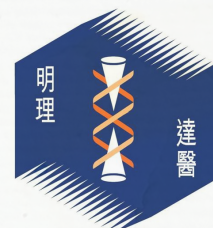


THE HONG KONG COLLEGE OF
PATHOLOGISTS



SCIENTIA ILLUMINAT MEDICINAM
香港病理學專科學院

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PATHOLOGUE

NEWSLETTER OF THE HONG KONG COLLEGE OF PATHOLOGISTS

Cover:

Mindfulness watercolour painting by Dr KWOK Ka Ki, Member of Young Fellows Chapter, named 'Robin'

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Message from the President

Wish you all a Happy New Year of the Rabbit.

Our College hosted our Annual General Meeting (AGM) and the Conferment Ceremony successfully in 2022 despite the COVID-19 outbreak. Congratulations once again to all the new Members and Fellows. We are very fortunate that Dr. Michael BUCKLEY, our Honorary Fellow and the speaker of the TB Teoh Foundation Lecture, has attended the event in person despite the restriction related to the outbreak. Dr. Buckley's enlightening lecture, "Exomes and Genomes: from Bedside to Bench-top", was very well received.

The 18th Trainee Presentation Session was also held on the same day of AGM. All the trainees who have participated in the session have done a great job, and congratulations to the winner Dr. Aden CHAN of Anatomical Pathology for his study "Combinations of Single Gene Biomarkers can Precisely Stratify 1,028 Adult Gliomas for Prognostication". Thanks to Dr. Derek YAU, Dr. Christopher LAI and to all the judges for making the session a success.

The continuing medical education/continuous professional development (CME/CPD) 3-year cycle 2020-22 has just ended, and a new 3-year cycle (2023-25) has started. On behalf of the Education Committee, may I remind our new Fellows that CME/CPD is important in your career development and future practice. Failed compliance may result in suspension of your Academy's Fellowship and your specialist registration status.

The coming year is a busy year for Training and Examinations Committee (TEC). TEC is currently engaging various Specialty Boards in the review of our training programmes. We are grateful for the advice we have received from our Academy's Educationist, Dr. SO Hing Yu. Concurrent with the training programme review exercise, our College is also planning to contribute to the development of training programmes for the SZ-HK Medical Specialist Training Centre. This is in support of the Academy's initiative to strengthen our collaboration with the Shenzhen medical profession.



Above:

Dr. Alexander CHAN presenting the Honorary Fellowship certificate to Dr. Michael BUCKLEY



Left:

Hong Kong Academy of Medicine 29th Annual Fellowship Conferment Ceremony and 2022 David Todd Oration (16 December 2022)

These few years have been challenging times for all of us. Other than taking care of our patients, we also need to take good care of ourselves and those around us. Academy has taken various initiatives to promote the well being of doctors. Helpful material is available in the Academy's website, and peer supporters (with some from our College) are ready to help. Our younger generation is encountering lots of challenges and uncertainties in life. As trainers and seniors, we should be supportive. On the other hand, I hope our younger members can also understand that the trainers are likewise facing unprecedented stress, but you should not hesitate to approach your seniors, colleagues or Academy's peer supporters in case of need.

The multifactorial manpower shortage issue has great impact on our specialty and other medical professions. Our College will work closely with the Academy, the Hospital Authority, and the government, on exploring various options to tackle the matter. Meanwhile, we hope all new Fellows can stay longer in the public sector, to contribute to the training of our next generation of Pathologists.

Regarding government's plan to explore empowering Chinese medicine practitioners (CMPs) to prescribe diagnostic imaging and laboratory tests for their patients, our College is working closely with our sister Colleges and the Academy to deliberate with the government and relevant parties. The Academy had a meeting with the Hong Kong Registered Chinese Medicine Practitioners Association on 16 January 2023, exploring the view of some CMPs.

Our College wishes to engage more young Fellows in College activity. After the establishment of the Academy's Young Fellows Chapter (YFC), we have set up our College's own YFC. Some of our young Fellows are currently members of our College Council and some College committees. We treasure their input and contribution, and it is essential for succession planning. Our current YFC Chairman, Dr. Ivy CHENG, is also in charge of our College

Facebook page. We hope to use this platform more often to share information, and your comment is most welcome. (<https://www.facebook.com/hkcpath/>)

The Academy's Conferment Ceremony was held on 16 December 2022. Congratulations to our new Academy Fellows and to Dr. Lois CHOY, our College trainee in Chemical Pathology who won the gold medal of the Academy's 2022 Best Original Research by Trainees (BORT) on that day.

International Pathology Day Workshop 2022 was held successfully on 17 December 2022. Dr. Rock LEUNG and his team have done an excellent job introducing our profession to over 200 secondary school students.

I represented our College to attend the Opening Ceremony of the New Territories (Shatin) Forensic Medicine Centre on 29 December 2022. The establishment of this new state-of-the-art facility is an important milestone for Forensic Pathology.

The year 2023 marks the 30th Anniversary of the Academy. The Tripartite Medical Education Conference on 14 January 2023 is the first of a series of celebration events, and Dr. MAK Siu Ming (Chairman of Training & Examinations Committee), Dr. Christopher LAI (Chairman of



Above:

Hong Kong Academy of Medicine Strategic Planning Retreat on Education and Training (4 March 2023)



Left:

HKAM Media
Spring Tea
Reception (3
February 2023)

Education Committee) and I have attended the conference. Dr. MAK and I have also joined the Academy's Strategic Planning Retreat on Education and Training on 4 March 2023, and it was a precious opportunity for experience-sharing amongst all Colleges and the Academy.

The next Academy's anniversary celebration event will be Health for All, Move Forward Together on 19 March 2023. Our College has formed a competition team for the run, and some College members have also registered for the event.

The Academy has resumed the annual gathering with the media this year. I attended the HKAM Media Spring Tea Reception held on 3 February 2023. It was a good opportunity for the Academy to highlight the latest development of the Academy and promulgate the Academy's view on some healthcare related policies and initiatives.

The next annual International Liaison of Pathology Presidents (ILPP) meeting has been planned to take place in Hong Kong in October 2023. Hong Kong was the hosting city in 2010. We look forward to hosting it once again after more than one decade.

With return to normalcy, I expect we shall be able to organise the long-overdue College annual dinner in 2023. I look forward to seeing you all.



Dr. CHAN Chak Lam, Alexander

President

March 2023



Grand opening of the New Territories (Shatin) Forensic Medicine Centre

Our president Dr. Alexander CHAN attended the grand opening of the New Territories (Shatin) Forensic Medicine Centre on 29 December 2022. At present, there are three public mortuaries operated by the Forensic Pathology Service of the Department of Health designated for specialised facilities for conducting medico-legal investigation of deaths that are reportable to the Coroner in accordance with the Coroners Ordinance. They are Victoria Public Mortuary (VPM), Kwai Chung Public Mortuary (KCPM) and Fu Shan Public Mortuary (FSPM). They also serve as training units for specialist trainees under the stream of forensic pathology, medical students and law enforcement officers in criminal investigation. Capacities for temporary storage of dead bodies have all along been strained during cold surges and recently exacerbated by the massive influx of deceased succumbed in the pandemic during 5th wave of COVID infection. The average length of storage of bodies in public mortuaries is estimated to be around 20 days, often pending administrative procedures of the court and application for a desired cremation slot. The issue of capacity in public mortuaries, therefore, have constantly drawn the attention of public. To address this concern, the Department of Health has put forward to re-provision FSPM at an adjacent site of around 6,600 square meters with increased body storage capacity from 216 to 830. This will cater for the caseload of New Territories East and Kowloon East in the coming decade.

The existing FSPM has been incorporated into the New Territories (Shatin) Forensic Medicine Centre

with enhanced quality of public mortuary service that meets the expectation in infection control, occupational safety and health standards. The 5-storey building of over 18,500 square metres included nine cold rooms and one deep freezer; eight autopsy suites for routine Coroner's cases, decomposing cases, homicide and suspicious cases, functional facilities including X-ray and Computed Tomography scan rooms, histopathology laboratory, body identification areas, suite for bereavement services and autopsy viewing rooms. There will be three indoor ceremonial halls to allow bereaved families to conduct memorial ceremony with dignity and privacy.

