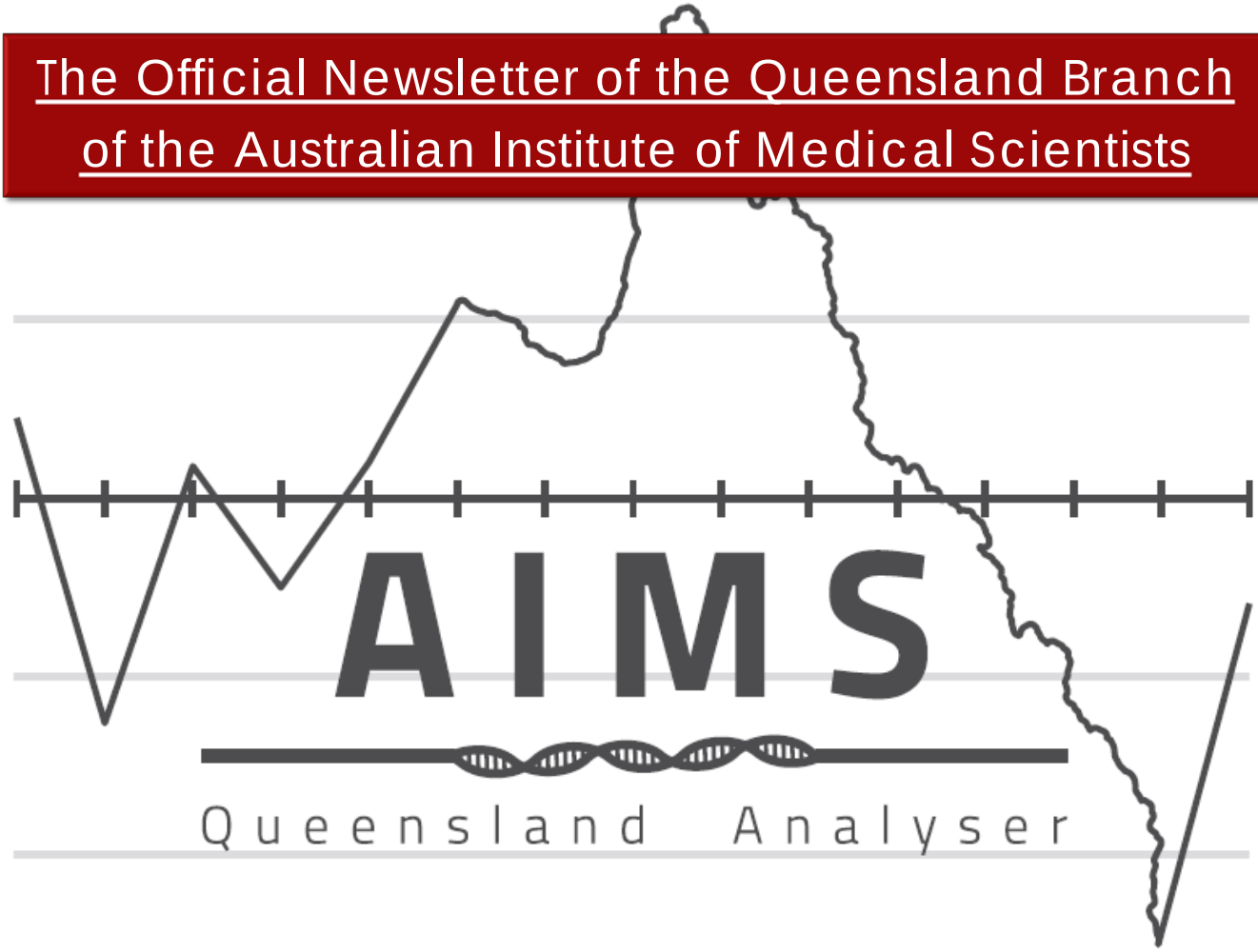
The Official Newsletter of the Queensland Branch of the Australian Institute of Medical Scientists



