

何鴻燊博士醫療拓展基金會 資助的研究中心及項目報告

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基金會資助的研究中心及頂目報告 Updates of projects / centres sponsored by Dr Stanley Ho Medical Development Foundation

何鴻燊海量數據決策分析研究中心 Stanley Ho Big Data Decision Analytics (BDDA) Research Centre

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INTRODUCTION 引言

The Stanley Ho Big Data Decision Analytics Research Centre was established in 2013 with the generous support from the Dr. Stanley Ho Medical Development Foundation. The Centre focuses on the new paradigm of big data decision analytics, targeting knowledge creation and insight extraction from massive datasets using ICT, data mining techniques and operations research methods. The research members of the Centre come from various disciplines, including professors from the Engineering, Medicine, Public Health, Education, Science and Social Science. The diversity of the research team creates an environment to stimulate innovate ideas and enables the Centre to conduct cutting edge interdisciplinary research in areas such as health, environment, learning, logistics and supply chain management, finance and social networks, aiming to achieve societal impact and benefit Hong Kong, Macao, the Greater China region and beyond.

何鴻燊海量數據決策分析研究中心承蒙何鴻燊博士醫療 拓展基金會慷慨捐助,於2013年成立。本研究中心專 注於研究大數据決策分析的創新模式。我們的目標是利 用資訊及通訊科技,數据挖掘,運籌學等技術從海量數 据中洞察,提取及創造知識。中心的研究成員來自多個 不同的學科,包括工程,醫學,公共衛生,教育,科學 和社會科學的教授。跨學科的研究團隊創造了一個激發 創新研究方向的環境,使本中心能夠在公共衛生,環 境,教育,物流和供應鏈管理,金融和社交網絡等領域 開展尖端的跨學科研究,旨在對社會產生影響以惠及香 港,澳門,大中華區及以外地區。

RESEARCH & DEVELOPMENT 研究及發展

Our research covers the domains of health, logistics, eLearning, etc. Our research work on Visual Analytics for Global Trends in Cancer Incidence based on WHO's global cancer data led to a collaboration with IBM, and was featured in IBM's 2015 Corporate Responsibility Report (http://www. ibm.com/ibm/responsibility/2015/communities/health. html) and circulated in over 170 countries). In 2016, this work was further featured as a case study and video on IBM's website (http://ecc.ibm.com/case-study/us-en/ECCF-ASC12423USEN) and also appeared in the December 2016 issue of ComputerWorld (http://bit.ly/2cJ0JnW). In the area of transportation logistics, we are working closely with a major public transportation operator in Hong Kong and have developed a real-time optimization model which utilizes the high-velocity auto-sensed data collected from their vehicle locating system to provide recommendations for the redeployment of drivers and vehicles. This constitutes an efficient disruption management system to enhance both efficiency and effectives for public transit in Hong Kong. On eLearning, our effort started with the CUHK-MIT-Macao Joint Workshop on Big Data and eLearning in 2015. We have set up a locally hosted Open edX system (referred as the bddaX system) and enhanced it with audio indexing and search capabilities that supports multimedia search. With support from the Foundation, we will continue to work closely with MIT in eLearning pedagogical research. We have also been awarded a grant from the HKSAR Government Innovation and Technology Fund Public Sector Trial Scheme to develop an electronic communication book (referred as "E-Commu-Book"), which is a cloud-based assistive tool that supports augmentative and alternative communication (AAC) for patients with communication disorders. We are also pushing other technological frontiers, relating to healthy ageing, environmental monitoring, etc.

本研究中心自成立後,在開發研究,參與澳門的學術活 動,學術交流,培育學生和服務社會等各方面做了大量 的工作。在公共衛生開發研究方面,我們利用來自世界 衛生組織(WHO)的全球癌症數據來繪制癌症趨勢的 視覺化資訊圖表及預測隨著人口老齡化的癌症趨勢。相 關研究工作成為了 IBM YouTube 頻道的視頻,IBM 入門 網站的研究案例及 COMPUTER WORLD 的精選報導。同 時也成為 IBM 企業責任報告中的一個案例,分享到 IBM 全球超過170個國家的分支機構。在交通管理方面, 我們與香港一主要公共交通公司合作,利用大數據和優 化技術應對公共交通受阻的情況,以提昇香港公共交通 的效率和效益。在電子學習方面,我們設置了本地託管 的 edX 教學平台,并新增支持多媒體搜索的音頻索引以 增 其搜索功能。同時,我們亦獲得香港創新及科技支 援計劃 - 公營機構試用計劃的資助,以開發一套輔助患 有溝通障礙的患者溝通的電子書。



2015 CUHK-MIT-Macao Workshop on Big Data and eLearning



Screenshot of the bddaX platform – an ongoing project in developing an eLearning platform enhanced with multimedia search capabilities





using WHO data

A screenshot of the E-Commu-Book, a cloud-based assistive device for subjects with communicative disorders

ACTIVITES IN MACAO 參與澳門的學術活動

Following the CUHK-MIT-Macao Joint Workshop on Big Data and eLearning in 2015, BDDA Director Professor Helen Meng visited with University of Macao and delivered a Distinguished Lecture in January 2016 and her visit was kindly hosted by Vice Rector Professor Lionel Ni. Also, Professor Yong-Hong Kuo was invited to present his work on healthcare management at the 7th Production and Operations Management Society (Hong Kong Chapter) International Conference, held in University of Macao in January 2016.

The IBM Executive Summit took place in Macao on 11 March 2016, and invited Professor Meng to be a Keynote Speaker. Her undergraduate student project, named "Catchup", which is a system that uses wearable devices for personalized public transportation recommendation, was also featured in a demonstration booth at the Summit, and later on IBM's Facebook page.