Vertical greening and planting would be provided in the building designed by Architectural Services Department. Together with the natural greenery surroundings, users and residents in the proximity are presented with a pleasant landscape upon visit. The use of natural lighting to public areas including waiting hall, interview room and resting lounge, through the curtain walls and big windows, have enhanced the integration with the outdoor landscape and natural settings. Dedicated selection of materials like sawn cut fair faced concrete walls, timber panels, copper claddings, glass block walls also create a heartwarming atmosphere for the next-of-kin.

Dr. FOO Ka Chung, Thomas
Member, Education Committee



Left:

From left to right:
Dr. KWOK Ka Ki, Dr. TSANG Chak Chi, Dr. FOO Ka Chung, Dr. CHIU Pui Yin, Amy (Controller, Regulatory Affairs, Department of Health), Dr. POON Wai Ming (Consultant Forensic Pathologist in-charge cum Council Member), Dr. CHAN Chak Lam, Alexander (President), Dr. LAI Sai Chak (Consultant Forensic Pathologist), Dr. LAM Wai Man, Joey.



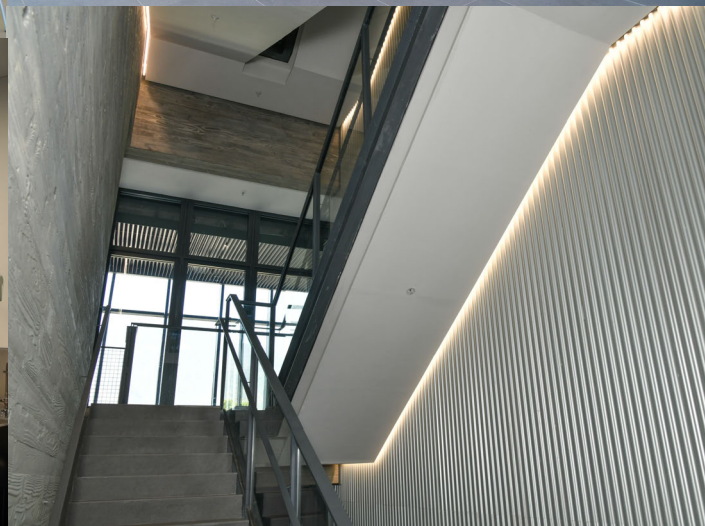
Above:

Dr. Alexander CHAN, President, officiating the ceremony

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| 1 | 2 |
| 3 | 4 |
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Right page:

1. Built-in ceremony garden for families handling funeral matters
2. External view of the newly commissioned Forensic Medicine Centre
3. Public waiting hall designated to receive families pending Coroner's procedures
4. Lift lobby on the first floor
5. Modernised facilities in autopsy room for effective medicolegal investigations
6. Selection of construction materials along the staircase creating a natural harmonised feeling among the bereaved
7. Viewing rooms dedicated for autopsy teaching
8. The use of multi-slice computed tomography (MSCT) has markedly enhanced diagnostic ability in postmortem setting





Tripartite Medical Education Conference - Actualising the Curriculum Continuum

The Tripartite Medical Education Conference was held in the Hong Kong Academy of Medicine Jockey Club Building on the 14th and 15th of January, with the theme “Actualising the Curriculum Continuum”. The conference was the flagship event, jointly organised by the Hong Kong Academy of Medicine and the two local medical faculties to celebrate its 30th anniversary. There were more than 300 registrants and everyone was overjoyed to see the Run Run Shaw Hall filled with delegates once again.

The two-day program was packed with lectures, symposia, and workshops covering the latest developments in both undergraduate and postgraduate training, preparing tomorrow's doctors along the continuum of their professional journeys from medical students to specialists.

The opening ceremony was officiated by Prof. LO Chung Mau, Prof. CHAN Ka Leung, Francis, Dr. LEE Pui Wah, Pamela, and Prof. LEUNG Ka Kit, Gilberto. Next up was the round table discussion titled “Ten Years Down the Line” hosted by Prof. Paul LAI. The session was exceptionally inspiring.

All speakers addressed the unavoidable change in medicine that brought along with the rapid pace of technological advancements. Prof. Francis CHAN emphasised the need of holding on to the human touch and the importance of role models. Dr. Pamela LEE discussed details on megatrends and encouraged the audience to embrace technology with a humanistic approach. Dr. Tony KO marvelled at the adaptability of our young generation but emphasised the importance of adopting good attitudes. Prof. Gilberto LEUNG emphasised the continuum of medical education from universities to hospitals and in the community.

Heavyweight overseas speakers gave plenary lectures virtually. Dr. Ajit K. SACHEVA from the American College of Surgeons gave his expert view on coaching and highlighted the difference between coaching and mentoring. Prof. Richard FULLER from the United Kingdom gave an excellent lecture on supporting effective transitions across health profession careers. Prof. Collin MELVILLE from the General Medical Council of the United Kingdom gave an overview of accrediting a medical school program. Prof.

Elizabeth MOLLOY from the University of Melbourne gave an excellent talk on developing feedback literacy of learners across the medical education continuum. Feedback literacy was a hot topic this year, with Prof. David CARLESS from the University of Hong Kong, an internationally renowned expert on the topic of feedback literacy, giving an excellent lecture in person on promoting feedback seeking as a core aspect of feedback literacy.

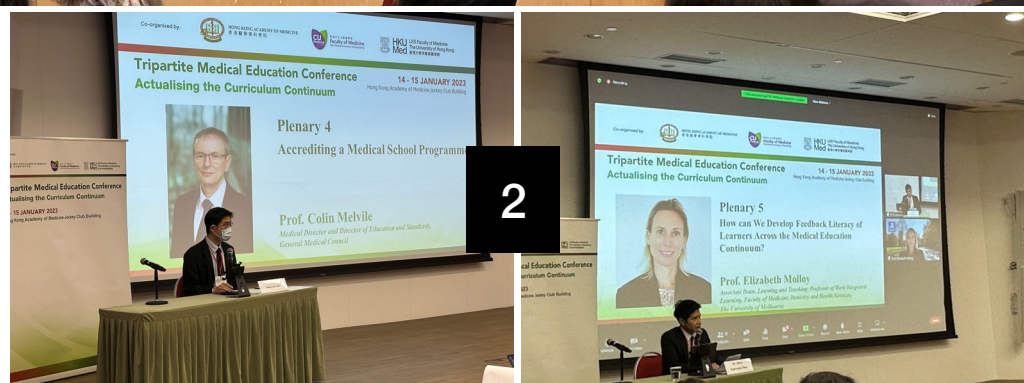
The two-day symposium was also packed with parallel sessions covering internship training, challenges of training in the light of COVID-19, workplace-based assessment, curriculum design, well-being, and mindfulness. The session on A.I. and medical education were particularly inspiring. The advance in technology has undoubtedly changed our lifestyles and the way we communicate. The rise of Chatbots and A.I. tutors will change the way we teach and learn. As Dr. Pamela LEE rightly pointed out in her talk “Information is no longer monopolised by doctors”. We as medical educators and teachers

have to modify the ways we teach to stay competitive amid the current A.I. revolution.

The speaker of Halnan Lecture this year was Dr. SO Hing Yu. Dr. SO is currently the President of the Hong Kong College of Anaesthesiologists, and the Educationist of the Hong Kong Academy of Medicine. His inspiring talk titled “Postgraduate Medical Education: See One, Do One, Teach One...What Else?” was absorbing and well received by the audience.

The conference was a huge success and we look forward to future events organised by the HKAM during the year-long celebration of its 30th Anniversary.