In this Edition

AIMS Qld Branch Committee Members 2020

Chair: Indu Singh

Vice-Chair: Anne-Marie Christensen

Treasurer: Patricia (Trish) Laube and Avinash Kundur

Secretary: Patricia (Trish) Laube & Avinash Kundur

Committee Member: Ali Baradaran

Committee Member: Allan Hicks

Committee Member: Jacqueline DeWirral

Committee Member: Rebecca Donkin

Committee Member: Deborah Orr (PaLs)

Student Members: Wendy Walker & Jarod Edgeworth (QUT)

Arthur Forrest & Andre Jones-Dorr (Griffith)

For all branch enquiries, please contact
queenslandaims@gmail.com

Chair's Report

Welcome to the *Queensland Analyser* end of year issue for 2020. We have had a few changes in the AIMS Queensland Branch Committee this year after elections. The committee would like to thank Ms Christine Knauth for dedicating her time and huge contribution to the AIMS Queensland Branch in her time as treasurer of the committee for many years. Committee would also like to thank Mr Ritwik (Ricky) Palit for his services as committee member for last few years. Thanks also to Ms Trish Laube and Dr Avinash Kundur for sharing the Treasurer and secretary positions of the committee. Welcome back to all the continuing members of the committee.

Ongoing COVID-19 pandemic challenges are still affecting everyone's life. However, a great control and preventive measures taken by Queenslanders to keep infectivity very low must be applauded. Hence with borders opening all our pathology workers just like everyone else can enjoy some festive time with families and take a well-deserved break. Congratulations to all healthcare workers and unsung heroes working behind the scenes in clinical laboratories and pathologies.

Due to need for social distancing and restrictions on movements, we continued to have some online meetings and postponed a few events to 2021.

Since last newsletter in August 2020, we enjoyed our combined HGQ-AIMS scientific meeting with Histotechnology Group of Queensland (HGQ) with a theme of LUNG, on 13th August 2020. It was another great night, and I would like to extend our thanks to HGQ president, Mr Jerres Alcober, AIMS office and the Queensland Branch Committee for their continuing support. About 70 people attend the annual HGQ-AIMS combined scientific online Zoom meeting and we would like to thank Abacus for sponsoring this event.

We will also host another free event on 6th Feb 2021 as a joint AIMS Queensland State Branch and Queensland Tropical Division half day ZOOM meeting reflecting on COVID 19. The flyer with registration link is on pages page 13 please do register soon.

Our annual end of year quiz night has also been postponed to 23rd March 2021 at QUT Garden Points campus, registration details for this fin night will be provided in early 2021 hope to see many members there face to face after a long time of online meetings. Talk to your work colleagues and friends to form your team or join a team to take the title for 2021.

In one of the regular features of this newsletter '5 minutes with' we introduce you to Prof Denise Jackson, who has been an AIMS member for several years and is current AIMS Board President. We also thank Griffith University BMLS student, Arthur, for preparing our article on page 13-17 and encourage all other members (again, including our Students and PaLs members) to get involved and contribute by sending us case studies or articles. We are happy to include more than one each issue if multiple come in.

Here's wishing everyone a wonderful holiday season and very Happy New Year. Hoping 2021 will be less challenging than 2020. See you all for less online and more face to face meeting next year. For now, let us all go and relax with safe parties.

Indu Singh
i.singh@griffith.edu.au

Queensland Branch Events Update

AIMS / HGQ Joint Scientific Meeting

Written by Trish Laube

Our annual joint AIMS/ HGQ scientific meeting held in August this year in the thick of Covid-19 social distancing restrictions, found us unable to meet as usual at the Pineapple Hotel. Thanks to modern technology we were able to attend this meeting via Zoom from the comfort of our own homes. A big thank-you to our four presenters who gave us the benefit of their expertise!

