出國報告 (出國類別：開會)

「應用人工智慧於農民使用農藥安全評估」之國際研討會發表

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派赴國家：日本
出國期間：**2025.05.15-18**
報告日期：**2025.08.17**

摘　　要

為落實農民職業安全及農藥源頭管理之政策精神，並因應國際間日益強調個體化風險評估之趨勢，本研究應用人工智慧方法，建構農藥皮膚吸收率預測模型，提升農藥風險評估之效率與精準度。透過收集文獻中化學物質之皮膚滲透係數（Kp），運用 QSAR 原理轉換為結構描述符，再以回歸模型與支持向量機（SVM）等機器學習方法建立預測模型，初步結果顯示，對單一機制類型農藥（如乙醯膽鹼酯酶抑制劑）具有較佳之預測準確性。更進一步分析臺灣核准使用的 155 項農藥中，發現 13 項具潛在暴露風險，其中 5 項其暴露量高於 AOEL（可接受操作暴露劑量），經計算認定風險不可接受。

本計畫於 ICMHI 研討會發表該研究成果，並參與多場機器學習及基因組學應用之討論，發現醫學領域已大量應用圖像辨識、數據分析及個人化基因資訊於臨床決策及風險判定中。此一趨勢提供農藥風險評估可行之借鏡路徑，未來可考慮利用農藥毒理資料庫、導入圖像資料（如細胞病變或剖檢影像），或應用深度學習進行病理分析與機轉建模。此外，針對微生物類農藥之基因安全性以及抗生素類農藥，也可參考全基因組分析應用於毒理基因組學與可轉移性抗菌素耐藥性分析。透過此次國際交流，提出人工智慧技術與安全評估之應用可能性，將為我國農藥風險評估提供不同思考面向，並退進農業健康政策跨域整合的可能性。

目　　錄

壹、前言

隨著農業政策逐步聚焦於保障農民健康與永續發展，農藥使用所引發的職業風險成為不容忽視的議題。根據聯合國糧農組織與世界衛生組織之建議，當前農藥管理策略應致力於源頭風險控制，特別是在農藥評估與登記制度上，強化對高風險物質的限制與汰除。傳統安全評估模式雖提供一定依據，然其對資料量及評估人力資源的依賴，使其效率與精確性仍有待提升。為回應此一挑戰，本次於研討會提出結合人工智慧中機器學習之創新技術，建構定量構效關係原理建立之皮膚滲透係數（Kp）預測模型，有望取代部分耗時且昂貴的實驗試驗，並應用於農藥安全評估。

藉由參與 2025 年於日本京都舉辦之「國際醫學與健康資訊學研討會」（ICMHI），發表並報告國內於人工智慧應用於農藥安全評估的初步成果。該研討會主題涵蓋醫療資訊、數位健康、風險預測與統計建模等領域，為一重要國際交流平台。透過會議參與，除分享我國研究成果外，更可借鏡醫學風險評估領域之技術與資料整合經驗，拓展農藥安全評估未來應用之可能性。

貳、擬解決問題和目標

為呼應增進農民福利體系政策，避免農民因農藥使用造成化學性職災，增加職災負擔，同時因應落實農業源頭管理 (農藥安全) 政策，依據國際聯合國糧食及農業組織對於農藥使用安全策略建議，在農藥安全之第一防線-農藥評估及管理時，便應減少對農藥的依賴，同時減少高危害農藥之登記限用或汰除，因此在農民使用農藥之安全評估技術中，利用先進的人工智慧預測模式技術，可增進農藥之安全評估效率及提高準確率。目前國際趨勢對於農民使用農藥之安全評估技術方面，多採用階層式的方式進行，評估時共分三階層，各階層皆將暴露量與暴露限值進行比較，如暴露量高於暴露限值，則風險不可接受，則暴露量需進行下一階層之評估。國際上如歐盟於 1997 年指令 91/414/EEC 明確提及化學性農藥之主要作用成分(active substance)需經每日可接受操作暴露劑量 (Acceptable Operator Exposure Level, AOEL) 之評估，且如農藥施用者、農業工作者等等人員暴露量超過訂定之 AOEL 值，則該項農藥不可登記上市，日本亦於 2019 年，公告農藥登記申請時，需檢送農藥施用暴露相關評估，美國要求農藥登記時需檢附相關職業暴露風險評估，更已行之有年。

由於對於農業生產者而言，工作項目包括農藥混合、施用，甚或是施用完後再次進入作物種植區工作，其主要的農藥暴露途徑皆為皮膚，因此皮膚吸收率(dermal absorption rate)為農藥使用暴露量估計時之重要參數，由於皮膚吸收率如進行實際試驗，則耗時、耗經費，但若以預設值進行暴露量估計，則有過度高估暴露量的問題，同時目前並無針對農藥皮膚吸收率之預測模型，因此隨著人工智慧能力躍升，利用先進的人工智慧預測模式及定量構效關係（Quantitative Structure-Activity Relationship, QSAR）原理，建構皮膚吸收率的模型，並應用於農藥皮膚吸收率乃至暴露量估計，不僅減少資源的浪費，同時增加農藥使用安全風險評估效率，強化對農藥使用人之高風險農藥源頭管理。模型原理為利用文獻之化學物皮膚滲透係數 (skin permeation coefficient, Kp)，並將其結構以 QSAR 原理轉為幾何性質、熱力學性質、電子學、一般性質、拓樸學性質等 5 大類描述符，再將數據以迴歸 (regression)及支持向量機

(Support Vector Machine, SVM)建構共計 8 項皮膚滲透係數預測模型，研究初步顯示，對同一機制類型之農藥預測表現而言，則支持向量機迴歸結合 PCA、rank 及屬性選擇之模型表現較佳。且無論是何種模型，單就單一農藥類別 (乙醯膽鹼酯酶抑制劑類)，其預測誤差較多種農藥類別來得佳。