In addition, our Centre also published and presented 2 papers in the 7th International Conference on Cloud Computing and Big Data held in Macao in November 2016, which are authored with Professors Yong-Hong Kuo and Kelvin Tsoi of BDDA.



CUHK-MIT-Macao Workshop on Big Data and eLearning 2015 involved a discussion among representatives from the three locations, facilitated by the representatives of the Dr. Stanley Ho Medical Foundation and hosted by Macao's Tertiary Education Services Office (Gabinete de Apoio ao Ensino Superior)



IBM Executive Summit in JW Marriot, Macao, March 2016 – on stage for keynote presentation, with Vice President Gill Zhou of IBM Greater China Group



IBM Executive Summit in JW Marriot, Macao, March 2016 – off stage with CUHK undergraduate students invited to demonstrate their Catchup project and Mrs. Mary Law of IBM

在參與澳門的學術活動方面,緊接著在 2015 年舉辦的 中文大學 - 麻省理工 - 澳門大學大數據和電子學習聯 合研討會,本研究中心總監蒙美玲教授於 2016 年 1 月 訪問了澳門大學并主講了一堂傑出學人講座。該講座 由澳門大學學術副校長倪明選教授主持。郭永鴻教授 亦獲邀請到於 2016 年 1 月澳門大學舉行的生產與營運 管理學會(香港分會)國際會議分享醫療管理的研究。 此外,蒙教授獲邀為 2016 年 3 月 11 日於澳門舉辦的 IBM EXECUTIVE SUMMIT 主題演講者。蒙教授的一個關 於應用穿戴裝置為使用者提供交通建議的本科生項目 也獲邀在是次 SUMMIT 的一個展示亭展示,及後并上 載到 IBM 面書專頁。最後,本研究中心的蔡錦輝教授 和郭永鴻教授在 2016 年 11 月於澳門舉辦的第 7 届雲 計算及大數据國際會議分別發表了他們的研究論文。





Poster of the Distinguished Lecture at University of Macaoa

wearable devices for personal transportation recommendation, developed by two CUHK undergraduate students.

ACADEMIC EXCHANGE AND STUDENT ACTIVITIES 促進學術交流及培育學生

The Centre has hosted visits by the Presidents of the University of Rochester, University Essex and Asia University. We have also hosted visits by faculty from MIT, Oxford University, Stanford University, UIUC, Yale, etc. We have organized and co-organized conferences and workshops with important partners including Chinese Academy of Sciences Academy of Mathematics and Systems Science (in 2013), Microsoft Research Asia (in 2013), MIT (in 2015) and National Natural Science Foundation of China (in both 2014 and 2016).

The Center also plays a key role in supporting the selection of CUHK students to participate in the MIT Kickstart Program under MIT Innovation Node in Hong Kong.





Our Centre co-organized in 2014 the Academic Symposium on Big Data with the National Natural Science Foundation of China

Our Centre organized the Joint Research Workshop Chinese Academy of Sciences Academy of Mathematics and Systems Science (2013)

2017 何鴻桑博士醫療拓展基金會醫學研討會 Dr. Stanley Ho Medical Development Foundation Symposium 35 在促進學術交流方面,羅徹斯特大學 (University of Rochester) 校長,艾塞克斯大學 (University Essex) 校長 和亞洲大學校 (Asia University) 長分別到訪本中心。到 訪本中心作學術交流的還包括多所世界知名大學的教授,例如麻省理工學院,牛津大學,斯坦福大學,耶 魯大學等。另外,我們和不同的合作伙伴包辦了多次 的國際學術會議。我們的合作伙伴包括中國科學院數 學與系統科學研究院 (2013),微軟亞洲研究院 (2013), 麻省理工學院 (2015),中國國家自然科學基金委員會 (2014 及 2016)。

另外,本中心在甄選中文大學的學生參與麻省理工香 港創新節點的 MIT Kickstart 計劃扮演重要角色。





Our Centre co-organized in 2016 the Academic Symposium on Big Datadriven Management and Decision Research, together with National Natural Science Foundation and CUHK Faculty of Business

SERVING THE COMMUNITY 回饋社會

- Professor Helen Meng has been appointed by the HKSAR Government's OGCIO (Office of the Chief Information Officer) to serve in the Hong Kong/Guangdong ICT Expert Committee (粤港信息化專家委員會), and is the Coordinator (Hong Kong side) of the working group on Big Data Research, Technologies and Applications.
- Professor Helen Meng has been appointed by the HKSAR Government Secretary for Food and Health to serve in the Steering Committee on Electronic Health Record Sharing
- Professor Kelvin Tsoi was invited to serve as Track Chair of Big Data Research in Healthcare in the IEEE BigData Congress 2015 conference in New York City
- Professor Yong-Hong Kuo serves as Board Member of Hong Kong Society for Transportation Studies (HKSTS) and co-organized the 20th International Conference of HKSTS with the theme of Urban Transport Analytics

在回饋社會方面,本中心研究人員積極參與各項公職, 以自已的專業知識,貢獻社會,包括:

- 蒙美玲教授獲香港政府資訊科技總監辦公室委任,加入粵港信息化專家委員會,成為大數据研究,技術及應用工作小組的港方協調專員。
- 蒙美玲教授獲香港政府食物及衛生局局長委任加入 電子健康紀錄互通督導委員會,推動電子健康紀錄 的發展。
- 蔡錦輝教授獲邀為在紐約舉行的 IEEE 大數據年會 2015 上,担任醫療保健大數據研究的主持人。
- 郭永鴻教授教授是香港運輸學會 (HKSTS) 的董事會 成員,並協辦第二十屆 HKSTS 以城市交通分析為主 題的國際會議。



Professor Kelvin Tsoi of our Centre served as Track Chair of Big Data Research in Healthcare, IEEE Big Data Congress 2015



Professor Yong Hong Kuo of our Centre contributed to the organization of the 20th International Conference of HKSTS with the theme of Urban Transport Analytics

OUTREACH 外展活動

Our Centre's director Professor Helen Meng has been invited to give keynote speeches on such topics as big data and analytics for a smart city, use of technology to democratize learning for a smart city, education in data science, and outthinking cancer using visual analytics in the following venues in 2016 – ASTRI-HPE Conference on Big Data and Analytics for Smart City, Microsoft CityNext Forum of the Hong Kong International IT Fest, IEEE Signal and Data Science Forum and IBM Executive Summit. She was also invited to be panel speaker in the HKSTP APAC Innovation Summit 2016.