Our 1st presenter was Dr. Billy Lam a third year AP registrar; whose topic was 'Thymoma? Lymphoma? Or Both?? This was a case study of a 63yold Male, who presented with chest pain, and who reported no Myasthenic symptoms. Imaging showed a large chest mass, and Dr Lam took us through the many steps towards diagnosis. The final diagnosis was the dual pathology of T Cell Lymphoblastic lymphoma, and a Thymoma.

Dr Godbolt, our 2nd speaker is the Director of Pathology at the Prince Charles Hospital, and he presented an 'Interesting Lung Case'. Dr Godbolt talked us through the differential diagnosis of this case, outlining the presentations of the different possible diagnosis. The final diagnosis was that of *Hot Tub Lung,* a condition caused by Mycobacterium Avium, which was cultured from the patient's spa bath water and was also found in his lungs.

Next up we learned that, 'Acid Base Status – Not Rocket science' Dr Kobus Ungerer the director of Chemical Pathology with Pathology Queensland wowed us with his explanation what a blood gas analysis means, and the classification of acid/base disorders, and the steps to decide on whether they are simple or mixed disorders.

Our final speaker was Dr Indu Singh, program director of the Medical Laboratory science Program at Griffith University on the Gold Coast, and our AIMS Queensland Branch chair. Dr Singh presented "COVID and Pulmonary embolism' leading us through a review of the current literature, explaining corona Viruses mechanisms which cause damage to the patients' lungs and increase the risk of pulmonary embolism.

I would like to extend a big thank-you to this event's sponsor, Abacus Dx, and to the HGQ for organising the technical side of this meeting, and of course our wonderful presenters, without whom none of this would have been possible. All these presentations can be accessed by following the link below if any of the topics spark your interest.

https://www.facebook.com/histo.group.qld/videos/

QUT School of Biomedical Science Student Award Night

QUT AIMS Awards for 2019 were presented in a ceremony on 19th Feb 2020. Branch members attended the QUT Student Awards Night which takes place at Room Three-Sixty at the Gardens Point campus each year. This evening is an annual highlight, bringing together staff, students, industry, and professional representatives to celebrate outstanding student achievements. It was our pleasure to see Chloe Moultrie awarded the Barbara Bain Prize for Haematology, Wing Kei (Selena) Chu honoured by the S. Walsh Memorial Prize for Blood Banking, Jessica Franiek awarded for Quality in Pathology Practice and Tsz Ki (Charlotte) Yip the JR Saal Award for Outstanding Performance in Medical Laboratory Science. Again, our congratulations to all students who received awards on the night. Prize-winning students photographed with Jacqui DeWirral (AIMS representative) and Prof David Waugh, Head of School, QUT School of Biomedical Science.

Jessica Franiek, winner of AIMS (Qld) Quality in Pathology Practice prize was not present at the event so there is no photo for her. Here are pictures and names of other students awarded.

AIMS Barbara Bain Prize for Haematology: Chloe Moultrie

AIMS S. Walsh Memorial Prize for Transfusion Science: Wing Kei (Selena) Chu

AIMS JR Saal Prize for Outstanding Performance in Medical Laboratory Science: Tsz Ki (Charlotte) Yip, with Jacqui DeWirral, and David Waugh (Head of School,

AIMS PaLS Pre-Analytical Combined Networking Meeting

Written by Avainsh Kundur

The AIMS PaLS pre-analytical combined night was held on 26th November 2020 in the Helsby Ale House, Pineapple hotel, Brisbane. The meeting was attended by the AIMS Queensland State Branch and Preanalytical & Laboratory Staff (PaLS) staff members. The event was well attended by both preanalytical and scientific delegates, many travelling from the Gold coast for the evening. After an initial meet and greet drink and a chat, the first Speaker of the night Dr Catherine Quagliotto a public health physician from the West Moreton Public Health Unit, gave an excellent talk on the current COVID-19 pandemic entitled “It’s Probably Just a Virus” the COVID-19 pandemic. The talk highlighted the rapid response from the South-East Queensland public health unit to identify source case and chains of transmission. The talk also included information on wastewater surveillance for SARS-C0V-2, which is a developing field in Australia and overseas. Dr Catherine Quagliotto in her talk has also thanked all the preanalytical staff and medical laboratory scientists who have contributed significantly in our fight against the COVID-19 pandemic.