由於國際研討會議 (International Conference on Medical and Health Informatics, ICMHI)旨為討論醫學與健康資訊學領域，由於當今醫療發展已從傳統「以疾病為中心」的模式，逐步轉向「以病人為中心」的個人化醫療（personalized medicine），而此須整合基因組、生活型態、環境暴露與心理狀態等資訊分析，此歷程為風險評估體系提供了寶貴的借鏡，例如安全評估，無論是在藥品、化學品或環境暴露的領域，長期以來大多依賴族群平均數據與標準模型來推估風險，但這樣的「一體適用」方法已未來可能無法應對日益強調個體差異的評估需求，藉由此次參與國際研討會發表，除將上述人工智慧預測模式於農藥使用者風險評估之應用，與國際健康危害評估學者，進行交流，以利結果之科學性確認及後續應用外，另外並藉由參與主講人之演講及其他場次的研究發表，可做為未來研究機器學習、人工智慧於農藥與環境、健康、危害之評估應用缺口的技術參考，並取得人工智慧及資訊學於健康評估及醫藥最新資訊，以達到借鏡國際技術，應用於農民職業安全評估及農藥安全評估，以及以量化風險加速評估效率之目的。

參、參與研討會時程表

日期	行程及研習內容	地點
114.05.15 (星期四)	啟程	台北-日本京都
114.05.16 (星期五)	發表報到及確認報告內容	日本京都
114.05.17 (星期六)	口頭發表及參加研討會	日本京都
114.05.18 (星期日)	返程	日本京都-台北

肆、參與研討會內容

一、International Conference on Medical and Health Informatics (ICMHI)簡介

ICMHI 成立宗旨為討論醫學與健康資訊學領域的最新創新、趨勢、關注點、遇到的實際挑戰以及各種解決方案，為亞洲醫學與資訊學結合領域最傑出的國際會議之一，提供來自全球的學者、專業人士和業界一個重要的平台，不僅促進跨學科合作和知識交流，ICMHI 更加速了亞洲的科學進步，提供安全評估、醫療保健的前緣科技。2025 年的主題為「透過數位創新推進醫學信息學科學」，(相關議程如附件 1)強調新興技術對醫療保健、安全評估的變革性影響，尤其是數位創新正在重建醫學及資訊學的格局，並使醫療保健比以往任何時候都更加個人化、高效和易於取得，不僅提供人工智慧、大數據分析、遠距醫療、穿戴式裝置等範疇，並提供最新知識及複雜性議題分析。

二、發表內容

由於對於農藥施用人員而言，與農藥相關的活動包括混合、裝填與施用等，而在執行這些作業時，皮膚為主要的暴露途徑。因此，「皮膚吸收率」成為農藥安全評估中非常重要的參考值，特別是在第二層級風險評估中，扮演決定性參數的角色。然而，目前公開的農藥皮膚吸收率參考值有限，且尚無專門針對農藥的皮膚吸收率預測模型。

本研究不僅建立了一個以「定量構造性質關係（QSAR）」為基礎的農藥皮膚滲透係數（logKp）預測模型，也運用此模型來搜尋在台灣可能對作業人員有害的農藥。在台灣核准使用的 155 種農藥中，透過比對預測之皮膚滲透係數 logKp 值的第 25 百分位數與歐盟農藥資料庫所列的可接受作業人員暴露量（AOEL），共發現 13 種農藥具有潛在危害性，包括：亞滅寧、貝他-賽扶寧、畢芬寧、比多農、賽滅寧、第滅寧、芬普蟎、伽瑪賽洛寧、賽洛寧、快

伏草、賜諾特、賜派芬、福化利，其中，有 5 種農藥劑型（畢芬寧、比多農、賽滅寧、伽瑪賽洛寧及賽洛寧）經風險評估後為「不可接受」，其暴露劑量（依據美國環保署 USEPA 的農藥作業人員暴露計算器 OPHEC 並根據台灣的作業情境計算）均超過了 AOEL 值。本研究顯示，皮膚滲透係數預測模型不僅可用於風險評估，也是一項可行的整合策略工具，用於篩選對作業人員可能有害的農藥。發表之論文如附件 2，口頭報告內容如附件 3，發表情形如圖 1、2。

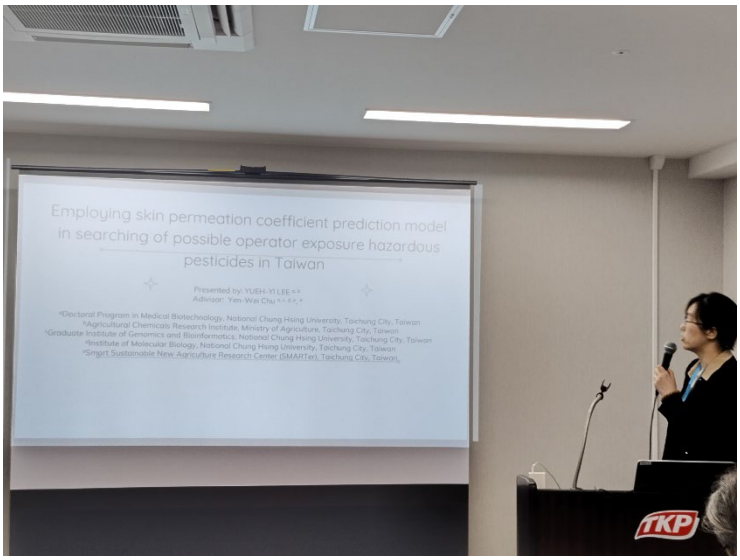

圖 1、報告人之口頭發表情形。

圖 2、報告人與場次主持人 Ahmet Murat Özbayoğlu 教授 (右 3)、Hsi-Chieh Lee 教授 (中)、Yonggang Lu 教授 (左 3)及同場次發表人合影。