Dr. LAI Koon Chi, Christopher
Chairman, Education Committee



Above:

1. Round table discussion
2. Plenary lectures
3. Dr. Christopher LAI (Vice-President; Chairman of the Education Committee), Dr. Alexander CHAN (President), Dr. MAK Siu Ming (Vice-President, Chairman of the Training & Examinations Committee)
4. Presentation by Dr. SO Hing Yu



Learning OnLine Educator Course organised by HKJC Innovative Learning Centre for Medicine (ILCM) of the Academy

The first Learning OnLine (LOL) course was held on 12 December 2021 and 17 January 2022. It was a 'taster' course and attended by members of e-HKAM Task Force, consisting of representatives from all 15 colleges with Dr. Christopher LAI representing our College. The objectives of the course were to equip learners with essential knowledge and skills for effective online or blended training programs through a social constructivistic approach, to develop online modules, and to practice online practice skills.

Although it was held online, there were extensive interactions between teachers and learners, with constant feedback and facilitation. Activities started one week before the first online class. Learners experienced a flipped-classroom approach with an extensive reading list supplemented by intensive interactions through active discussions led by facilitators with 4-6 learners per group through WhatsApp groups.

Experiential learning was continued throughout the course. There was a close collaboration between group members and members were required to prepare online teaching materials utilising skills learned. Skills in briefing and debriefing online, the best utilisation of Zoom and other platforms.

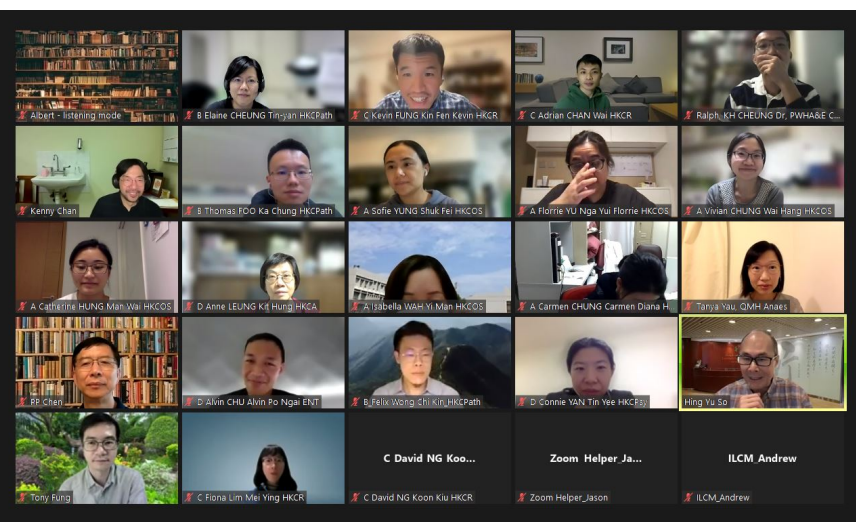
The course content was packed with important teaching and learning theories. The three interdependent elements of the Community of Inquiry (COI) Framework of Social Presence, Cognitive Presence, and Teaching Presence were introduced and practiced. The concept of Cognitive theories of multimedia learning was introduced. Different E-learning technology gadgets for different modes of teaching including synchronous vs asynchronous modes and their respective advantages and limitations were presented. Concepts of data security and copyright including the Pillars of Information

Security of confidentiality, integrity, and availability were also discussed.

All in all, this was an invaluable learning experience that enhances one's teaching skills, both online and offline. Please stay tuned for similar courses organised by the HKJCILCM.

Education Committee also nominated trainer representatives from various pathology subspecialties to join this course (from September to December 2022), including Dr. Rock LEUNG (Haematopathology), Dr. Leo LUI (Microbiology),

Dr. Thomas FOO (Forensic Pathology), Dr. Felix WONG (Chemical Pathology) and Dr. Elaine CHEUNG (Anatomical Pathology).



This is a well-organised learning journey covering in a nutshell the key elements of effective online education. From the more conceptual side of cognitive theory of multimedia learning, to practical suggestions of enhancing social and teaching presence, as well as useful tips on how to make use of software like Edpuzzle and Mentimeter to enable a more interactive and lively learning experience, the course materials will continue to serve as a great reference that I may review from time to time.

Dr. Leo LUI, Clinical Microbiology and Infection

The course has opened my eyes to educational theories and how to apply them in e-learning using online tools. I feel better equipped to become a teacher and trainer for my trainees after finishing the course. I would like to express my gratitude to the organiser for their structured and well-organised work.