After the first talk, a short refreshment break allowed all the attendees to have a drink and chat in the meeting. The second talk was by Dr Anna Brischetto, an infectious disease physician and microbiologist who has presented her topic entitled “Diagnosis of COVID-19”. In her presentation on COVID-19 Dr Anna Brischetto has briefly discussed the various methods currently followed for sample collection, testing and post analytical interpretation of results on samples from individuals with possible COVID-19 infection. The talk also included some of the advantages and disadvantages of various methods that are currently used for diagnosing COVID-19. Overall, the night was a great success

PaLS and AIMS Queensland branch would like to thank Dr Catherine Quagliotto and Dr Anna Brischetto, who generously have given is their time to come and speak to us. The night ended with some more refreshments and platters in the Halsby Ale House at the Pineapple Hotel.

A big thank-you to our sponsors for the night BD Diagnostics, for generously agreeing to sponsor this event, and to Deb Orr, our chair for the evening. Hoping to see you all in our next meeting in 2021.

Student Placement Experience at GCUH

Written by Issac Frank

As part of my Bachelor of Medical Laboratory Science degree program I had undertaken 10-week clinical placement with Pathology Queensland, at the Gold Coast University Hospital. During my placement in the Transfusion Science and Haematology departments, I was fortunate to directly observe and experience the significant role of medical scientists in patient care. During placement, I spent most of my time in blood banking, where I was trained on how blood and blood products are dispatched to the patients after the completing the necessary testing. Under the guidance of my supervising scientist, some of my responsibilities while completing my placement in blood banking department included assigning and despatching blood and blood products, storing specimens and receipting blood products delivered from the Red Cross Blood Service.

I believe that clinical placement is an essential component of training and has enabled me to become more aware of life after university and complemented the skills that I needed to develop to excel in my career. Within this short period, I have also improved my communication skills, understanding of organisational structures, health and safety regulations and ethics in health profession, specifically in pathology. Griffith University and Pathology Queensland have given me an excellent opportunity to experience life as a medical laboratory scientist and enabled me to develop valuable employability skills. During my time at Pathology Queensland, I was able to observe and learn the many facets of a diagnostic laboratory, which I have never experiences before. I thoroughly enjoyed my time at Pathology Queensland's Gold University Hospital Laboratory and believe it was an invaluable learning experience.

I would like to thank all the staff members at Pathology Queensland and Griffith University for taking the time to teach me and giving me this valuable opportunity of learning.

Note on Student Membership Application Forms

The one-page form is currently for full-time students only and has to be signed by the Course Coordinator or an officer of the university. The two-page form is for all other applicants. Both forms are available at http://www.aims.org.au/membershipinformation/join

The **APACE** (**Australasian Professional Acknowledgement of Continuing Education**) scheme is a voluntary programme that recognises continuing education, formal courses and a wide range of professional activities which contribute to your professional growth.

The healthcare industry is undergoing rapid change. We are expected to keep our knowledge and skills up to date to enable us to perform to the highest professional standard. The **APACE** scheme provides a method by which your professional activities are recognised.

APACE has been approved by the **New Zealand Medical Laboratory Science Board** as a re-certification programme for **New Zealand Medical Laboratory Scientists**.

APACE has been approved by the **Royal College of Pathologists Australia** (**RCPA**) as a continuing professional development recognition programme for Fellows of the Faculty of Science.