三、研討會參加

1. 主講人 Hitoshi Nakagama 之演講

圖 3 為主講人演講之情形。

圖 3、主講人 Hitoshi Nakagama 演講情形。

(1) 主講人 Hitoshi Nakagama 目前為日本國立研發法人日本醫療研究開發機構 (Japan Agency for Medical Research and Development, AMED)理事長，此機構是日本政府為了整合並加速醫療領域的研發進程而設立的核心機構。由於日本的醫療研究資源分散於各個部會，缺乏統一的協調機制，導致研究效率與成果轉化受到限制，因此便成立國立研發法人日本醫療研究開發機構，目標為集中管理與策略性投資，推動從基礎研究到實用化、產業化發展。其主要職責包括：制定與實施國家醫療研發策略，其根據國家的健康需求與科技發展趨勢，規劃並執行各項醫療研究計畫；同時整合與分配研發資金，將原本分散在各部會之研究預算集中管理並分配給不同的研究項目。

(2) 演講內容

演講題目：A perspective on future healthcare delivery in Japan with whole genome analysis.

內容摘要：在國家健康保險體系下，日本的癌症基因組醫學開始於 2019 年 6 月實施綜合基因組分析（comprehensive genetic profiling, CGP）測試。之後，政府將 CGP 測試的基因組數據以及相關臨床信息儲存在國家癌症基因組與先進治療中心（Genomics and Advanced Therapeutics, C-CAT）儲存庫數據庫中。到目前為止，C-CAT 已收集了超過 100,000 名患者的基因組數據和臨床信息，數據自 2021 年起，供學術界和工業界廣泛利用，雖然只有約 10%接受 CGP 測試的癌症患者獲得了腫瘤中基因變化的個人化治療，因此為了進一步擴大癌症患者根據其基因組分析結果獲得最佳治療的機會，日本政府啟動了全基因組分析（Whole Genome Analysis, WGA）項目，不僅收集和分析 100,000 份癌症患者和難治性疾病患者的 WGS 以及多組學(multi-omics)數據，並結合高質量的臨床信息，同時整合各種其他與醫療保健相關的數據，包括數字化生活方式數據、病理學和影像數據。講者並舉例此計畫的應用包括了：針對腺癌 (adenocarcinoma)的患者，利用上述計畫，篩選出針對基因之藥劑；使 99.7%的病患得到治療；另外則使日本政府登錄 6 種治療的療程；依據上述數據庫，研發出針對乳癌基因至少 3 種藥劑；研究胃癌、幽門桿菌以及治療藥劑；研究亞洲特有高盛行率腫瘤之基因 (如腎癌)，藉由上述利用案例，可以看出該數據庫應用的前景，然而如此龐大的數據庫，需要資金維持，此數據庫是由厚生勞動省（MHLW）和日本醫療研究開發機構（AMED）共同資助。

(3) 我國狀況

我國的 WGS 計畫主要由國家衛生研究院 （NHRI）及各大醫學中心主導，我國健保資料庫目前收錄的並非完整的 WGS 原始數據，然而從 2024 年 5 月 1 日起，台灣健保已經正式將癌症精準醫療的「實體癌/血癌次世代基因定序檢測(Next-Generation Sequencing, NGS)」。

(4) 農藥安全評估相關應用及未來展望

目前對於人類健康方面，還未有將 WGS 應用在精準安全評估之應用上，然而對於微生物類的農藥，已有相關文獻利用 WGS，進行潛在的致病性/感染性以及可轉移性抗菌素耐藥性（transferable antimicrobial resistance, AMR）基因的存在評估[1]。未來如相關資料庫健全後，搭配健保資料庫或農保資料庫，由於 WGS 目前已在毒理學及風險評估應用，尤其是毒理基因組學 (Toxicogenomics)以及環境毒物易感性範疇，例如透過 WGS，可加速微生物類農藥之安全性評估[8]，或進行斑馬魚模型研究[9]，因此未來可以此方向，進行下列研究：

-農藥對個人安全評估

-農藥對特定基因之安全評估

-農藥之毒理機制研究

-農藥之動物替代試驗研析

(5) 以進階機器學習應用於疾病預測 (Advanced Machine Learning for Disease Prediction) 場次

(1) 此場次共有 5 項發表及摘要如下表 1：

表 1、以進階機器學習應用於疾病預測場次之發表

發表人	題名	摘要	曾有與農藥/毒理/風險評估相關之文獻領域
Kezhi Li University College London, United Kingdom	Real-Time Prediction of Emergency Department Admissions Using Machine Learning with Digital Twins	將數位分身（Digital Twin）應用於急診之即時使用	害物控制[2]、優化施用方法[3]、預測藥物不良反應及減少動物試驗[4]等
Rizal Dwi Prayogo Kanazawa University, Japan	Enhancing Brain Tumor Detection Using CNN-Based Transfer Learning with FineTuning and Data Augmentation	以深度學習應用於腦腫瘤之分級	以 CNN 圖像辨識害物[5]、毒性預測[6]等

Vidya Gopal T V Indian Institute of Technology Hyderabad	Non-Invasive Detection of Cerebrovascular Diseases via Doppler Acoustic Signals and Machine Learning Approaches	以機器學習進行頸動脈圖像分析，以判別中風的可能性	預測毒性、定量結構-活性關係 (QSAR) 模型、毒理基因組學數據分析[7]等
Gilian Therese B. Madrid Ateneo de Manila University, Philippines	Citywide District-Level Weekly Dengue Forecasting: Evaluation of Bayesian Spatiotemporal Models for Routine Surveillance	以機器學習進行資訊分析，而預測登革熱之盛行率	
Rosaire Mongrain Frederic Michel, Morgan Chapados and Gabriel Altit McGill University, Canada	Reduced Order Modelling of Congenital Heart Defects using Electrical Analogues for Clinical Applications	以人文的角度，進行機器學習，分析相關資訊後，以利臨床判斷	

(2) 農藥安全評估相關應用及未來展望

機器學習在醫學或病理上，已應用於相當多的領域，從輔助診療判斷，到腫瘤分期，不僅可於圖像分析上應用，亦可應用於資料分析，上述相關領域，於農藥安全評估及應用可進行以下研究：