In addition, our Centre was also featured in two television (TVB) interviews about big data and cloud-computing based assistive communicative aid – in 「新聞透視:數據 時代」(November 2015) and「時事多面睇:智能安老」 (February 2016).

We have also published an invited article entitled "Hong Kong's Potential in Big Data Analytics", ComputerWorld Hong Kong, September/October 2014 and conducted many newspaper interviews (http://www.bdda.cuhk.edu. hk/press-releases)

我們積極參與各項外展活動,例如出席研討會或者獲邀 為主題演講者,接受電視或傳媒訪問,在技術雜誌上發 表文章等,以推動業界及公眾對大數據研究的認識。





Professor Meng gave the keynote and posed with the organizers and other speakers of the Microsoft CityNext Forum of Hong Kong International IT Fest 2016

Professor Meng was keynote speaker and posed with the organizers of the ASTRI-HPE Conference on Big Data and Analytics for Smart City 2016



Professor Helen Meng was Panel Speaker on artificial intelligence at the HKSTP APAC Innovation Summit 2016 Panel



Television (TVB) Interview, November 2015 on big data analytics

大腦與認知研究所 Brain and Mind Institute

機構:香港中文大學 The Chinese University of Hong Kong 項目負責人:黃俊文教授 Professor Wong Chun Man Patrick 聯絡方法 : Ms. Bo Lin 林博女士 at bolin@cuhk.edu.hk 網址 : http://bmi.cuhk.edu.hk

It is BMI's vision to become a world-leading research institute that makes discoveries in basic mechanisms of complex neurological conditions with the ultimate goal to enhance treatments of these conditions using molecular, cellular, behavioural, and engineering therapies and solutions in order to optimize human development, enhance learning, and improve quality of life.

Our mission includes:

- Conducting cutting-edge, interdisciplinary research to solve complex research problems concerning language, cognition, learning and their neural and neurogenetic underpinnings from molecule to behaviour.
- Solving these complex neurological research problems with strategic research partners nationally and internationally.
- Translating our laboratory findings into clinical and educational practices with community partners.

Our research teams have been working on the following four strategic projects to focus on BMI's four research themes and are making significant progress towards the project goals.

- (i) 'Association between Auditory Neurophysiology and Cognitive and Communication Behaviors in Infants' under the theme Optimizing language learning in early childhood;
- (ii) 'Fragile X Mutation/Premutation and Autism Spectrum Disorder' under the theme Defining the broad autism phenotype in Chinese societies;
- (iii) 'Phonological vs. Working Memory Training: A Behavioral Pilot Study in Normally Reading Chinese Children' under the theme Enhancing treatments for dyslexia; and
- (iv) 'Elucidating the Core Molecular Defects of Autism Spectrum Disorder' under the theme Identifying molecular mechanisms of neurodevelopment and neurodegeneration.

BMI also takes the role of facilitating knowledge exchange between scholars and professionals and promoting international networking. The BMI Seminar Series was launched in 2015 and 15 seminars have been organised so far. Our speakers include CUHK teaching members and invited speakers from Europe and North America. BMI has established collaborations with regional and international partners such as CUHK-PKU-UST Joint Research Centre for Language and Human Complexity and CUHK-UU Joint Centre for Language, Mind and Brain. BMI also collaborates with Macau. The BMI International Symposium on Cognitive and Development Neuroscience: From Molecule to Behaviour was held in Macau to address the Macau public, and clinical and educational professionals in November 2015. Our member Professor Cheung Him of CUHK was also invited to deliver a talk at 2016 International Brain Bee Competition (Macau) Prize Presentation Ceremony & Brain and Mind Lecture Series in June 2016.

In additional to research, BMI actively takes part in public education. It is an important aspect in our activities as we work to raise awareness of brain health and foster the understanding of neuroscience. We collaborate with elderly centres in the community to deliver messages about healthy living and stroke prevention. Public lectures and social groups delivered to date have reached over 1000 older adults in the community. BMI engages not only our seniors but also our juniors. BMI organized one-day event for high school students in order to enrich their knowledge and strengthen their understanding about neuroscience.