For more information and to enrol visit http://www.aims.org.au/apace

'5 Minutes with Denise Jackson

1. Where do you work?
   I am a professor in laboratory medicine at RMIT University, Melbourne, Australia.

2. What do you like best about your current position?
   I am able to do teaching and research in laboratory medicine field. I play a major role in teaching students in the areas of Haematology and Transfusion and Transplantation Science. I mentor students and staff for their respective careers in laboratory medicine.

3. Do you believe that there will be any lasting changes to the Pathology industry in the post Covid-19 world?
   Yes, once this crisis is over there will be a time for reflection of the Pathology industry in the post Covid-19 world. How well prepared were we for this pandemic and putting in a crisis management plan in place for future generations for the next emerging pandemic. There has been recognition of staffing issues, fatigue of the industry, acquisition of new equipment and scaling up of testing together with validation of testing systems. Covid-19 pandemic has raised awareness of the community and politicians of the important role of Australian Pathology.

4. What future development/s direction/s in the industry are you excited about?
   - *Digital transformation in healthcare and artificial intelligence technologies will impact pathology areas.*
   - *New and emerging technologies for delivery of pathology services.*
   - *Certification of medical scientists and technicians is a positive step to maintain quality of the industry.*
   - *Integration and interface between laboratory information systems; initiatives like national antibody register would be beneficial in Australia.*

5. If you could invite any-one to dinner, alive or dead who would they be?
   Hon Gough Whitlam-He was an idea. He was a big thinker and disrupter that made a significant impact in Australia.

6. What has been your favourite holiday?
   Trip to Adelaide to spend time with my partner. Enjoyed the Barossa, Glenelg, Adelaide Hills and the relaxed lifestyle.

CORONAVIRUS-COVID19

A COMBINED SCIENTIFIC MEETING BROUGHT TO YOU BY THE

AIMS QUEENSLAND STATE BRANCH
&
QUEENSLAND TROPICAL DIVISION

Saturday 6th February 2021
Via Zoom
Link to be forwarded closer to the event upon RSVP

0900 – 1300 with short break 1100-1115

***Ms Ailie Ross*– Townsville Hospital Pathology Queensland**
Haematology Scientist

Prof Nigel McMillan*– Griffith University, *Gold Coast
Infectious Diseases Expert

***Dr. Mimi Yue*-Mater Health Queensland**
Clinical and Laboratory Haematologist

***Ms Fleur Francis* – Townsville Hospital Pathology Queensland**
Molecular Microbiology & Serology Scientist

Dr Chris Heather – Townsville University Hospital
Infectious Diseases Specialist and Clinical Microbiologist

Assoc Prof Donna Rudd – James Cook University
Clinical Biochemistry Scientist

Join Zoom Meeting:
https://us02web.zoom.us/j/82302067859?pwd=Vzh6amFYb1FrYnNwMThSQmNlZUZXUT09

Meeting ID: 823 0206 7859
Passcode: 601822

RSVP by 22/1/2021 @ 3pm AEST
There is a limit of 100 participants on first cum first basis

THIS FREE EVENT WILL EARN THE PARTICIPANTS 5 APACE CPD POINTS

Payment's in Seeds: A Novel Approach to Histology

Written by Arthur's Forrest (4th year Medical Laboratory Science Student)

Introduction:

Histologists, radiologists and pathologists are highly skilled and educated professionals who spend much of their lives studying the delicate structure of tissues. However, there could be an upcoming professional in your local park. A study from the University of Iowa found that pigeons (Columbia livia), who show some visual system similarities with humans, can identify benign from malignant tissues in a section of human breast tissue.

This novel idea of training pigeons to identify clinically significant medical images originated from the species long history of visual prowess. Pigeons have been found to recognize defective drug capsules, human expression, texture, colour, the alphabet and differentiate between Picasso paintings and Monet. Pigeons are even able to remember more than 1,800 different images. It is unsurprising as the pigeon's basal ganglia and pallial-striatal synapses are stimulated by visual stimuli in the same fashion that human neural pathways are.