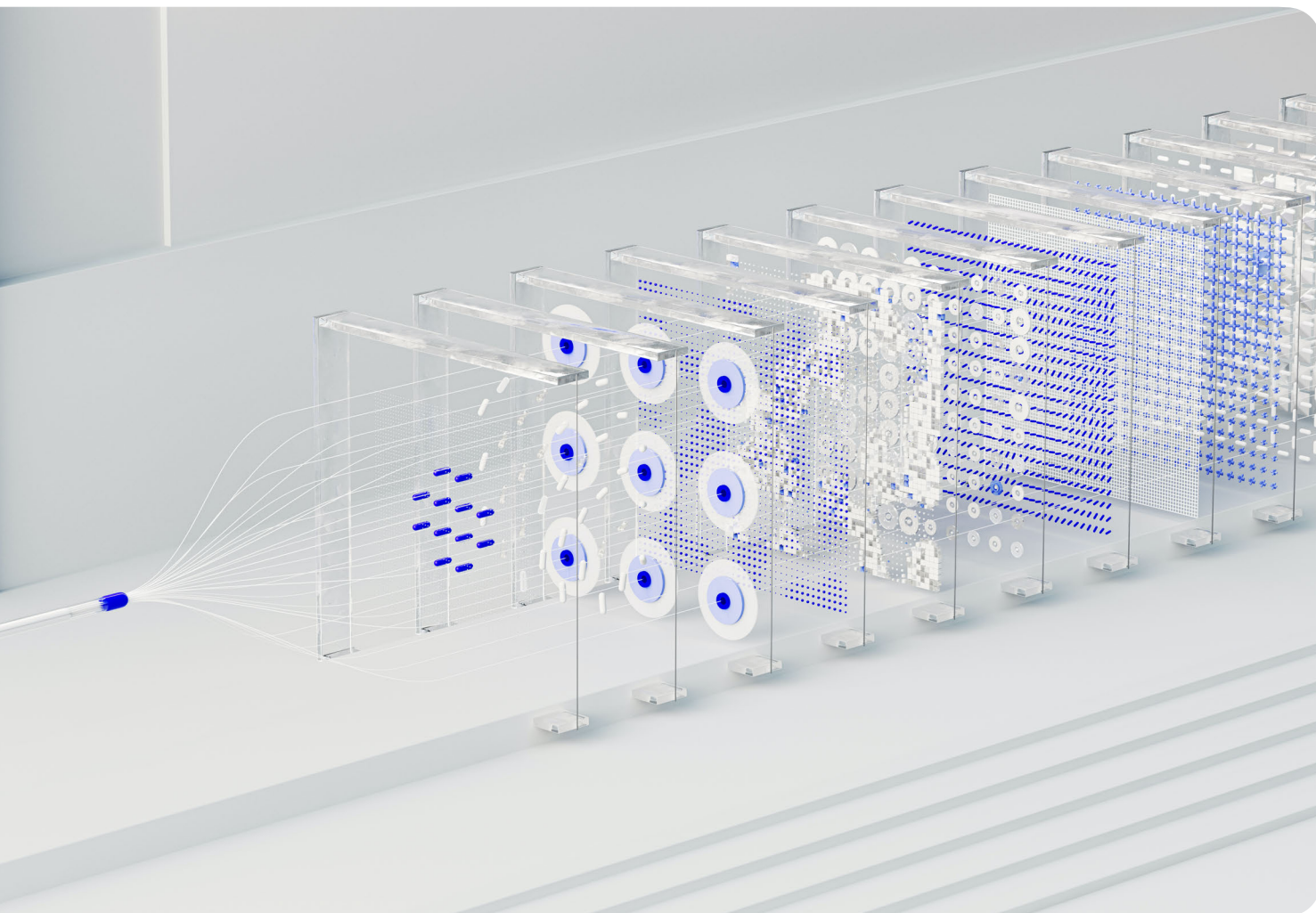
Dr. Felix WONG, Chemical Pathology

The pandemic has led to significant challenges to the traditional mode of teaching which medical students and trainees were deprived of precious hands-on exposure to various clinical subjects and skills; and our College was never immune from that. Mortuary visits were suspended and learners did not have sufficient exposure to appreciate the gross pathology of freshly eviscerated organs. While lectures could be delivered online through pre-recorded clips, feedback was not available to teachers and most students would find themselves not concentrating enough when being confined at home in the presence of various forms of distractions. While tutorials could be delivered via online platforms during scheduled school hours, students would find themselves not confident enough to present their ideas in front of the screen with minimal interactions. The Learning Online Educator course offered by the Academy allowed specialty trainers to grasp the appropriate methodology in designing appealing and flexible courses delivered in a virtual format, while maintaining the ability to monitor trainees' progress continuously through digital assignments with tailored feedback by instructors. This teaching essentially motivates them to achieve a state of self-perpetuated learning, which is something expected after attaining postgraduate qualifications.

Dr. Thomas FOO, Forensic Pathology

As a trainer in Anatomical Pathology interested in Information Technology application, I have found this online interactive course a good example of how to conduct e-learning courses for medical practitioners. Although there were no face-to-face sessions, the course organisers had great social presence and we had the chance to meet participants from different specialties and collaborate with them on multiple small projects to understand more about e-learning. The group discussions and feedback from tutors were also helpful.

Dr. Elaine CHEUNG, Anatomical Pathology



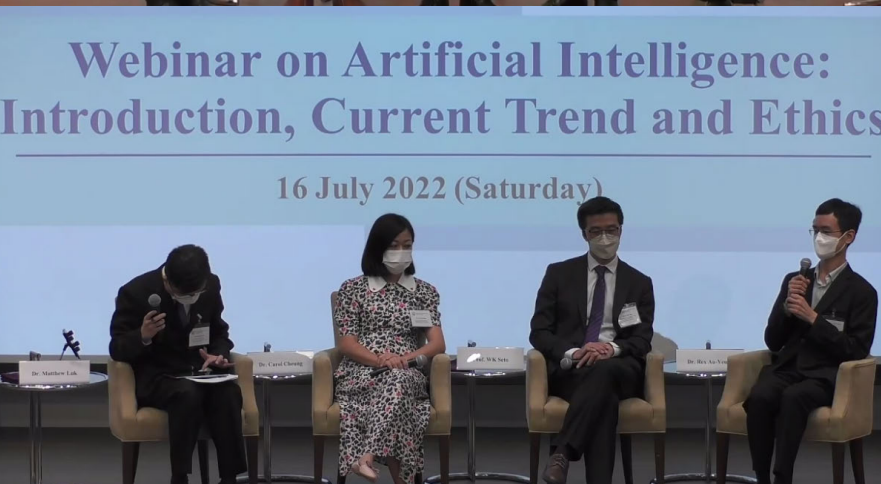
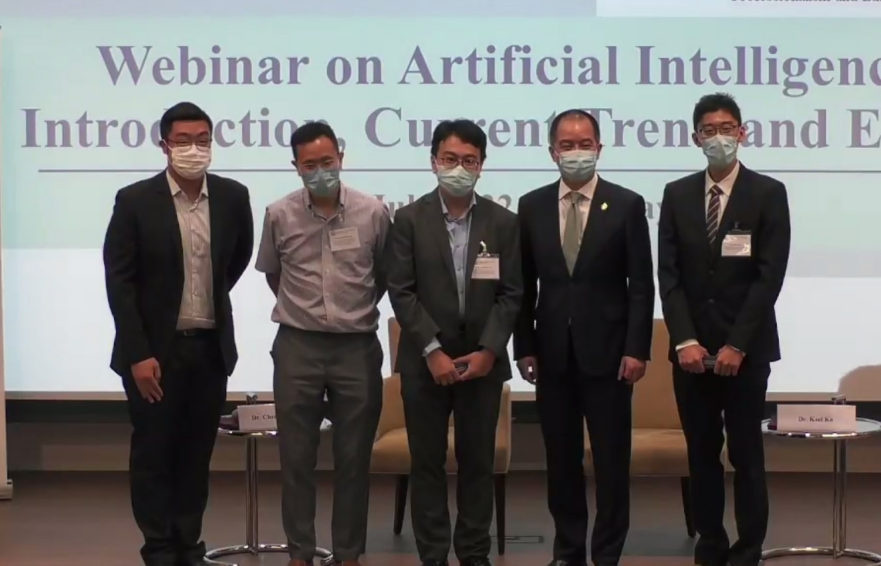
Created by Christoph Schramm using Artificial Intelligence by Google DeepMind on Unsplash

Webinar on Artificial Intelligence: Introduction, Current Trend and Ethics

On 16 July 2022, the Task Force on Artificial Intelligence of the Professionalism and Ethics Committee, the Hong Kong Academy of Medicine organised a Webinar on Artificial Intelligence: Introduction, Current Trend and Ethics.

A full-day programme starting with welcome remarks by Prof. Gilberto LEUNG, President and Co-chairman, PEC, HKAM. “AI Fundamentals for Healthcare Professionals” was presented by Prof. Phillip YU, Professor of the Department of Mathematics and Information Technology, The Education University Hong Kong. Dr. LUI Chun Tat, Consultant, Department of Accident and

Emergency, New Territories West Cluster, presented on “Implementation of Clinical Artificial Intelligence and Big Data Analytics Model in Smart Hospital: Experience Sharing from the Tin Shui Wai Hospital”. Various radiologists from Hong Kong, shared with the audience on their views on bringing AI into clinical practice including implementation of intracranial haemorrhage screening with AI locally. Dr. Neeraj MAHBOOBANI, Convenor, Task Force on Artificial Intelligence, PEC, HKAM, presented on “AI and Radiology Value Chain”. Experts in other specialties, including Family Medicine, Ophthalmology, General Surgery and Internal Medicine, shared their insights on the topic.



HKU Med
LKS Faculty of Medicine
Department of Pathology
香港大學醫學院

Computational Pathology: The Application of Artificial Intelligence and Digital Image Analysis in Histological Diagnosis

Rex KH Au-Yeung
HKAM Webinar on Artificial Intelligence
16 July 2022



Above (left to right, top to bottom):

1. Some of the speakers for the Webinar
2. Group photo taking with presentation of souvenirs to the speakers
3. Roundtable discussion of topics relating to Artificial Intelligence
4. Presentation by our College representative in the Task force, Dr. AU YEUNG Kwok Him Rex

In the Webinar, Dr. AU YEUNG Kwok Him, Rex, the College representative in the Task Force, gave a presentation titled “Computational Pathology: The Application of Artificial Intelligence and Digital Image Analysis in Histological Diagnosis”. In the presentation, Dr. AU YEUNG introduced to the audience on the different types of computer-assisted pathology diagnosis, quantification of immunohistochemistry markers by computer programs, examples of automatic histology classification by neural networks, and spatial analysis of tumour and microenvironmental cells as an emerging field of research.

Aside from local speakers, sharing from international speakers also enriched the webinar. Prof. Christopher AMES, Neurological Surgery, UCSF Weill Institute for Neurosciences, USA, presented on “The Role of AI and Big Data in

Process Improvement for Adult Deformity Surgery: A Six Sigma DMAIC Analysis”. Dr. Colin MITCHELL, Head of Humanities, PHG Foundation, UK, shared on “AI in Healthcare: Trends in Law and Policy in the UK and Europe”. Dr. Calvin HO, Co-Director, Centre for Medical Ethics and Law, The University of Hong Kong, presented on ‘Digitisation of Healthcare: Quo Vadis?’.