In the future, BMI will continue its research which encompasses from molecule to behaviour and examine the causes and therapeutic strategies for different developmental disorders. In particular, the upcoming Stanley Ho Developmental Cohort Study will unveil knowledge about cognitive and brain development unique to young children in a Chinese context. The next BMI International Symposium on Early Language and the Brain will be in April 2017. We wish to bring the different disciplines and partners together to solve some very difficult problems in order to benefit children, learners, older adults, patients, and their families. 大腦與認知研究所 (BMI) 的願景是成為世界領先的研究 機構,透過找出複雜神經系統疾病的基本機制,進而 運用分子、細胞、行為和工程治療和解決方案來改善 這些疾病的治療,以優化人類發展、增強學習,及提 高生活質素。

我們的使命包括:

- 進行尖端跨學科研究,從分子到行為各層面去解決
 與語言、認知和學習相關的神經和神經遺傳學的複
 雜研究問題。
- 與本地及海外策略研究夥伴合作,攜手解決這些複 雜的神經學研究問題。
- 與社區夥伴合作,將研究成果應用於臨床及教育實踐。

我們的研究團隊專注於四個研究主題,一直致力進行 以下四個策略項目,並在各項目中取得重大進展。

- 「優化兒童早期語言學習」主題下的「嬰兒聽覺 神經生理學以及其認知和溝通行為的關係」;
- 二「定義華人社會中的廣泛自閉症表現型」主題下 的「X 染色體易裂症基因突變 / 前突變與自閉症譜 系障礙」;
- 三 「改善閱讀障礙治療」主題下的「語音與工作記 憶訓練:具正常閱讀能力的中國兒童行為先導研 究」;及
- 四 「識別神經發育和神經退化的分子機制」主題下 的「闡明自閉症譜系障礙的核心分子缺陷」。

CLUT

2016 Brain Bee 腦神經科學大賽



認知與發展神經科學國際研討會



與本地長者中心合作

為促進學者和專業人員之間的學術及技術交流,並建 立國際研究網絡,BMI於2015年推出研討會系列,迄 今已舉辦了15場研討會。我們的演講嘉賓包括香港 中文大學的教員和來自歐洲和北美的研究人員。BMI 與本地及海外研究所成功建立合作夥伴關係,當中包 括CUHK-PKU-UST 語言與人類複雜系統聯合研究中心和 CUHK-UU 語言、認知及大腦聯合研究中心。BMI更與 澳門合作,於2015年11月特別為澳門公眾、臨床專 家和教育界人士舉辦了「認知與發展神經科學:從分 子到行為」國際研討會。2016年6月,我們的成員張 謙教授亦獲邀於2016 Brain Bee 腦神經科學大賽澳門區 選拔賽頒獎典禮暨何鴻燊博士醫療拓展基金會 BMI系 列講座擔仟演講嘉賓。

除致力科研外,公共教育亦是 BMI 活動中的一個重要 範疇。我們積極提高公眾對大腦健康的認識及對神經 科學的理解。我們與本地長者中心合作,宣傳健康生 活和預防中風的信息。我們不時舉辦公開講座和小組 活動,受惠人數超過一千人。另外,BMI不單關心長者, 亦照顧我們的年輕一代。BMI 為高中生舉辦了為期一天 的參觀活動,以加深他們對神經科學的理解。

未來,BMI將繼續涉及不同層面的研究工作,檢驗不同 發展障礙的成因和治療方案。即將開展的何鴻燊發展 世代研究會揭示有關幼兒在中文語境中特有的認知和 大腦發展的機制。BMI亦會於2017年4月舉行「早期 語言及大腦」國際研討會。我們冀望與不同學科的夥 伴合作,解決複雜的難題,令兒童、學生、長者、患 者及其家人受惠。



中學生參觀研究所

何鴻燊防治傳染病研究中心 Stanley Ho Centre for Emerging Infectious Diseases

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INTRODUCTION 簡介

Stanley Ho Centre for Emerging Infectious Diseases (CEID) was formally inaugurated on 16 November 2006. Physically located within the Prince of Wales Hospital compound, CEID is the only academic centre of the Chinese University of Hong Kong (CUHK) devoted to infectious disease research. It aims at generating new knowledge and supporting strategy development in the prevention and control of emerging infections, in Hong Kong and beyond. CEID is equipped with facilities provided at its own core laboratory, lending support to research conducted by the Centre's academics and their research teams.

何鴻燊防治傳染病研究中心(CEID)於2006年11月 16日正式成立,中心設於威爾斯親王醫院內。CEID是 香港中文大學唯一專注傳染病研究的學術中心。成立 目的是在香港境內外透過研究創造新知識,並為新發 傳染病探討預防和控制策略。CEID的核心實驗室配備 了研究所需的設施,為中心的學者及其研究團隊的工 作提供支援。

RESEARCH AND COLLABORATIONS 研究和合作

Currently, the main themes of CEID's research are: coronavirus infections – SARS and MERS (Middle East Respiratory Syndrome), HIV/AIDS and sexually transmitted infections, tuberculosis (TB), enteric infections and infectious disease epidemiology. The areas of expertise include clinical management, epidemiology and molecular analyses.

The Centre has established research collaborations with local, Mainland China and overseas institutions, with activities including academic exchange, joint grant applications, training and joint research projects. Locally, a series of studies have been developed with public hospitals, NGO and professional institutions in medicine, nursing, public health. In 2016, the Memorandum of Understanding (MOU) was renewed between the Centre and Liuzhou Centre for Diseases Control and Prevention of Guangxi Province. A CEID Scholar delivered a lecture on TB to researchers in Liuzhou. Besides, collaborative projects have been developed with universities and CDC in China on the following infections – EV71, HIV and influenza. Since late 2014, researchers of CEID have been collaborating with investigators of Macao University in the use of a zebrafish model for studying drug interactions in HIV treatment and the mechanism of drug resistance in TB treatment. This is an ongoing initiative, which has led to presentations at international scientific conferences, and a manuscript is under preparation.