Training

During training, the birds were shown a set of randomized training images 6 times. Depending on the experiment, they were trained with magnified, monochrome and compressed images. The birds were placed into a chamber with an LCD monitor with an AccuTouch touchscreen. At first, the screen would show a white square. After one peck within the square, a tissue sample image would appear. The pigeon was free to peck any area of the screen with the displayed tissue sample. If the pigeon did not identify the required feature of the image, the number of pecks needed for a correct response would rise. Once the pigeon identified the desired feature a yellow button and a blue button would appear to indicate if the tissue was benign or malignant. If the pigeon picked the correct response food would be delivered as a reward. The pellets were dispended into a food cup in the chamber. If the pigeon chose incorrectly no food would be delivered and would be corrected with a "correction trial". Once training was complete, the birds were tested with a new set of images and the correct and incorrect answers were collected for results, and no correction trials were completed.

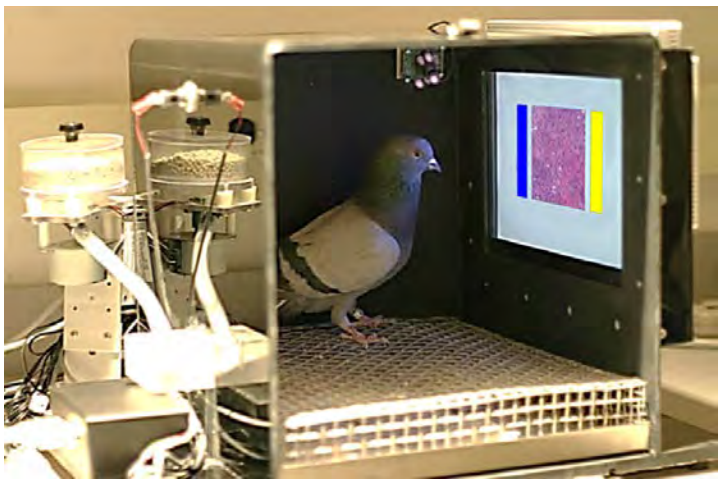


Figure 1: A pigeon in a training chamber.

The Experiments:

In one experiment the birds were tested with full-colour histopathology images of benign and malignant breast tissue histology. The birds were effective at recognizing benign from malignant cells in these images with 85% accuracy after 15 days of training. The study found that if the images were rotated the birds were only 77% correct but after 5 more days of training the birds were 83% correct when images were rotated and 88% when images were not rotated. Images were magnified at 4x, 10x and 20x. It was determined that the pigeons were equally accurate at classifying the abnormal cells when magnified. To determine if the pigeons were memorizing the images or if the pigeons were indeed recognizing key features of benign and malignant cells, a small sample of new images were added to the testing set. The birds were able to correctly classify these new images with 83% effectiveness. In another experiment monochrome, hue-normalised benign and malignant breast tissue images were used for testing and training. After 15 days of training, the pigeons showed a high level of accuracy, however, introducing new images to the test showed lower accuracy. In both cases, the pigeons showed a level of accuracy above 50% which would be expected if the results were a 50/50 chance. The pigeons were also tested with compressed images at two different compression levels, mixed into a set of the same images uncompressed. The pigeons were correct at identifying unaltered images at an average of 95%, and compressed images at 92% and 90% accuracy. Flock sourcing was also tested as if one pigeon could be an accomplished scientist, a pigeon group project might be more accurate. The pigeon flock were trained with a training set of 10 monochrome images. After training the pigeons were found to have a staggering 99% accuracy rate.