-數位孿生（Digital Twin）技術可應用於動物飼養及環境監測

-人文數據之機器學習可應用於農藥使用之相關研究

- QSAR 模型之毒理學應用

-毒理基因組學數據分析於細胞培養或動物試驗之應用

3. 基因體學之電腦處理與精準醫療(Computational Approaches in Genomics and Precision Medicine)場次

(1) 此場次共有 9 項發表及摘要如下表 2：

表 2、基因體學之電腦處理與精準醫療場次之發表

發表人	題名	摘要	曾有與農藥/毒理/風險評估相關之文獻領域
Joung Min Choi Virginia Tech Blacksburg, Virginia, USA	Cell-specific network-based cell type prediction via graph convolutional network using transcriptomics profiles	以深度學習方法分析相關轉錄體學的資料，以利細胞種類的預測	目前深度學習之圖像分析，仍以細胞影響評估[10]及組織病理學分析為主[9]。
Tianyu, Qiu Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China	Learning Description Logic Descriptions for the Pathway Ontology Classes	以深度學習應用於腫瘤之機轉分型	

Ching-Fen Jiang Graduate Program of Smart Healthcare and Bioinformatics, I-Shou University, Kaohsiung, Taiwan	Quantification of Morphological Changes in Stem Cells for Quality Assessment	以深度學習分析圖像，以分別出幹細胞之種類，後續則將應用於疾病治療	
Ozbayoglu TOBB University of Economics and Technology, Turkiye	Deep Learning-Based Classification of Human Foot Nail Deformations: A MultiFactor Analysis	以深度學習將腳指甲的變形進行分類	
Chun-Chia Chen Division of Plastic Surgery, Department of Surgery, Chi Mei Medical Center, Taiwan	Developing Necrotizing Soft Tissue Infection Identification Model in Computed Tomography Images	以深度學習將軟組織壞死性感染，進行辨認	
Goran Vinterhalter	WiNGS-AG: A Clinically-Oriented Genomic Data	以臨床基因體學資料，建構平台，以利 NGS 分析利用	-

Department of Electrical Engineering, ESAT-STADIUS, KU Leuven, Belgium	Aggregation Platform for Federated NGS Analytics		
Huiling Shu State Key Laboratory of Digital Medical Engineering, School of Biological Science and Medical Engineering, Southeast University, Nanjing, China	Roles of G-quadruplexes in breast cancer transcriptional control	研究基因的四聯體在乳癌轉錄控制的機轉	-
Cleber França Carvalho Ubiquitous and Personal Computing Lab, Kyoto University of Advanced Science (KUAS)	Exploring Gender Differences in Interstitial Glucose Dynamics through a Systematic Multiscale Entropy Analysis	以熵的角度分析間質中葡萄糖於不同性別之動力學	-

Hongjia Liu Southeast University, School of Biological Science and Medical Engineering, State Key Laboratory of Digital Medical Engineering, China	Multi-omics analysis reveals the interaction between POSTN+ fibroblasts and myeloid cells in triple-negative breast cancer	為案例報告，利用多重體學，進行纖維母細胞及肌母細胞的差異及相關性	-
Sylvia Hsu York University, Canada	ChatGPT-4 Assisted Data Abstraction in Systematic Review of Observational Studies: A Case Study	先以 Chatgpt-4 作期刊導覽，再分析其對期刊的分析能力	-

(2) 農藥安全評估相關應用及未來展望

由上述的表格可以看出，9 篇發表中，有 5 篇是與圖像分析，隨然無論機器學習或是深度學習，皆可應用於各式資料，包括數據資料，然而應用時需要具有一定的資料量，如需應用於農藥安全評估，需先累積相關資料後，可先以常見之圖像數據開始，避免數字型數據的資料太少量，可能應用包括圖像數據：

-剖檢病變之判定及分析

-組織病變之判定及分析

-臨床症狀之判定及分析

-細胞培養影響之判定及分析

而在數字型數據或判斷方面，則可：

-農藥化學結構對臨床、病理之影響，尤其是應用於定量構效關係模型（QSAR models）

伍、心得與建議

由於 ICMHI 涵蓋的領域相當廣泛，此次參加研討會，不僅可看到人工智慧於醫學及評估於亞洲最新的研究成果外，並且將本所研究成果，推向國際，且可發現許多廠商及研究學者，除積極參與相關發表外，同時於發表中亦不諱言需尋找與會人員之合作機會，未來仍應積極參與此研討會或類似研討會，以利學研技術之更新及合作。

此次參加研討會之主講主題及其他場次，可將主題分別為：

1. 全基因組分析（Whole Genome Analysis, WGA）之建構與應用
2. 機器學習之應用
3. 深度學習之應用

對於人工智慧而言，機器學習及深度學習皆是其基石，另外在研討會中，較常提及之關鍵字包括基因體學、轉錄體學、圖像分析，因此我們可以得知針對醫學評估或應用領域中，這些關鍵字為目前主流，且可發現其應用面相當廣泛，從基因分析、癌症治療、診斷輔助、行政體系建置等，都可應用，因此藉由此次研討會及上述主題、關鍵字，未來針對農藥毒理及風險評估，如最終目標為導入人工智慧，則建議以以下步驟進行，並進行相關分述：

1. 收集相關資料及建構相關資料庫，或是利用既有資料庫

無論是機器學習、深度學習等，皆須大量資料，方能進行相關分析，而就農藥與毒理方面，可獲得大量資訊及數據的範疇，主要包括基因體學、轉錄體學、以及圖像，基因體學、轉錄體學可依不同的農藥性質 (如微生物類農藥)及影響標的生物，收集相關資料，包括以細胞試驗或活體試驗可取得之資料，另外圖像資料由於取得成本較低，可做為初步資料收集或資料庫建構之來源，而對於既有資料庫方面，則可先利用免費資料庫如臺灣人體生物資料庫、病原微生物基因體資料庫 (疾管署建置)、國家級人體生物資料庫整合平台 (國家衛生研究院)、健保資料庫等等，然而對於試驗結果資料之資料庫，則端賴