現時 CEID 研究的主題有: 冠狀病毒感染 — SARS 和 MERS(中東呼吸綜合症),愛滋病毒感染和性傳播疾 病,結核病,腸道感染,以及傳染病流行病學。專業 領域包括臨床治理,流行病學和分子分析。中心與香 港本地,中國內地及海外機構合作,進行學術交流, 共同申請科研撥款,提供培訓及聯合發展研究項目等。 在香港,中心已經與公立醫院,非政府組織和各醫學、 護理、公共衛生專業機構開展一系列研究項目。2016 年,中心與廣西省柳州疾病預防控制中心簽訂諒解備 忘錄(MOU),為柳州市的研究人員開辦結核病的講 座。此外,中心還聯同中國內地的大學和疾病預防控 制中心,合作開展了有關 EV71,HIV 和流感等研究計 劃。自 2014 年底以來,CEID 的研究人員與澳門大學合 作,使用斑馬魚模型研究 HIV 治療所涉藥物相互作用以 及抗結核病治療的耐藥性機制。研究項目仍在進行中, 研究組曾於國際科學會議上發表初步結果,並正在撰 寫論文。



TB lecture at Liuzhou CDC in Oct 2016 2016 年 10 月在柳州市關於結核病的講座

ACADEMIC ACHIEVEMENTS 學術成果

Over the years, researchers of CEID have been awarded research grants, amounting to a total of HKD70 million, largely from competitive grants of Research Grant Council, Health and Medical Research Fund, AIDS Trust Fund, and also as commissioned by the Hong Kong Government.

Publication of research results findings in prestigious scientific journals is one important means of delivering academic outputs in the scientific community. So far, researchers of CEID have published 540 manuscripts, 50 scholarly books/chapters or monographs, and made over 100 conference presentations to share their new knowledge with other specialists and scholars.

Some important outputs in terms of new research findings are:

- Characterization of the clinical outcomes of influenza virus diseases
- New understanding of droplet dispersion and its implications in designing infection control practice in hospital wards

2017何鴻桑博士醫療拓展基金會醫學研討會 Dr. Stanley Ho Medical Development Foundation Symposium

- Discovery of antiviral effects of interferons for EV71 infection
- Novel network analyses for describing HIV epidemiology
- High potential of sexual transmission of hepatitis C virus in the HIV population

多年來,CEID的研究人員成功獲得了不同的研究撥款,總額達700萬港元。資金主要來自香港的研究資助局, 醫療衞生研究基金,愛滋病信託基金會等競爭性撥款, 以及接受香港政府委託項目的撥款。

在重要的科學期刊上發表研究報告是展示學術成果的 重要渠道。到目前為止,CEID研究人員已經發表了540 份文章,50份學術書籍/專著,並發表了100多次會 議演講,與其他專家和學者分享他們的新知識。

以下是部份重要的研究結果:

- 流感疾病的臨床特徵
- 了解液滴分散對設計醫院病房的影響和控制感染的 成效
- 干擾素對 EV71 感染的抗病毒作用
- 用於描述愛滋病毒流行病學的新型網絡分析
- 愛滋病毒感染人群中出現丙型肝炎病毒的高危傳播

MAJOR EVENTS 主要活動

A major highlight of the activities of the Centre is the Annual Scientific Symposium, which is a platform for health professionals and academics to update on knowledge and skills in infectious diseases prevention, treatment options and control. The 2016 symposium attracted over 300 participants from Hong Kong, Macau, Mainland China, as well as overseas. The Postgraduate Student Exchange Session was scheduled on the day preceding the Annual Scientific Symposium, providing a forum for postgraduate students to present and discuss their research. In Nov 2016, the 2nd ICGEB Workshop on Human papillomavirus: From Basic Biology to Cancer Prevention was organized under the co-ordination of Centre, with the participation of over 140 scientists from 12 countries in Asia and internationally.

年度科學研討會是中心舉辦的一個主要活動,透過此 平台讓專業人員和學者更新對預防傳染病的知識,並 且提升疾病控制和治療的能力。2016年的研討會吸引 了來自香港,澳門,中國大陸和海外的300多名參會 者。在研討會前一天,大會安排研究生參與交流會, 為年青學者提供討論平台。2016年11月,中心協辦了 第二屆 ICGEB 人類乳頭瘤病毒研討會,來自亞洲和國 際12 個國家的140多名科學家出席了會議。





Postgraduate Student Exchange Session in June 2016 2016 年 6 月研究生交流會

CEID Annual Scientific Meeting 2016 2016 年度的科學研討會

EDUCATION 教育

As the hub of infectious disease expertise for CUHK, CEID has been delivering teaching to medical undergraduates and research postgraduates. Over the past decade, totally 22 research postgraduate students have graduated with PhD or MPhil under the supervision of CEID's academic staff. In 2016, the Centre's postgraduate student won the Best PhD Thesis Award of the Public Health Division of the Graduate School. In 2007 and 2013, an HIV Manual was published for the reference of medical undergraduates and also clinical doctors. Free Apps in iOS and Android are available for downloads. A total of 6000 installs have been made by readers so far. To offer a textbook for public health students, "Public Health infectious disease" was released by CEID. Parallel Apps versions have become available in mid-2016.

作為中大傳染病專業知識的樞紐,CEID 一直為醫學本 科生和研究生提供教學。在過去十年,共有 22 名研 究生在 CEID 的學者監督下取得博士或碩士資格。2016 年,中心一名研究生贏得中文大學公共衛生範圍的最 佳博士論文獎。2007 年和 2013 年,中心出版了一本 « 愛滋病手冊 » 供醫科生和臨床醫生參考,手冊有 iOS 和 Android 的免費應用程式可供下載。到目前為止,總共 錄得 6000 次安裝。另外,CEID 在 2012 年推出了 « 公 共衛生傳染病 » 作為公共衛生學生的教科書,應用程 式版本也於 2016 年面世。

PERSPECTIVES 遠景

- With the generous support of Dr. Stanley Ho Medical Development Foundation, CEID is planning to expand the scope of its research to the following areas:
- Genomic research and bioinformatics in infectious diseases
- Establishment of a cohort of newly diagnosed HIV infections
- Time-space modelling in infectious disease epidemiology