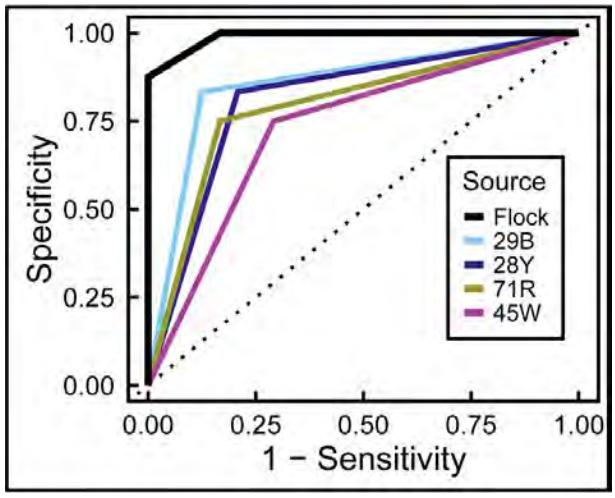


Figure 2: Flock sourcing - The pigeons individual choices have been summated to provide accurate identification of samples.

The pigeons were trained and tested on their identification of masses. This task seemed to be the most difficult for the pigeons. It took much longer for the birds to be able to learn the images in the training set. After 12 weeks of training, the pigeon pairs could identify masses in mammogram images at 80% and 60% accuracy. When trained and tested to detect microcalcifications in mammograms, pigeons were found to identify non-calcification sample images with 84% accuracy and calcification sample images at 72% accuracy. Human

Human radiologists in contrast were more accurate at identifying non-calcification sample images at a rate of 97% but were less accurate at identifying calcification sample images at a rate of 70%. In the defence of the radiologists, there were no pellet dispensers used during their testing.

The Issues:

Pigeons have a remarkable memory and can recall over 1,800 different images. To ensure the pigeon's ability to learn key features of the cells was tested and not the pigeons ability to memorise the images, altered and new images were introduced. The birds were able to identify these altered and new images with high accuracy. This indicates that the birds were able to discriminate between benign and malignant cell tissues without route learning the training images.

To account for the staining differing between samples, the images were altered and presented in full colour, monochrome and in some cases, a purple hue was overlayed to mimic natural variation. Malignant cells were often found to be darker with a higher contrast compared to benign cells which were paler. To prevent the birds from just learning to differentiate between brightness and contrast, the images were manually brightened, and contrast levels altered to remove as much difference between the benign and malignant samples as possible. Changing the colour, brightness and contrast of the images allowed the pigeons to learn key features of benign and malignant cells and identify the samples accurately.