Overall it was a fruitful introductory webinar introducing us to concepts of Artificial Intelligence, an important field to be explored and embraced in modern pathology practice.

Dr. CHEUNG Tin Yan, Elaine
College Webmaster & Chief Editor



From Young Fellows Chapter: Well-being - More than happiness?

Well-being is attained little by little, and nevertheless is no little thing itself. Quality patient care and doctors' well-being go hand in hand. As trainees or specialists in pathology, our duties are to provide quality care, collaborate with other disciplines and look after the health of patients and the community, and we can do these well only if we are willing and able to look after ourselves and each other.

In our evolving medical system, apart from clinical duties of various cases, we are expected to actively participate in meetings, laboratory management duties and hospital administrative tasks. Our jobs as pathologists may be busy or even hectic, but we should also spend some time to grasp the opportunities for personal development, and to enjoy other areas of life.

Our College aligns with the active advocacy of well-being by the Hong Kong Academy of Medicine ("HKAM"). College representative joined the well-being taskforce by HKAM, at which HKAM has promulgated a Well-being Charter

committed to cultivating and promoting well-being of Academy fellows and specialist trainees of Academy Colleges.

Peer support scheme

We all have ups and downs during career development. Peer support is a way of giving and receiving support. It is not a therapy but it offers temporary social support as empathic and non-judgemental listening from a colleague. It is entirely confidential and voluntary.

The HKAM has launched the peer support scheme since last year, which is a voluntary programme for Academy fellows and specialist trainees to offer or find support through informal communication that may be beneficial to mental well-being. A number of our College fellows joined the Peer Support Scheme and have become peer supporters.

Dr. CHENG Shui Ying

Council member

Chairlady, Young Fellows Chapter



Left:

Three of the peer supporters of our College participated in the training programme organised by the Hong Kong Academy of Medicine

From left to right: Dr. WONG Wing Cheuk, Prof. CHEUNG Nga Yin, Annie, Dr. CHENG Shui Ying

For the complete list of peer supporters, please refer to <https://well-being.hkam.org.hk>

Mental Health Tips for Pathologists

- Addressing negative cognitions - It may be tempting to suppress the negative emotions and numb ourselves with more work, but this may not be sustainable in the long run.
- Validating yourself and each other - Remind yourself that no one is perfect and that everyone has his or her limits. Focus on what you can control. Pay attention to things that are going well.
- Time out - If your emotions become difficult to contain, take a short break from the source of stress.
- Mindfulness skill and deep breathing exercise (Please see well-being website by HKAM for more details.)

Mindfulness painting (opposite page):

Serene watercolour painting in Spring 2023 by Dr KWOK Ka Ki, Member of Young Fellows Chapter, titled '**Sunrise**'.



Left:

QR code for well-being website by the Hong Kong Academy of Medicine

International Pathology Day Workshop 2022

To commemorate the International Pathology Day 2022, the College organised the International Pathology Day Workshop 2022 at Student Laboratories, 2/F, Block T, Queen Mary Hospital on 17 December 2022 to promote public understanding of pathology and to engage the future generation to the meaningful roles of pathology disciplines in healthcare. The theme of “How Pathologists Save Lives!” was adopted for the workshop this year. Around 200 students from 41 local secondary schools attended the occasion. After a warm welcome and introduction of pathology disciplines by our College President, Dr. CHAN Chak Lam, Alexander, attendees were divided into seven groups to learn about the practice in the seven disciplines of pathology by rotation. An inaugural station dedicated to Genetic and Genomic Pathology was included this year to represent the recent inception of the discipline in the College and to address the interests of the attendees in genetics and genomics. From the lively demonstrations and hands-on practical sessions, the attendees interacted with pathologists from all disciplines to learn about discipline-specific technologies and testing principles, acquiring a basic understanding of the work nature of pathology.

The Professional and General Affairs Committee would like to thank its members and dedicated volunteers from various pathology disciplines for the success of the event this year.

Dr. IP Ho Wan

Honorary Secretary, Professional and General Affairs Committee



Left:

Workshop poster outlining the seven disciplines of pathology and their discussion topics in the workshop



Above:

Workshop poster outlining the seven disciplines of pathology and their discussion topics in the workshop



Left:

Agar plates decorated with Christmas drawings in the Clinical Microbiology and Infection station

Right:

Inaugural station for Genetic and Genomic Pathology



Members' Laurels

In recognition of their dedicated effort and outstanding community service, especially in combatting the COVID pandemic, some members of our College have received awards by The Government of the Hong Kong Special Administrative Region in July 2022.

Medal of Honour (MH)

Dr. LEE Cheuk Kwong

Chief Executive and Medical Director, Hong Kong Red Cross Blood Transfusion Service



Dr. LUNG David Christopher

Consultant Pathologist, Queen Elizabeth Hospital

Justice of the Peace (JP)

Dr. LUK Wei Kwang

Consultant Pathologist, Tseung Kwan O Hospital

Chief Executive's Commendation for Community Service

Prof. CHAN Kay Sheung, Paul

Professor (Clinical), Department of Microbiology, The Chinese University of Hong Kong



Dr. CHAU Ka Yee

Consultant Pathologist, United Christian Hospital

Dr. LAM Yiu Wing, Jimmy

Service Director/Chief of Service, Department of Clinical Pathology, Pamela Youde Nethersole Eastern Hospital

Dr. TANG Wai Lun

Consultant Pathologist, Pamela Youde Nethersole Eastern Hospital

Dr. TSE Wing Sze, Cindy

Chief of Service, Department of Pathology, Kwong Wah Hospital/Wong Tai Sin Hospital/Our Lady of Maryknoll Hospital

Dr. WONG Lap Gate, Michael

Director (Quality & Safety), Hospital Authority Head Office

Chief Executive's Commendation for Government/ Public Service

Dr. POON Wai Ming

Consultant Forensic Pathologist i/c, Department of Health



Congratulations to the above members for their contribution to public health protection and the community!

Panel of Examiners 2022

Anatomical Pathology (Fellowship Assessment)

(From left to right):
Dr. MAK Siu Ming
(Deputy Chief Examiner), Prof. TO Ka Fai (Chief Examiner), Dr. CHAN Wai Kong, Prof. Richard WILLIAMS (External Examiner, on screen), Dr. LAM Woon Yee, Polly, Prof. CHEUNG Nga Yin, Annie, Dr. CHAN Ngot Htain, Alice, Dr. LO Wing Ip, Anthony



Anatomical Pathology (Membership Examination)

(From left to right):
Dr. LAM Wing Sun, Prof. KHOO Ui Soon, Dr. MAK Siu Ming (Deputy Chief Examiner), Prof. Richard WILLIAMS (External Examiner, on screen), Prof. TO Ka Fai (Chief Examiner), Dr. CHAN Kui Fat, Dr. KAN Nim Chi, Amanda and Dr. FUNG Ngai Sheung





Chemical Pathology (Fellowship Assessment)

Front (from left to right):

Dr. TAI Hok Leung, Morris,
Dr. SHEK Chi Chung,
Dr. CHEN Pak Lam, Sammy (Chief Examiner),
Dr. CHAN Ho Ming,
Dr. POON Wing Tat
Back:
Dr. Alan McNEIL
(External Examiner)

Genomic and Genetic Pathology

Front (from left to right):

Dr. CHONG Yeow Kuan,
Dr. YUEN Yuet Ping, Dr. CHEN Pak Lam, Sammy (Chief Examiner),
Dr. POON Wing Tat
Back:
Dr. Alan McNEIL (External Examiner)





Forensic Pathology

(From left to right):

Dr. CHIAO Wing Fu, Dr. POON Wai Ming (Chief Examiner), Prof. BEH Swan Lip, Prof. Noel WOODFORD (External Examiner), Dr. LAM Wai Kwok, Dr. FOO Ka Chung



Haematology

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Clinical Microbiology and Infection

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(From left to right, top to bottom):

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Congratulations!