在何鴻燊博士醫療拓展基金會的大力支持下,CEID 計 劃將其研究範圍擴展到以下領域:

- 傳染病基因組和生物信息學研究
- 建立新診斷愛滋病毒感染者的群組研究
- 探討傳染病流行病學中的時空模式

頭頸部腫瘤偵測與治療的生物標誌物研究 Developing biomarkers in head and neck squamous cell carcinoma

機構:香港中文大學 The Chinese University of Hong Kong 項目負責人:陳英權教授 Professor Jason Y K Chan 聯絡方法 : jasonchan@ent.cuhk.edu.hk

Through the support of the Dr. Stanley Ho Medical Development Foundation we have been able to initiate and develop a comprehensive Head and Neck cancer tumour bank for research purposes that includes patients from Macau that visit our institution for treatment. This has been achieved through the collection of samples from multiple centres throughout Hong Kong, including the Prince of Wales Hospital, Alice Nethersole Ho Miu Ling Hospital, United Christian Hospital and Tsang Kwan O Hospital and the employment of new staff to collect samples and follow-up on patients. Currently, over the course of the year we have managed to collect ~50 paired tumour head and neck cancer samples, tumour margins, with oral rinses and plasma pre-treatment and on followup. Of note, >90% of patients have follow-up oral rinses and plasma samples collected at 4 weeks, 3 months, 6 months and 12 months after treatment, a feat that puts our sample collection in a unique position for important research into disease surveillance. In addition, we have also collected ~20 normal patient samples.

All of this, in conjunction and with the support of the Department of Chemical Pathology at The Chinese University of Hong Kong, we have been able to start analysing Tumour Suppressor Gene (TSG) methylation in our samples. At this juncture we have chosen 7 known hypermethylated TSG in the literature including EDNRB, CDKN2A, PAX5, DCC, DAPK, TIMP3 and MGMT to analyse and are in the process of analysing these samples with digital droplet PCR, Figure 1 shows the early results of methylation of TSG of head and neck cancer samples. The results are promising for PAX5 and EDNRB hypermethylation in our head and neck cancer population. In addition, we are in the progress of analysing pretreatment and 4 weeks post treatment oral rinses for head and neck cancer patients with the results shown in figure 2. The results show a significant decrease in the presence of hypermethylated PAX5 TSG in oral rinse following treatment for head and neck cancer. The sensitivity and specificity of PAX5 in the detection of head and neck cancer was found to be 91.7% and 75% respectively.







Figure 2. PAX5 methylation in oral rinses pre-treatment and 4 weeks following treatment for head and neck cancer.

Overall, the results from the early stages of this study are encouraging, but there are multiple more specimens to analyse including tumour margins, plasma and further follow-up oral rinses, while we continue to collect samples. The importance of this research is highlighted by the lack of biomarkers in head and neck cancer, in particular the lack of research in head and neck cancer in our region, for a disease that is increasingly important, and now the 10th most common cancer amongst men in Hong Kong based on data from the Hong Kong Cancer Registry 2014 data. To conclude, none of the above would have been possible to initiate and maintain in the future without the generous support of the Dr Stanley Ho Medical Foundation to improve the management of head and neck cancer patients in the region.

澳門失智症協會 Macau Alzheimer's Disease Association

機構:澳門失智症協會 Macau Alzheimer's Disease Association 項目負責人: 禤永明 會長 聯絡方法 : 曾文理事長 zengwen@kwnc.edu.mo 網址 : http://www.mada.org.mo

Macau Alzheimer's Disease Association (hereinafter referred to as MADA) was established in 2010 by Mr. Patrick Huen Wing Ming, the Chairman of Dr. Stanley Ho Medical Development Foundation and several professors of Kiang Wu Nursing College of Macau. Other experts who are concerned about the ageing population from medical, nursing, education, social service, law, and nursing home also contributed to the establishment of MADA.

MADA became a full member of Alzheimer's Disease International in 2013.

The objectives of MADA are:

- (1) Cultivate public's awareness and positive attitude about dementia;
- (2) Promote early detection which allows dementia patients to have timely care;
- (3) Provide related knowledge and care plan to professionals from different disciplines.

MADA is now carrying out the following missions:

- 1. Raising public's awareness and enhance their understanding about dementia. MADA provides professional and academic support to "Benevolence Lights up my Later Life: A Tailored Meta-programme to Face with Ageing Population in Macau", which is conducted by Kiang Wu Nursing College. Many directors serve as keynote speakers in public lectures and workshop for care-givers.
- 2. Promoting early detection which allows dementia patients to have timely care. Kiang Wu Nursing College of Macau founded the Memory Clinic in 2013, in an effort to provide cognitive assessment for senior citizens and dementia helpline service. These two services had resulted in positive social benefits. Starting from this year, MADA will cooperate with Kiang Wu Nursing College of Macau and Dr. Stanley Ho Medical Development Foundation to enhance the Memory Clinic. On top of the existing assessment services, assessors will be dispatched to three elderly homes on a weekly basis to provide cognitive competence screening for older persons.
- 3. Multi-professional cooperation which reinforces the cultivation of local professionals. To coordinate with the governmental policy about dementia prevention and treatment, MADA, Hong Kong Alzheimer's Disease Association and Kiang Wu Nursing College of Macau will collaboratively organize the Certified Dementia Care Planner (CDCP) Course, which is a structured and systematic certificate programme specifically designed for dementia care professionals. The teaching contents

cover fundamental knowledge about dementia, early screening and assessment, design of rehabilitation training for patient, care management and support to patient's family. Upon the completion of this course, students will be able to discern patients of early stage dementia and provide the patients and their families with professional consultation service and technical guidance regarding care management.