擬應用之試驗研究，進行相關搜尋。以農藥及毒理範疇方面，我國可使用之資料及資料庫相當有限，如以安全評估而言，則可利用之資料則更為數不多，且並無基因分析相關資料，就目前而言，可能可加以應用者，應為本所自行建置的相關資料庫。

2. 機器學習、深度學習、圖像分析、專家系統資源的投入及應用導入

無論是機器學習、深度學習或是圖像分析，如要建置可應用之系統，則需投入相關資源及人力，同時由於農藥、毒理、安全評估範疇所仰賴之知識相當專門，因此需要專家系統，方能提供應用方向及判別資訊正確性，與上述資料庫相同，由於圖像資源取得較為容易且較易累積數據，因此建議可由圖像分析開始，如臨床、病理、組織病理之判讀，另外由於細胞或是環境生物試驗的圖像較易取得，亦可做為資源投入初步測試，另外，在本次發表案例中，所使用之資源投入僅包括資料收集、人力投入、軟體購置，且可跨足至安全評估範疇，因此研究方式及架構，可做為未來從事類似研究方向的範例。

3. 人工智慧的應用及驗證

最後人工智慧的導入，最重要的一步，則是應用及驗證，雖然此步驟大部分是仰賴上述專家系統，但若於導入前，即收集足夠量之資料，則可藉由訓練集、測試集等概念，同時進行驗證，如本次之發表範例。另外由於人工智慧的範圍相當廣泛，因此確定明確目標，是在建構及應用前進行縝密規劃，是不可或缺的步驟，如以圖像分析而言，從此次的研討會可看出，應用目標明確，是研究及應用的重點，如以頸動脈之圖像判定其中風可能性為例，其圖像資料易取得及累積，最終判定目標明確 (中風/無中風)，因此不僅可導入人工智慧，甚至可應用於儀器設備之研發，對於農藥及毒理而言，應先依據此架構，進行研發。

此次研討會的參加及發表，不僅達成將研發成果推向國際外，並於會中習得並交流人工智慧於醫學應用之經驗，未來於農藥、毒理、安全評估之範疇中，如需導入此些技術，則可借鏡此次參與經驗，達成導入人工智慧於農藥安全評估的目的。

陸、參考文獻

1. Barrero-Canosa, J., Ebeling, J., Kenny, E.F. et al. 2025. Human health risk assessment for microbial pesticides in the EU: challenges and perspectives. Environ Health 24, 43 https://doi.org/10.1186/s12940-025-01196-1
2. Dai, Min, Yutian Shen, Xiaoyin Li, Jingjing Liu, Shanwen Zhang, and Hong Miao. 2024. "Digital Twin System of Pest Management Driven by Data and Model Fusion" Agriculture 14, no. 7: 1099. https://doi.org/10.3390/agriculture14071099
3. El Sakka, Mohammad, Mihai Ivanovici, Lotfi Chaari, and Josiane Mothe. 2025. "A Review of CNN Applications in Smart Agriculture Using Multimodal Data" Sensors 25, no. 2: 472. https://doi.org/10.3390/s25020472
4. Goldberg, Andrew L. 2024. Automated Deep Learning in Toxicologic Pathology Slide Image Analysis for Pharmaceutical Drug Development. University of Illinois Chicago. Thesis. https://doi.org/10.25417/uic.29049842.v1
5. Olawale M. Ajisafe, Yemi A. Adekunle, Eghosasere Egbon, Covenant Ebubechi Ogbonna, David B. Olawade. 2025. The role of machine learning in predictive toxicology: A review of current trends and future perspectives, Life Sciences 378 https://doi.org/10.1016/j.lfs.2025.123821
6. Tandon A, Howard B, Ramaiahgari S, Maharana A, Ferguson S, Shah R, Merrick BA. 2022. Deep Learning Image Analysis of High-Throughput Toxicology Assay Images. SLAS Discov 27(1):29-38. doi: 10.1016/j.slasd.2021.10.014.
7. Technology Networks. 2025. Scientists Create Digital Twin to Simulate Cell Behavior. https://www.technologynetworks.com/informatics/news/scientists-create-digital-twin-to-simulate-cell-behavior-402733
8. Yuan Q, Wei Z, Guan X, Jiang M, Wang S, Zhang S, Li Z. 2019. Toxicity Prediction Method Based on Multi-Channel Convolutional Neural Network. Molecules. 17;24(18):3383. doi: 10.3390/molecules24183383.
9. Zhang, Ruixue, Huate Zhu, Qinglin Chang, and Qirong Mao. 2025. "A Comprehensive Review of Digital Twins Technology in Agriculture" Agriculture 15, no. 9: 903 https://doi.org/10.3390/agriculture15090903

附件1

2025 9th International Conference on Medical and Health Informatics (ICMHI 2025)

Theme: Advancing the Art and Science of Medical Informatics with Digital Innovation

May 16-18,2025 | Kyoto, Japan

Organized by

中山醫學大學 Chung Shan Medical University

中山醫學大學附設醫院 Chung Shan Medical University Hospital

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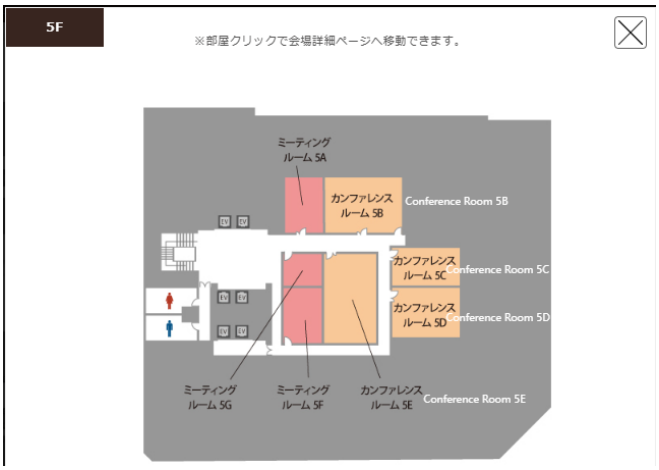
Conference Venue