We are pleased to announce that the following candidates have passed the Fellowship Assessment or Membership Examination. Congratulations!

Fellowship Assessment - Anatomical Pathology

CHEUNG Chun Kei
LAI Shui Wun
LAM Man Wah
LEUNG Ho Wai
SO Yik Ka
TSANG Cheuk Ho
WONG Yuen Sze, Sivia
WONG Tak Siu
YUEN Karen Ka Wan

Fellowship Assessment - Chemical Pathology

CHAN Yim, Candace
LING Tsz Ki
TONG Hok Fung

Fellowship Assessment - Clinical Microbiology and Infection

LI Xin
SZE Kin Ho
TSANG Yat Ming

Fellowship Assessment - Haematology

LAM Wing Kit

Fellowship Assessment - Genetic and Genomic Pathology

CHEUNG Ho Kwan, Alvin
KWONG Hoi Yi, Joyce
LI Xiuling
WONG Chi Kin, Felix
WONG Hung Fan

Membership Examination - Anatomical Pathology

CHAN Ka Yin
HO Cheuk Lam
HO Tin Wai
LAM Ping Hei
LI Hung Wai
LOONG Chi Wang
LUI Yin Wing
NG Hoi Yi, Dorcas
TSANG Chui San, Zara
YUEN Wing Nam

Membership Examination - Haematology

YEUNG Ka Pik, Vivian



Editorial note:

The complement system though commonly regarded as component of the innate immune system that protect our bodies from infection, it is increasingly evident that it has important roles in other immune surveillance and housekeeping functions, involving in a wide and diverse range of clinical conditions. In this review, Dr Elaine Au provided an overview of the complement diagnostics and its clinical applications. We welcome any feedback or suggestions. Please direct them to [Dr Elaine Au](#) of Education Committee, the Hong Kong College of Pathologists. Opinions expressed are those of the authors or named individuals, and are not necessarily those of the Hong Kong College of Pathologists.

Topical Update: A Review on Complement Diagnostics

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The Hong Kong College of Pathologists, Incorporated in Hong Kong with Limited Liability


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The complement system not only as part of the innate immune system that contributes to the elimination of pathogens, and promote inflammation, it also modulates the adaptive immune response. Though its primary role is in host defence, it also serves an important role in clearance of apoptotic cells and immune complexes. Low or dysregulated activity in complement system has been described in a range of disease and pathological conditions.

The Complement system

The complement system comprises approximately 50 proteins, that are found in fluid phase or bound to cell surface (2). The central complement reaction involves the cleavage of C3 into C3b and C3a, which is promoted by the C3 convertase. Collectively, there are three activation pathways forming the C3 convertase. The classical pathway (CP) is triggered by the immune complexes, while the lectin pathway (LP) is triggered by the binding of mannan-binding lectin (MBL) or ficolins to carbohydrates or



pathogen-associated molecular patterns. Both activation of CP and LP would lead to the formation of C4b2a as C3 convertase. On the other hand, in the alternative pathway (AP), there is a constant low-grade hydrolysis of C3, that binds factor B and cleaves factor D to generate a fluid phase C3 convertase, that is self-limited in healthy state. However, the AP will be activated and amplified through binding of the cleaved C3 to pathogens or altered tissues. Hence, AP helps to amplify complement activation initiated from CP and LP. The pathways converge in a common pathway to form the membrane attack complex (C5b-9). In addition, the cleavage of C3 and C5 generates C3a and C5a, that act as anaphylatoxins, while the target bound C3 fragments (C3b, iC3b, C3dg) facilitate phagocytosis.

The complement activation is delicately controlled by multiple soluble and membrane bound regulators. Factor H, C4b binding protein, the membrane proteins complement receptor 1 CR1 (CD35), decay acceleration factor (CD55), and membrane cofactor protein MCP (CD46), act as cofactors for plasma proteinase factor I, accelerating the decay of convertases. In addition, CD59 and C1 inhibitor regulate the C5b-9 complex and the C1 complex respectively.

Examples of complement diagnostics indications and associated disease conditions


A broad spectrum of clinical conditions is associated with complement deficiencies or its overactivation / dysregulation. The clinical consequences can be broadly categorised into three areas. 1) susceptibility to infection, 2) autoimmunity and 3) defects in controlling and limiting complement activation.

Infection susceptibility

In general, complement deficiencies are associated with increased risk of infections, especially encapsulated bacterial infections, most commonly *Pneumococci*, *Haemophilus* etc. In particular, individuals suffering from deficiencies in the terminal components (C5-C9) or properdin are susceptible to *Neisseria* infections. Hence, complement studies are indicated in the workup of young individuals suffering from recurrent infections (e.g. recurrent sinopulmonary infections, meningitis, etc), especially in recurrent infections caused by encapsulated bacteria. Nevertheless, primary component deficiency is rare, and most of these conditions are autosomal recessive (X-linked inheritance in properdin deficiency) (1).

Autoimmune diseases

Deficiency in early components of the CP, is frequently associated with lupus like autoimmune conditions. The associations range from 10% prevalence of lupus like conditions in C2 deficiency, to C1r/s (57% prevalence), C4 (75% prevalence) and C1q (90% prevalence) (2). These deficiencies can be confirmed in genetic studies and components measurement. Overall, primary deficiency is relatively uncommon. More often, lupus and other autoimmune immune complex diseases causes secondary complement components deficiency as consumption due to the immune complex activation. The component levels, e.g. C3 and C4 levels, are commonly employed in the workup and disease activity monitoring in these conditions. In some occasions, measuring autoantibodies, such as anti-C1q antibody in hypocomplementemic urticarial vasculitis syndrome (HUVS) and lupus, is useful for diagnosis and prognostication.



C3 nephropathy and Thrombotic microangiopathy (TMA)


Uncontrolled AP activation may result in a number of kidney diseases and systemic conditions. C3 glomerulopathy comprises C3 glomerulonephritis (C3GN) and dense-deposit disease (DDD), a pathological condition defined by predominant C3 accumulation, with absent or scanty immunoglobulin deposition. Atypical post infectious glomerulonephritis also falls in the continuum of C3 GN and DDD (3). In these conditions, underlying predisposition, be it genetic or acquired, may not be clinically evident until a triggering event, such as infection or pregnancy, that unfold the complement dysregulation. Besides genetic predisposition, presence of autoantibodies, e.g. C3 nephritic factor (C3 Nef), anti-factor H, have been observed in some patients. C3 Nef are autoantibodies that bind to components of AP convertase, prolonging its functional half-life, leading to continuous C3 activation and consumption, with lowish CP and AP studies. Factor H has important role in the regulation of complement activation. In some patients, they are predisposed to the disease due to Factor H dysfunction caused by mutation or anti-Factor H. Useful workup for C3 nephropathy includes the complement pathways, components and activation products studies, testing for plasma cells disorders, determination of autoantibodies (C3 Nef, anti-factor H), along with gene panel (C3, *CFH*, *CFI*, *CFB*, *CFHR1-5*) testing (3).

aHUS is a primary TMA, that is characterised by uncontrolled AP activation, presenting with microangiopathic haemolytic anaemia, thrombocytopenia and acute renal failure. The dysregulated AP could be caused by mutations of complement regulators, most commonly factor H, and in around 6-10% of cases, by the presence of anti- factor H (4). Initial workup includes investigations to exclude other co-existing medical conditions associated with HUS or other forms of TMA. Similar to the workup of C3GN, checking the complement pathways, components and activation products, along with anti-factor H and genetic testing (*C3*, *CFH*, *CFI*, *CFB*, *MCP*, *CFHR1-5*, *THBD*, *DGKE*) are useful.

