminium (mordant/metal salt) -haematein (oxidised haematoxylin) complex binding to the chromatin. Haematoxylin solutions are classified based on the mordant used and there are numerous mordants to choose from (figure 7).

The scientific approach requires a lot of documentation. Documentation is important, not just as a NATA requirement, but for tracking, reproducibility of results, quality control (QC) and to minimise the aberrations in protocols and staining outcomes. Such laboratory documentations include batch registers for all supplies, QC registers, conformance action reports, methods, formulations and amendment records.
Correct referencing in methods and design is also vital as there are so many deviations. Numerous books/scientific papers can have the same references yet there can be large or even subtle differences between ratios, volume percentages, mordants, elution times etc. Typing errors can also occur even after publication.

To achieve the best staining results, formulations can be modified and selected to suit the site and the pathologist’s requirements. Documentation needs to be followed and amended as needed and lastly, scientific knowledge and experience must be shared.

Karen Bampton – Clinpath Laboratories

There are many variables that can affect staining quality. These include, but are not limited too; changes to packaging, ingredients used (e.g. percentages/ratio’s – figures 8-10), equipment used (e.g. using a glass cylinder rather than a plastic cylinder to achieve a larger meniscus), pH of solutions, tissue fixation/pre-treatment, timing and the person conducting the stain. However, with greater standardization required within medical labs, most staining is automated, but even then, there can be performance issues so regular calibration is required. The pH of a solution needs to be properly specified, i.e. which hydrated form is used. For instance, a pH with the same mass of a lower hydrated form will give a lower pH and subsequent paler staining especially with haematoxylin. Timing issues such as the age of the haematoxylin (can affect its stability), how long a slide is kept in a solution, the number of times the haematoxylin is used and the batch expiry date. The water quality also affects staining outcomes. Treated water can cause fuzzy membranes and weak background staining with haematoxylin and acidic water can reduce alcian blue staining.
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Check out our website www.histosa.org.au and Facebook page https://www.facebook.com/HistoSA/info for further details of the following events. Don’t worry, you will also get sent an email closer to each event, so make sure you are on our mailing list!

<table>
<thead>
<tr>
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<tr>
<td>National Histology Conference</td>
<td>Friday 17th – Sunday 19th November</td>
<td>Hobart, Tasmania</td>
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<tr>
<td>HGSA Christmas Dinner</td>
<td>Monday 4th December</td>
<td>Le Riad, Adelaide</td>
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The Histology Group of South Australia, along with the Histology Group of Victoria, Histotechnology Group of Queensland and the Histotechnology Society of New South Wales, are hosting this year’s National Meeting in the picturesque city of Hobart, Tasmania. Anyone within the medical science, clinical and research fields, commercial scientists and students are invited to attend. There are a range of workshops and plenary sessions offered, aimed to provide continuing education and professional development. The program also consists of a pre-conference Multiplex IHC workshop held on Thursday afternoon, a self-tour of the Museum of Old and New Art (MONA) on Friday, a Molecular Breakfast workshop on Saturday morning and the Conference dinner Saturday night at Glen Albyn Estate. Modern equipment and consumables will also be showcased by trade sponsors.

**Upcoming Events**

**REGISTRATION:**
- Full standard + dinner $690
- Full standard $550
- Saturday standard $320
- Saturday student (full-time) $100
- Sunday standard $230
- Sunday student (full-time) $75

**WORKSHOPS**

**FRIDAY MORNING:**
- Tissue Recognition – The Basics
- Pathology of the Surgical Cut-Up: What you need to know before making the cut

**FRIDAY AFTERNOON:**
- Tissue Recognition – The weird, the wonderful and the wacky
- Perfecting the Gram Stain
  - Friday morning and afternoon workshops run concurrently and cost $95 each, which include morning/afternoon tea.

**SATURDAY MORNING:**
- Molecular Breakfast $70

Check out the full program here [http://www.nationalhistologyconference.com/program](http://www.nationalhistologyconference.com/program)
A/Prof Lisa Butler’s research program at the University of Adelaide and SAHMRI investigates new therapies and diagnostic tests for prostate cancer. Most research relies on cell line or animal models of prostate cancer, which do not always accurately reflect how the cancer behaves in the human body. This is a major reason for the failure of many developmental drugs in clinical trials.

A/Prof Butler’s group has developed a unique model where tissues collected from consenting patients undergoing prostate cancer surgery are cultured in the laboratory in a way that retains their 3D structure. She then assesses changes in prostate cancer cell growth and death as well as changes in genes, proteins, lipids, and cellular pathways that occur when the tissues are exposed to drug treatments. This approach can uncover important information about how prostate cancers behave and greatly increases the likelihood that the findings will quickly translate to clinical practice. Understanding the pathology of each tissue sample is essential to successfully working with human prostate samples in this way.

Interaction between researchers and pathologists provides a detailed analysis of the different morphologies within each tissue sample and helps to relate our research findings to the aggressiveness of each cancer. We are working towards developing accurate and non-invasive diagnostic tests to monitor the aggressiveness of a patient’s cancer and how it responds to treatments, as well as analysing efficacy and mechanism of action of potential new drugs.

Clinpath – Kent Town Histology lab are currently assisting this exciting research program. Histology scientists sample the tissue from core biopsy positive sites of the fresh prostates that are brought into the lab. These samples are then taken away by Jessica Savage, from the University of Adelaide’s School of Medicine, for their team to work their magic. The prostates are then processed routinely for histology at Clinpath and the University of Adelaide and SAHMRI research team utilise their samples for various tests.

Watch this space for updates on the team’s research!

Legend: Prostate tissues are collected from surgery and assessed for pathology then a core is taken to the laboratory for culture on gelatine sponges. Some of each tissue is used for H&E stain to visualise tissue pathology. Other tissue pieces are used for experiments such as MALDI Mass Spectrometry Imaging, immunohistochemistry or RNA, protein or lipid profiling.
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Find us on the Web:

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Thank you to our 2017 Trade Sponsors and subscribers for all your support. We wish you a wonderful Christmas and New Year. The Histology Group of S.A will be bigger and better in 2018 so stay tuned!!

The Christmas countdown is on!!

Cryptic Corner Answer

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