TKP Garden City Kyoto | TKP ガーデンシティ京都

https://www.kashikaigishitsu.net/facilitys/gc-kyoto/
Address: Japan, 〒600-8216 Kyoto, Shimogyō-ku, Higashishiokōjichō
〒600-8216, 京都府京都市下京区烏丸通七条下ル東塩小路町 721-1 京都タワーホテル

Conference Rooms Direction



Transportation

ＪＲ山陰本線 京都駅 徒歩 2 分 | 2 minutes' walk from JR San-in Main Line Kyoto Station
ＪＲ東海道新幹線 京都駅 徒歩 2 分 | 2 minutes' walk from JR Tokaido Shinkansen Kyoto Station
JR 奈良線 京都駅 徒歩 2 分 | 2 minutes' walk from JR Nara Line Kyoto Station
JR 東海道本線 京都駅 徒歩 2 分 | 2 minutes' walk from JR Tokaido Main Line Kyoto Station
JR 湖西線 京都駅 徒歩 2 分 | 2 minutes' walk from JR Kosei Line Kyoto Station
近鉄京都線 京都駅 徒歩 2 分 | 2 minutes' walk from Kintetsu Kyoto Line Kyoto Station
京都市営地下鉄 烏丸線 京都駅 徒歩 2 分 | 2 minutes' walk from Kyoto Municipal Subway Karasuma Line Kyoto Station

*** The organizer will not reserve the accommodation. You are recommended to confirm with the conference secretary for participation mode before you finalize the reservation.**

Welcome Address

It is our great pleasure to welcome you to the 9th International Conference on Medical and Health Informatics (ICMHI 2025), to be held in Kyoto, Japan, from May 16 to 18, 2025. On behalf of the organizing committee, we extend our heartfelt gratitude for your enthusiastic support and participation.

ICMHI stands as one of Asia's most prominent international conferences dedicated to medical and health informatics, serving as a vital platform for scholars, professionals, and industry leaders from across the globe. By fostering interdisciplinary collaboration and knowledge exchange, ICMHI not only accelerates scientific progress in Asia but also contributes to shaping the global future of healthcare.

This year, our theme, "Advancing the Art and Science of Medical Informatics with Digital Innovation," underscores the transformative impact of emerging technologies on healthcare delivery and research. Digital innovation is fundamentally reshaping the landscape of medical informatics, enabling healthcare to become more personalized, efficient, and accessible than ever before. Together, we will examine how digital technologies, from artificial intelligence and data analytics to telemedicine and wearable devices-are redefining healthcare delivery and research, while navigating the complexities these advancements bring to our field.

Kyoto, with its rich cultural heritage, offers an inspiring backdrop for this intellectual exchange. Whether you are joining us in person or participating virtually through our customized web platform, we invite you to immerse yourself in a true feast of knowledge-engaging with leading experts, exchanging ideas, and forging partnerships that will shape the future of medical informatics.

We are deeply grateful to all contributors, including our program and organizing committees, whose dedication ensures the success of ICMHI 2025. May this conference be a rewarding and memorable experience for you all. We look forward to your active participation and to welcoming you again at future ICMHI events.

Prof. Taka-Aki Sato
Conference Chair

Prof. Chi-Chang Chang
Conference Chair

AGENDA

May 18 (Sunday)

Instructions for Physical Presentations

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Duration of each Presentation

Keynote Speech: about 45 Minutes of Presentation and 5 Minutes of Question and Answer
Regular Oral Presentation: about 10 Minutes of Presentation and 2 Minutes of Question and Answer.

Instructions for Poster Presentations

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Poster size is A1, it should be vertical
Load Capacity: Holds up to 0.5 kg

Poster Session: There is Q&A part for all posters, so each presenter is required to stand in front of the poster for interaction with other participants.

Dress code

Please wear formal clothes or national representative of clothing.

Instructions for Online Presentations

➢ **Time Zone**

The time shown in this schedule is **Greenwich Mean Time+9 (GMT+9).**

➢ **Equipment Provided by the Presenters**

1. A computer with an internet connection (wired connection recommended)
2. USB plug-in headset with a microphone (recommended for optimal audio quality)
3. Webcam (optional): built-in or USB plug-in

➢ **Environment requirement**

1. Quiet Location and Proper lighting
2. Stable Internet Connection
3. Suitable Background

➢ **Duration of each Presentation**

Regular Oral Presentation: about **10 Minutes of Presentation** and 2 Minutes of Question and Answer.

How to use ZOOM

Step 1: Download Zoom from the link: **https://zoom.us/download**

China Mainland Users: https://www.zoom.com.cn/download

Step 2: Sign up an account.

Step 3: Set up the languages and do some basic test.

Step 4: Get familiar with the basic functions: Rename, chat, raise hands, and screen share, etc.

1. **Rename:** Before you enter the conference room, please change your name to Paper ID + Name
2. **Chat and raise your hand:** During the session, if you have any questions about the operation of zoom, please let us know by clicking "raise your hands" and use "chat" to communicate with conference secretary.

   During the Question section, if you have any questions about keynote speaker or authors, you can also click "raise your hands" or "chat"
3. **Share Screen:** Please open your power point first, and then click "share screen" when it's your turn to do the presentation.

Notes: How to join the conference online.

1. Find your paper ID and suitable meeting ID on the conference program.
2. Open the ZOOM, click the join, paste the meeting ID, then you can join the conference.
3. Click the stop share after you finish your presentation.