澳門失智症協會由何鴻燊博士醫療拓展基金會主席 永明先生與澳門鏡湖護理學院幾位教授,聯同一群關 注社會老齡化、熱心長者照護工作的醫務界、護理界、 教育界、社會服務界、法律界、老人院舍負責人等專 家學者,於2010年成立「澳門失智症協會」。本會宗 旨為:(一)培養公眾對失智症的正確認識和正面態度, 積極防治此疾病;(二)推廣早期檢測,使失智症患 者得到適時照顧;(三)提供有關知識及照顧計劃予 各界專業人士。目前主要工作有:

- 提高公眾對失智症的認識和了解。協會提供澳門鏡 湖護理學院「仁·愛晚晴」應對老齡化社會教育 系統工程:老人失智症之預防及照顧的專業與學術 支援,並擔任公眾講座主講嘉賓及腦力大使\青年 大使的指導老師。
- 推廣早期檢測,使失智症患者得到適時照顧。澳門 鏡湖護護學院於 2013 年建立記憶中心,為本澳居 民免費提供長者認知能力評估及失智症電話熱線服 務,該兩項服務均取得良好的社會效益。今年起, 協會將聯合澳門鏡湖護護學院及何鴻燊博士醫療拓 展基金會三方共同加強記憶中心的建設。在原有評 估的基礎上,每週定期派評估人員到三間老人中心 為長者提供認知能力篩查。
- 多專業跨職系合作,加強本地專業人員的培養。為 配合特區政府失智症防治政策,將于 2017 年與香 港認知障礙症協會及澳門鏡湖護理學院合辦失智症 照顧策劃師課程,該課程是專門為失智症照顧護理 專業人士設計的結構性、系統性證書課程,內容涵 括失智症基本知識、疾病的早期篩查及評估、失智 症患者康復訓練的設計、照顧管理及家屬的支援。 完成該課程後,學員能有效識別早期失智症患者, 並能準確地為失智症長者及家人提供照顧管理方面 的諮詢及技術指導。

個體化醫療中心 Centre for Personalised Medicine



2017 何 鴻 桑 博 士 醫 療 拓 展 基 金 會 醫 學 研 討 會 43 Dr. Stanley Ho Medical Development Foundation Symposium

高端機器人科研計劃 Advanced Robotics Initiatives

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Background

The Foundation's foresight in supporting medical and surgical robotics shows tremendous commitment from the community in tackling health problems and enhancing the quality of living for the aged and the sick.

Robotics research and medical applications

Dr. Ka-Wai Kwok from Department of Mechanical Engineering has formed a research group for Interventional Imaging and Robotic Systems (IRIS) for training young talents on innovative technologies for medical applications. The IRIS group, comprising 4 postdoc, 1 research assistant, 5 MPhil and 4 PhD students, has initiated new lines of studies at HKU including soft robotics, image-guided robotic system, and high-performance intra-operative image processing.

Their research bridges the technical gap between medical imaging and surgical robotic control aiming at enhancing surgical precision, safety and effectiveness. Their new system being developed can provide high-quality visual feedback for robotic instruments to navigate inside a patient body. With the support from the Foundation, the IRIS group has gained good laboratory-based experimental results and is now able to work with industrial partners.

Dr. Zheng Wang has opened another promising front of robotics in clinical applications. He is currently supervising the Bionics and Control Lab in the Department of Mechanical Engineering. His group has focused on soft robotic devices with a primary target application into the medical field.

The Lab has collaborated with the Department of Orthopedics and Traumatology of HKU in developing a soft robotic glove for use by patients with hand dysfunctions. The robotic glove comprises of one left hand unit and one right hand unit, both driven by ten actuators, enabling opening and closing motions on each individual fingers. Made by 3D-printed soft material, the gloves impose minimum interference to the wearer's normal daily activities so that they could be worn both in clinic and at home. The actuation mechanisms of the robotic gloves are integrated into a portable box, with the power source, actuation units, as well as the control electronics.

The B&C Lab has also collaborated with the Faculty of Dentistry in developing a surgical robotic manipulator for dental applications. The highly dexterous 7-degreesof-freedom robotic arm packs human-arm dexterity into a 6mm diameter slim body. It could reach any location and orientation within a space over 50 times of its own volume. The arm is driven by 14 electric motors controlled coordinately by one central motion controller also developed in our lab.

The targeted application of this robotic arm is to conduct dental preparation and treatment with a high level of autonomy. In the future, the arm could also be extended for use in general surgical applications, such as laparoscopic surgery, and even endoscopic surgery. Cooperation of two or three arms under more complex control algorithms will enable the robotic system to perform surgical procedures of a higher level of complexity.

Robotic competitions for engineering students

There is no better education than facing the challenge head-on. Two teams of students took part in international robotics challenges this year:- Surgical Robot Challenge and DJI Developer Challenge.

Surgical Robot Challenge

A team comprising 6 students, 1 postdoc and 1 cardiologist was sent by HKU to compete in the Surgical Robot Challenge held in UK in June 2016. They strived into the final round and staged with strong teams like UC Berkeley, Imperial College London, Vanderbilt University, The Hospital for Sick Children, and Israel Institute of Technology (Technion). All teams had to demonstrate their robot prototypes in front of the general public, surgical roboticists and a panel of 10 judges who were experts in academia and healthcare industries.

The system designed by the Team-HKU was a catheter robot capable of operating inside the magnetic resonance imaging (MRI) scanner and run with the left-atrial phantom simulator. The whole prototype earned the "Best Live Demonstration Prize" of the Challenge. The Team was fuelled with great enthusiasm by the recognition.

DJI Developer Challenge

Another team of five engineering students formed TeamHKU and attempted the DJI Developer Challenge since January 2016. The game was a search and rescue one requiring the contestants to code a drone to take off from a moving vehicle, survey a "search area" for objects identified as survivors, avoid obstacles and return to the vehicle.