TMA leads to generalised endothelial dysfunction, that can progress to multiorgan injury. Apart from primary causes, some disease or medical conditions may predispose to TMA. In particular transplant associated TMA (TA-TMA) has been an important clinical entity, that carries high mortality and morbidity. Recent literature has shown that complement pathway dysregulation may play a role in the process. The pathogenesis in TA-TMA is complex, that multifactorial factors contribute to the endothelial injury and pathological process. Complications related to transplant, including GVHD or infections, may also stimulate the complement pathways. Complement blockage therapy, e.g. eculizumab, is useful in managing complex cases. After workup to exclude other potential differential diagnoses, risk assessment is important. Although not all patients with TA-TMA will have elevated sC5b-9, patients with elevation are at increased risk of death from TA-TMA (5). Hence, the activation product measurement has been used as risk stratification for consideration of complement blockade therapy (4,6).

Paroxysmal Nocturnal Haemoglobinuria (PNH)

PNH is a rare acquired disorder, that patients suffered from haemolysis with acute exacerbations, leading to anaemia, bone marrow failure and increased risk of thrombosis. PNH arises from an expanded clonal proliferation of haematopoietic cells with somatic mutations of the X chromosomal gene *PIG-A*. Lack of *PIG-A* resulted in inability to bind GPI-anchored proteins, including the membrane bound complement regulators, DAF and CD59. As a result, cells having the mutation are susceptible to complement mediated intravascular haemolysis. Assessing the surface expression of CD55 and CD59 is helpful for the diagnosis.



Inherited and Acquired C1 inhibitor deficiency

Hereditary angioedema (HAE) and acquired angioedema (AAE), are rare diseases caused by C1 inhibitor deficiency. As a result, unregulated bradykinin formation leads to angioedema. HAE is an autosomal dominant condition, with majority of cases suffered from reduced concentration (Type I) or less commonly, reduced function (Type II), of C1 inhibitor. Some patients may have similar clinical presentations as HAE cases, but as an acquired condition due to the presence of autoantibodies against C1 inhibitor. These patients usually present at an older age, and may have underlying haematological malignancies or autoimmune conditions as predisposition. The diagnosis of HAE is based on C1 inhibitor and C4 measurement. It is important to include both antigenic and functional assays for C1 inhibitor, since around 15% of cases may have normal or elevated dysfunctional C1 inhibitor protein (Type II). Furthermore, serum C1q concentrations can be used to differentiate HAE from acquired angioedema (AAE) as the latter is characterised by decreased C1q antigen concentration and autoantibodies against C1-INH. Genetic analysis for *SERPING1* variants status may also help in the workup.

Monitoring of Complement Regulatory Drugs


In recent years, drugs targeting complement activation has been in clinical use. Eculizumab is the first approved complement inhibitor, that it is a humanised monoclonal antibody that hinder C5 proteolytic activation, inhibit the generation of C5a and the initiation of the membrane attack complex C5b-9, through its binding to the C5. Eculizumab is approved in the treatment of PNH, aHUS and refractory myasthenia gravis. Complement studies, such as CH50/ AH 50, and activation products (sC5b-9), have been employed in the treatment monitoring (7). In some specialised laboratory, C5 function may also be tested. The best time to monitor the therapy is at trough, immediately before the next dose. With effective drug treatment, CH50/AH50 and C5 function will be low. The activation products will also be suppressed.

Complement assays

The assays used in complement assessment can be broadly divided into 1) screening assays of total functional complement activity, 2) quantification of individual components, 3) quantitation of activation products 4) detection of autoantibodies against the complement components 5) assessing cell surface expression or tissue deposition of complement proteins/ breakdown products, and 6) genetic assays.

Apart from the rare primary component deficiency, complement is associated in a number of disease conditions (such as infections, sepsis, malignancy, immune complex diseases, etc) by activation via different pathways. When a component is activated in vivo, the component is taken up by receptors on leukocytes or Kupffer cells. This results in secondary deficiency as consumption. Note that in complement studies, some assays are sensitive to in-vitro activation. Consumption can also be an artefact from heat labile nature of the complement proteins combined with delayed freezing of specimen after sample collection. Overall, the specificity of single complement test is low. Assessing several markers of the pathways and careful interpretation of results as a whole, is useful. In some situations, complementary use of genetic tests may help in cases suspecting primary in nature.

Since EDTA is able to inhibit complement activation in vitro, it is commonly used for quantification of complement components, in particular for activation products. Since heparin and citrate are insufficient inhibitors of complement activation, these are not suitable. Serum, on the other hand, is used for complement function and autoantibodies assessment. Plasma and serum received for complement assays should be



separated within 2 hours from collection and frozen at -70 degree Celsius (4). Careful attention to the pre analytical steps and storage is crucial in complement studies.

Screening assays for total functional complement activity

The main indication for total complement function screen is to detect complement deficiencies. Such deficiencies can be genetic (primary), acquired (secondary, e.g. to consumption after pathway activation), or as a consequence of treatment. These tests reflect the total amount of active complement component present in a freshly sampled serum, and reflect the potential of the serum sample to achieve full activation *in vitro* after addition of activator. The traditional assays used are CH50 and AH50, based on studying the lysis of antibody sensitised sheep erythrocytes (CH50 for the CP activity) and the lysis of untreated rabbit erythrocytes (AH50 for the AP activity). The lysis of erythrocytes correlates with the formation of the terminal membrane attack complex downstream of the pathways' activation. The results are usually expressed as reciprocal dilutions of the sample required to produce 50% lysis. Besides the traditional assays, a variety of modified methods based on the haemolytic assay were done in different centres. The functional screen can also be tested by measuring the deposition of activation products (ELISA detecting C9 neopeptide generated in terminal complex formation) upon activation of the serum with immobilised complement activating substances on a microtiter plate. Targeted molecules for each pathway are coated in wells of the microtiter plates; Ig M for CP, mannan /acetylated bovine serum albumin for LP and LPS for AP. (8)

In general, the pathway screens may provide some hints to the underlying disease process. Absent/low AH50 with normal CH50 suggests alternative pathway component deficiency, while absent/low CH50 with normal AH 50 suggests early classical pathway components (C1, C2, C4) deficiency. Absent/low results in both AH50 and CH50 suggests a deficiency affecting common components (C3, C5, C6, C7, C8, C9) shared in both pathways or complement consumption. Further investigations, including quantitation of individual components, would be helpful. In the settings of multiple components deficiency, consumptive depletion is likely.


Quantitation of individual components

In cases where the screening assays indicating a complement deficiency, quantitation of individual components and interpreting the results as a profile are useful to further delineate the affected pathways and pathogenesis.

Measurement of complement components is commonly done by immunoprecipitation assays with polyclonal antibodies against the protein of choice, e.g. nephelometry and turbidimetry. Other assays, such as gel precipitation assays or enzyme immunoassays are also used. Overall, these assays are relatively robust, however, do not provide information on the conformation or activation status *in vivo*.

Quantitation of activation products

Abnormal total complement functional screen could be due to primary deficiency or deficiency secondary to consumptive loss. Measurement of individual components level is not able to distinguish between primary from secondary loss. On the other hand, *in vivo* complement activation in acute phase reaction may not always lead to low components measurement despite ongoing consumption. Hence, quantitation of activation products would be helpful in the assessment of complement activation. Among the activation products available for measurement, detection of the soluble form of the terminal complement complex (sC5b-9), is the most promising screen for complement activation. The terminal complex reflects the activation to the final stage of the three pathways. Moreover, sC5b-9 has a relatively long *in vivo* half-life (60 mins), compared to other activation



products, and is more stable with respect to in vitro activation compared to early components fragments (1,4). Overall, these activation markers can be rapidly produced by complement activation in vitro, therefore, proper sample collection and handling are important.

Autoantibodies against complement components

Autoantibodies to complement components have been linked to a number of disease conditions. The pathogenesis is often caused by the dysregulation of complement activation, as in the case of C3 NeF and anti-Factor H. Occasionally, it may be affecting non-complement pathway, as in the case of anti-C1 inhibitor related angioedema, that it is due to inefficient inhibition of the kallikrein-kinin system and bradykinin release (4).