Brief Schedule of Conference

May 16, 2025 | Friday

Time	Arrangement	Venue
Onsite		
10:00-17:00	Onsite Registration & Materials Collection	**5F: 5G**
Online (GMT+9)		
11:00-11:50	Online Test: YA0063, YA0087, YA0136, YA0215, YA0156, YA0029, YA0120, YA0214, YA0149, YA0127	**Meeting ID: 854 7237 4956**

May 17, 2025 | Saturday

Time	Arrangement	Venue
Onsite		
08:00-09:22	**Student Essay Competition -Undergraduate Session I** 6 presentations: YA0229, YA0230, YA0231, YA0233, YA0234, YA0237 **Chaired by:** Prof. Yen-Wei Chu, National Chung Hsing University, Taiwan Dr. Xiucai Ye, University of Tsukuba, Japan Prof. Yang Xu, Peking University, China	**5F: 5C**
09:30-09:50	**Opening Remarks** Prof. Chi-Chang Chang, Chung-Shan Medical University, Taiwan Prof. Taka-Aki Sato, University of Tsukuba, Japan Superintendent Prof. Ming-Che Tsai, Chung Shan Medical University Hospital, Taiwan Prof. Tetsuya Sakurai, University of Tsukuba, Japan Prof. Wen-Wei Chang, Chung-Shan Medical University, Taiwan	**9F: 八阁**

09:50-10:40	**Keynote Speech** Prof. Hitoshi Nakagama President, Japan Agency for Medical Research and Development (AMED) / Honorary President, National Cancer Center (NCC)	**9F: 八阁**
	Moderator Superintendent Prof. Ming-Che Tsai, Chung Shan Medical University Hospital, Taiwan **Q&A:** Prof. Wen-Wei Chang, Chung-Shan Medical University, Taiwan	
Online		
09:50-10:40	**Student Essay Competition -Graduate Session I** Master Session: 4 presentations: YA5003, YA5004, YA5005, YA5006 **Chaired by:** Dr. Hsien-Wei Ting, Taipei Hospital, Ministry of Health and Welfare, Taiwan Dr. Chalong Cheewakriangkrai, Chiang Mai University, Thailand Dr. Bolormaa Purevdorj, Medical Science University of Mongolia, Mongolia Prof. Ahmet ALTUN, Sivas Cumhuriyet University, Turkiye	**Meeting ID: 854 7237 4956**
10:40-11:10	**Group Photo & Coffee Break**	

Parallel Sessions		
11:10-12:00	**Poster Session 1:** Predictive analysis and health monitoring for preventive medical service management 9 presentations: YA0017-A, YA0045-A, YA0062-A, YA0077, YA0121-A, YA0140-A, YA0143-A, YA0152-A, YA0203-A **Chaired by:** Prof. Frank Shou-Cheng Tseng, National Kaohsiung University of Science and Technology, Taiwan **Poster Session 2:** AI intelligent technology and application in digital medical system 9 presentations: YA0019-A, YA0092-A, YA0093-A, YA0096, YA0098-A, YA0183-A, YA0185-A, YA0021-A, YA0036-A **Chaired by:** Dr. William.Yu Chung Wang, University of Waikato, New Zealand **Poster Session 3:** Early detection and diagnosis of diseases based on bioinformatics 10 presentations: YA0054-A, YA0060-A, YA0075, YA0139-A, YA0179-A, YA0184-A, YA0187-A, YA0196-A, YA0198-A, YA0199-A **Chaired by:** Prof. Hao-Yun Kao, Kaohsiung Medical University, Taiwan **Poster Session 4:** Image-based intelligent diagnosis and disease analysis 9 presentations: YA0037-A, YA0043-A, YA0044, YA0080, YA0226-A, YA0227-A, YA0228-A, YA0076-A, YA0113-A **Chaired by:** Prof. Wen-Wei Chang, Chung-Shan Medical University, Taiwan **Poster Session 5**: Machine Learning Approaches for Clinical Data Analysis 9 Presentations: YA0167, YA0188, YA0207, YA0150, YA0151, YA0166, YA0071-A, YA0052-A, YA0026-A **Chaired by:** Prof. Tetsuya Sakurai, University of Tsukuba, Japan	**9F: 八阁**

Note: There is Q&A part for all posters, so each presenter is required to stand in front of the poster for interaction with other participants. Best poster presentation would be chosen by the chair.

11:10-11:22	**Student Essay Competition -Graduate Session II** Master session: 1 presentation: YA0232 **Chaired by:** Prof. Hsi-Chieh Lee, National Quemoy University, Taiwan Prof. Yonggang Lu, Lanzhou University, China Prof. Ahmet Murat Özbayoğlu, TOBB University of Economics and Technology, Turkiye	**5F: 5C**
11:22-11:58	**Student Essay Competition -Graduate Session III** PhD session: 3 presentations: YA0079, YA0094, YA0147 **Chaired by:** Prof. Hsi-Chieh Lee, National Quemoy University, Taiwan Prof. Yonggang Lu, Lanzhou University, China Prof. Ahmet Murat Özbayoğlu, TOBB University of Economics and Technology, Turkiye	
12:00-13:00	**Lunch Time**	
Parallel Sessions		
13:00-14:00	**Session 1**: Advanced Machine Learning for Disease Prediction 5 presentations: YA0041, YA0137-A, YA0055, YA0163, YA0173-A **Chaired by:** Prof. Ahmet Murat Özbayoğlu, TOBB University of Economics and Technology, Turkiye	**5F: 5B**
13:00-14:12	**Session 2**: Personalized Health and Explainable AI 6 presentations: YA0005, YA0162-A, YA0047, YA0074, YA0157-A, YA0031 **Chaired by:** Prof. Hsi-Chieh Lee, National Quemoy University, Taiwan	**5F: 5E**
13:00-14:12	**Session 3**: Predictive Analytics in Clinical Treatment Optimization 6 presentations: YA0219-A, YA0061, YA0126, YA0220-A, YA0177-A, YA0221-A **Chaired by:** Prof. Yen-Wei Chu, National Chung Hsing University, Taiwan	**5F: 5D**