TeamHKU struggled to the second around and among the 15 finalists. The competition was fierce and quickly lifted the "track-and-locate" technology to a new height. Though it seems remote, such generic technology would shed new light on the imaging and targeting application in clinical research.

背景

基金會大力支持內、外科醫療機器人技術發展的遠見 足見其致力解決老年人和病患者健康問題及提高該人 群生活素質的決心。

機械人研究與醫學應用

機械工程學系的郭嘉威博士帶領著他的研究團隊,發展醫學用的新機械人設備及技術,同時間又積極培養科研人才。這個名為IRIS的團隊共有4位博士後同事、 1位研究助理、5名碩士生及4名博士生,陣容龐大。 所開展的研究範圍包括軟性機械人、影像導引機械人 系統及高效體內影像處理系統。

該項研究彌補了醫學成像與外科手術機械手操控之間 的技術差距,大大增加了外科手術的準確度、安全性 及有效性。他們所發展的新設備可以提供高質素的畫 面,讓機械手可以清楚地安全地在病人體內移動至預 定目標。現在研究隊已取得一定的實驗數據,吸引到 業界的注意,共同開發項目。

另一方面,同系的王 博士亦於機器人技術臨床應用方 面打開了一個新局面。他成立了一個研究團隊,名為 仿生及控制實驗室 (Bionics and Control Laboratory),專 注於發展軟性機械人設備以用於醫療範疇。他的團隊 與校內醫學院的矯型及創傷外科學系合作,為手部失 去活動能力的病人發展一雙由軟性物料造的手套。這 對手套分左右各一隻,由10個驅動器帶動,令每隻手 指均可做出開合動作。手套是用軟性材料經 3D 技術打 印製造,能把佩戴者因佩戴該手套而對日常生活帶來 的不便減至最低,因此該手套在診所或家居均可佩帶。 整套設計包含手套、電源、驅動配件及控制電路,可 放在一個便攜的小箱中。

與此同時,王博士亦與校內的牙醫學院合作,發展一支牙科手術用的操縱桿。這支操縱捍極其靈活,自由 度達至7,但直徑只有6mm。它可以任何角度延伸至 50倍於其自身體積的空間。這支操縱捍由14個電動 馬達推動由1個中央動作控制器管理及協調。該控制 器也是於仿生及控制實驗室成功研發。

王博士期望該操控杆可在牙科治療及準備方面自主操 作。展望將來,這項設計可以進一步應用於其他手術, 例如腹腔鏡及內窺鏡檢查手術。如果用上二至三支機 械臂及更精密的控制運算,這項機械裝置更可以用於 複雜的外科手術中。

機械人比賽

今年港大工程學院派出 2 支隊伍參加了國際比賽,其 中之一是外科機械人大賽 (Surgical Robot Challenge)及 大彊開發者大賽 (DJI Developer Challenge)。

外科機械人大賽於2016年6月底英國倫敦舉行,港大隊由6名學生、1位博士後同事、郭嘉威博士及中大 醫學院的心臟科李沛威醫生組成。除了港大隊外,其 他隊伍有加州大學柏克萊分校、倫敦帝國學院、范德 堡大學、加拿大多倫多病童醫院及以色列理工學院等 強隊。參賽隊伍必需展示並向參觀的市民、外科機械 專家及評判團解釋整個設計的構造和功能。評判團當 中不乏學者及衛生保健行業的專家。 港大隊的參賽作品是一套可以在磁共振掃描儀內操作 的心導管系統,由模擬器控制。整套設計最後贏得全 場最佳現場示範,港大隊為此感到莫大鼓舞。

大彊開發者大賽

另一港大隊由 5 位學生組成,參加大彊開發者大賽。 比賽分多個階段,由 2016 年 1 月開始,最後出線的 10 隊可以出戰 2016 年 8 月底在美國加州舊金山舉行的決 賽。比賽規則是用 DJI 在市面上出售的無人機,以其專 用開發軟件,控制無人機從車上起飛、巡邏、搜救生 還者、迴避障礙物及最後返回那輛車上安全降落。

港大隊雖然在第二回合 15 強中止步,但同學們從在這 7 個多月的努力中 獲益良多。是項比賽亦大大提高了 「追蹤及鎖定」技術,對於將來成像及鎖定技術應用 於臨床醫學研究不無裨益。



師生參與比賽和成果演示

基金會發展藍圖 Development Plan to Elevate the Healthcare Standard of Macau and the Pearl River Delta



In order to proceed further towards achieving the mission of the Foundation to <u>elevate the healthcare</u> <u>standard of Macau and the PRD</u>, we have devised a development plan aiming to create a 'liaison office' to link up the medical practitioners and the general public in Macau with worldwide access points for knowledge and resources on related areas.

We envision that the concept of creating this 'liaison office' would best be realized through a webbased digital platform. Currently, we are working closely with worldwide technological experts including Microsoft and IBM which will guide us through the process of selecting and building the most suitable data warehouse for medical practitioners and general public to get access to most updated information they need efficiently.

為朝著基金會提升<u>澳門和珠江三角洲醫療水平</u>的使命向前邁進,我們建構了一個以此為目標 的發展方略。我們期望透過建立一個聯絡樞紐,把來自世界各地相關的知識和資源,轉介給 澳門的醫護人員及市民大眾。

要實現這個概念,我們認為最佳的方法是建立一個網上數碼平台。目前,我們正與全球頂尖的科技專家(包括 Microsoft 和 IBM)共同相討,從而挑選和構建最合適的數據庫,使澳門的醫護人員及市民大眾能快捷地獲取他們所需要的醫療資訊。