Most often, these autoantibodies could be detected by enzyme immunoassays. Functional assays were also helpful in the assessment. For example, in C3 Nef detection, a haemolytic assay that utilises unsensitised sheep erythrocytes, or assay detecting fluid-phase C3 conversion after incubation of patient serum with normal serum at 37 degree Celsius, were commonly used for the C3 Nef activity detection (9).

Assessing cell surface expression or tissue deposition of complement proteins/ breakdown products and measuring complement components and activation products directly on cell surface provide valuable information for the workup. For example, examining the deposition of various complement components in the glomeruli and peritubular capillary is useful for glomerulopathies assessment. Furthermore, studying the expression of membrane bound regulators is also helpful in some conditions, such as the use of flow cytometry assessment of CD55 and CD59 on blood cells in the diagnosis of PNH.

Genetic assays

With the advances in molecular diagnostics, complementary use of molecular diagnostics with traditional assays, has been increasingly employed in cases suspecting primary deficiency of complement factors or regulators. For example, gene panels study has been recommended in the workup of aHUS and C3 glomerulonephritis (3, 10-11).

Conclusion

With the vast and constantly growing knowledge in various disease process, along with expanding indications and emerging treatment options in complement mediated disorders, the application of complement diagnostics has been broadened and is not limited to diagnosing rare primary genetic entities only. However, many of these assays remains highly subspecialised with limited availability, lack of standardisation and complex interpretations. Careful standardisation and close international collaborations and experience sharing, would be important for both the laboratory development and clinical applications in the field.



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Migration of CME quizzes from iCMECPD to eHKAM LMS

Starting from the 2023 – 2025 CMECPD cycle, all CMECPD quizzes will be available in the eHKAM Learning Management System (LMS). The existing iCMECPD platform will remain in use for a 6-month transition period (i.e. 1 Jan 2023 to 30 Jun 2023). After the transition period, all CMECPD quizzes will be available in the LMS only. The iCMECPD will continue to serve users for listing their CMECPD profiles.

Fellows are encouraged to familiarise themselves with the eHKAM LMS early. To access the eHKAM LMS, it is necessary to perform the eHKAM ID registration online. The eHKAM ID is a unique user account for Fellows to access online resources of the Hong Kong Academy of Medicine, including the iCMECPD, eHKAM LMS, and any new systems in the future.

For information on eHKAM ID Registration: please go to:

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Dr. LAI Koon Chi, Christopher

Chairman, Education Committee

Emperor Penguin

KEY FACTS

By Dr. LO Hui Yin

TERMINOLOGY

- 帝王/皇帝企鵝
- *Aptenodytes forsteri*
 - *Aptenodytes*: diver without wings
 - *Forsteri*: Johan R. Forster, a German naturalist

PHYLOGENY

- All extant penguin species belong to the same order (Sphenisciformes) and family (Spheniscidae)
- Emperor penguins are under the genus *Aptenodytes*, as are King penguins (*A. patagonicus*)

DISTRIBUTION, ECOLOGY AND CONSERVATION STATUS

- Diet varies between colonies
 - Fish, e.g. Antarctic silverfish
 - Crustaceans e.g. Antarctic krill

- Cephalopods e.g. squids
- Predators
 - Leopard seal
 - Orca (killer whale)
 - For chicks: birds such as Southern giant petrels
- Lifespan: around 20 years
- Conservation status: Near Threatened
 - Total population is difficult to determine due to their remote habitat
 - Estimated population: 595,000 adults

MACROSCOPIC

- Body length up to 120 cm
- Weight up to 45.4 kg

DIFFERENTIAL DIAGNOSES

- King penguin

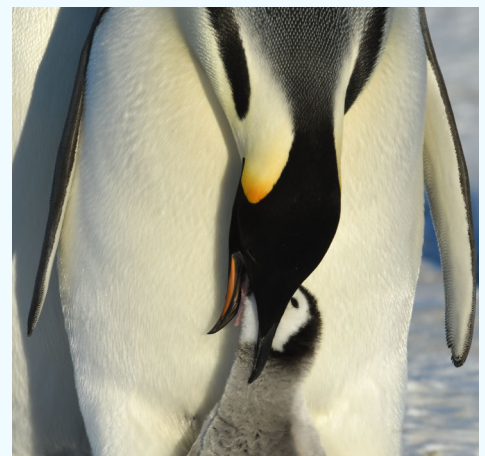
Gould Bay colony

(Left) The colony at Gould Bay is the most southerly Emperor penguin colony. There are about 66 known Emperor penguin colonies in the world.



(Right) Adults regurgitate partially digested food to feed their chicks.

Emperor penguin feeding



Crèche of Emperor penguin chicks

(Left) Emperor penguin chicks would huddle to form a crèche to keep warm when their parents are away



(Right) Only about one in five chicks survive their first year of life

Frozen dead body of an Emperor penguin chick



Emperor Penguin

Emperor penguin

(Left) Emperor penguins are larger and heavier than King penguins. They live in Antarctica.

(Right) King penguins have longer and larger flippers in proportion to their body size. They live on sub-Antarctic islands.



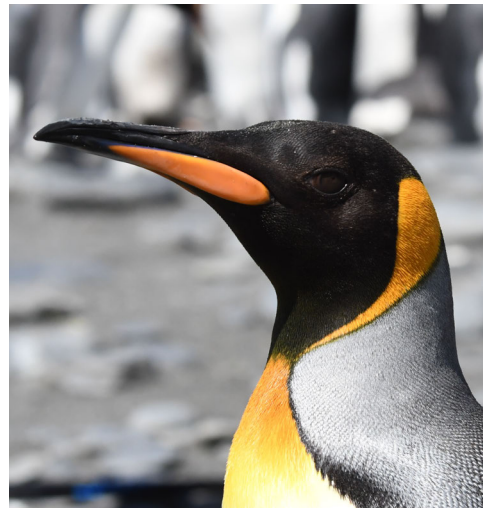
King penguin



Emperor penguin

(Left) Emperor penguins' beaks are curved. They have an orange ear patch that fade to light yellow and white.

(Right) King penguins have spoon-shaped bright orange ear patch that extend to their neck and upper chest.



Emperor penguin chick

(Left) An Emperor penguin chick has a black head, white mask, and body covered with grey plumage.

(Right) A King penguin chick looks like a fluffy kiwi fruit with beak.



King penguin chick



Photos of Emperor penguins were taken in Gould Bay, Antarctica
Photos of King penguins were taken in St Andrews Bay and Gold Harbour, South Georgia Island

Dr. Shum Ka Shing

In this issue, I would introduce to you one of the most common species of swallow-tailed butterfly in Hong Kong, commonly known as Common Mormon. Its scientific name is *Papilio polytes*. As the name suggests, this species demonstrates various forms. In fact, there is only one male form, but three female forms (*cyrus*, *stichius* and *romulus*). That is the reason why the name “Common Mormon” was coined originally, as an allusion to the practice of polygamy of the old Mormon sect. The *cyrus* form is non-mimicking and almost identical to the male form, but for the *stichius* form and *romulus* form, they are morphologic mimics of Common Rose (*Pachliopta aristolochiae*) and Crimson Rose (*Pachliopta hector*) respectively. Common Mormons are not poisonous by themselves. The patterns of the wings of these two forms mimic those of the two different non-palatable, poisonous species. Hence, the predators are warned and therefore less likely to prey on these forms. This interesting defensive mechanism is known as Batesian mimicry. The morphologic clue to differentiate these two forms of Common Mormon from the two poisonous species is actually obvious, if you pay attention to the bodies instead of the wings. The body of a Common Mormon is black, whereas the other two species are invariably red-bodied.

Perhaps, the mimicking forms of Common Mormon are capable of deceiving most of their predators by Batesian mimicry, but they don't stand a chance “in the eyes of pathologist”!



Fig. 1 Common Mormon, *cyrus* form (non-mimicking)



Fig. 2 Common Mormon, *stichius* form (mimicking Common Rose). Note the black colour of body.



Fig. 3 Common Rose. Note the red color of body. (Photo credit: Verity.hk)