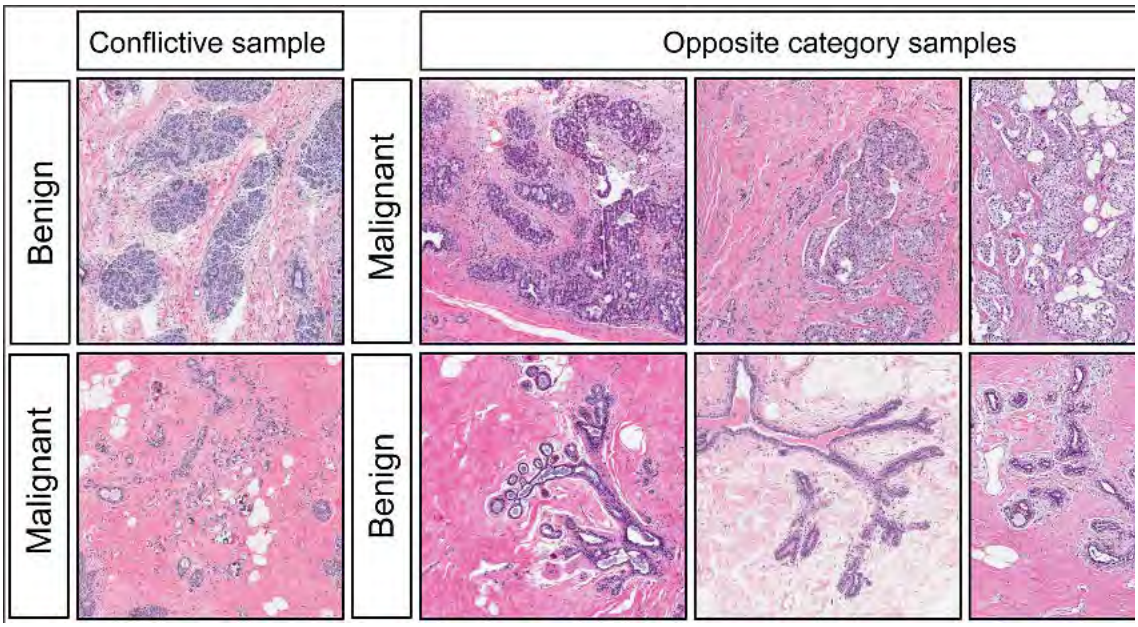


Figure 3: Examples of the pigeon's commonly misidentified images (left) compared to samples of the opposite category.

The pigeons did incorrectly identify some images, one example is a sample of benign breast tissue that was highly cellular which could be mistaken for malignant cells at low magnification. It seemed that all misidentified images followed this trend and had some similarities to the other category of cells. The errors are likely not random and could stem from these misidentified images having features not usually seen in the standard training set

for either benign or malignant cells. This indicates that pigeon students, much like human students should be exposed to a diverse range of specimens to ensure the greatest accuracy.

Discussion

These experiments concluded that pigeons performed with the highest accuracy when given full colour. Pigeons showed 85% accuracy when tested with full-colour images compared to 70% accuracy when tested with monochrome images. This indicates that key features and colour are beneficial for the birds when discriminating between malignant and benign cells. The pigeons performed with the highest accuracy when given uncompressed or lightly compressed images. Like humans, pigeons found highly compressed images harder to identify as compression lowers the overall quality and creates compression artifacts. Through differential reinforcement training, the pigeons were able to adapt to the image compression and performed accurately. Humans and pigeons perform better when presented with compressed low-quality images as they can ignore compression artifacts while computerized approaches may struggle.

When detecting mammograms with calcification the pigeons performed slightly better than the radiologist cohort. This might be due to the similarities between detecting small white specks against a complicated background and detecting seeds against the complicated background of their natural environment. In comparison, when trained to identify masses in mammograms only two pigeons performed on the same level as the radiologists at 80% accuracy. The other two pigeons only reached 60% accuracy. This in contrast to the other experiments were the pigeons all had similar rates of accuracy. This experiment indicates that the pigeons' route learned the position of the masses from the training set and did not learn the key features of the masses.

Conclusion

The pigeons were individually competent at identifying malignant and benign cells in breast tissue histology images, and as a flock were 99% accurate. Pigeons were more accurate than the radiologist cohort at detecting calcifications in mammograms but less accurate than the radiologists at identifying non-calcification samples. Pigeons performed poorly when identifying masses in mammograms. These accomplishments are likely due to the pigeon's natural survival mechanisms such as identifying seeds amongst a busy background. The study concludes that pigeons might be a suitable candidate for a medical image observer in perception studies which would negate the need to employ clinicians for this task. The study claims that using pigeons would be more cost-effective and could provide a higher statistical yield as the pigeons can be used in repeat studies and cases that humans might not tolerate. A new study from the University of Iowa has trained pigeons similarly to diagnose human cardiac disease from myocardial perfusion imaging. The birds could characterize the images and determine the degree of perfusion deficit in the images. As was discovered in the breast tissue cancer experiments, pigeons performed well with coloured images rather than monochrome. These studies further emphasize the potential usefulness of the pigeon's visual prowess. Despite the achievements of these pigeons, the chance of a bird taking your job is slim, but never zero.

Sources:

Pigeons (Columba livia) as Trainable Observers of Pathology and Radiology Breast Cancer Images by Richard M. Levenson et al.

Taking pigeons to heart: Birds proficiently diagnose human cardiac disease by Victor Navarro