13:00-13:48	**Special Session**: Deep Learning for Biomolecular Interaction and Multi-Omics Integration 4 Presentations: YA0239-A, YA0240-A, YA0241-A, YA0242-A **Chaired by:** Dr. Xiucai Ye, University of Tsukuba, Japan	**5F: 5C**
Parallel Sessions		
14:00-15:12	**Session 4**: Intelligent Non-Invasive Diagnostics and Rehabilitation 6 presentations: YA0012-A, YA0153, YA0083, YA0084, YA0122-A, YA0174-A **Chaired by:** Prof. Frank Shou-Cheng Tseng, National Kaohsiung University of Science and Technology, Taiwan	**5F: 5B**
14:12-15:24	**Session 5:** Patient Engagement and Resource Optimization 6 presentations: YA0050-A, YA0064-A, YA0081-A, YA0125-A, YA0148, YA0116 **Chaired by:** Prof. Wen-Wei Chang, Chung-Shan Medical University, Taiwan	**5F: 5E**
14:12-15:24	**Session 6**: Large Language Models and Decision Support 6 presentations: YA0155-A, YA0067, YA0088, YA0051, YA0171, YA0068 **Chaired by:** Prof. Yonggang Lu, Lanzhou University, China	**5F: 5D**
13:48-15:24	**Session 7**: Innovations in Digital Health Policy and Prognostic in Asia 8 presentations: YA0078, YA0123-A, YA0073, YA0146-A, YA0164-A, YA0212, YA5002-A, YA0186-A **Chaired by:** Dr. William.Yu Chung Wang, University of Waikato, New Zealand	**5F: 5C**
15:24-15:40	**Break Time**	
Parallel Sessions		
15:40-17:40	**Session 8**: Data-Driven Approaches for Enhancing Healthcare Outcomes 10 presentations: YA0022-A, YA0035-A, YA0066, YA0170, YA0117, YA0030-A, YA0058-A, YA0082, YA0013-A, YA0015-A **Chaired by:** Prof. Hao-Yun Kao, Kaohsiung Medical University, Taiwan	**5F: 5B**

15:40-17:28	**Session 9**: Information Security and Health Science 9 presentations: YA0112, YA0119, YA0190-A, YA0161-A, YA0197-A, YA0208, YA0213, YA0103-A, YA0160 **Chaired by:** Prof. Yang Xu, Peking University, China	**5F: 5E**
15:40-17:16	**Session 10**: AI-Powered Patient Journey and Design Science Framework 8 Presentations: YA0046-A, YA0059, YA0091, YA0201-A, YA0224, YA0144, YA0114, YA0211-A **Chaired by:** Dr. Ting-Ying Chien, Yuan Ze University, Taiwan	**5F: 5D**
15:40-17:28	**Session 11:** Computational Approaches in Genomics and Precision Medicine 9 presentations: YA0042, YA0072, YA0085-A, YA0090-A, YA0130-A, YA0172-A, YA0097-A, YA0070-A, YA0225-A **Chaired by:** Prof. Yen-Wei Chu, National Chung Hsing University, Taiwan	**5F: 5C**
18:00-18:30	**Closing Ceremony**	**9F: 八閣**
18:30-20:00	**Dinner**	**9F: 八閣**

May 18, 2025 | Sunday

Time	Arrangement	Venue
Onsite		
09:10-18:00	**One Day Visit**	**Lobby of TKP Garden City Kyoto**
Online		
Parallel Sessions		
10:30-11:42	**Session 12**: Advanced Predictive Modeling for Healthcare Outcomes 6 presentations: YA0087, YA0063, YA0136, YA0215, YA0154-A, YA0158 **Chaired by:** Prof. Yi-Ju Tseng, National Yang Ming Chiao Tung University, Taiwan	**Meeting ID: 854 7237 4956**
11:42-12:00	**Break Time**	
12:00-13:12	**Session 13**: Interoperability and Personalized Interventions for Improved Patient Care 6 Presentations: YA0156, YA0029, YA0120, YA0214, YA0149, YA0127 **Chaired by:** Dr. Hsien-Wei Ting, Taipei Hospital, Ministry of Health and Welfare, Taiwan	**Meeting ID: 854 7237 4956**

Notes

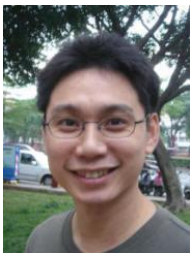
- **Online participants need to join the test session on time. On May 16, 2025**, we will have the test session and online sign-in. Please join the test session before the formal session.
- Onsite participants need to do arrival registration. On May 16, 2025, we will have arrival registration and conference materials collection.
- Please pay special attention to the **time difference** and all schedules are arranged based on **GMT+9**. You can change the time on your watch and phone to **GMT+9** in advance in case you are confused with the time difference.
- Please try to find a **quiet environment**. In addition to the presentation and question section, the host will mute your microphone all the way.
- Please get familiar with the basic functions: **Rename, Chat, Raise Hands, and Share Screen.**
- Please join the session 10 minutes earlier and attend the whole conference. **Official electronic receipt and certificate** will be sent to you via e-mail after the conference.
- Only the organizer can record the video. Please **do not record** the video during the meeting.
- For participants who will attend the physical conference, the organizer doesn't provide accommodation, and we suggest you make an early reservation.
- For your property safe, please take good care of your valuables during the entire conference. The conference organizer does not assume any responsibility for your personal losses.
- For personal and property safety of delegates, please wear the conference Representative Card when enter and exit the venue. And wear it near the conference venue. Do not lend your card to someone unrelated to the conference. Do not bring unrelated people into the venue.
- ***There is Q&A part for all posters, so each presenter is required to stand in front of the poster for interaction with other participants. Best poster presentation would be chosen by the chair.***

Student Essay Competition-Undergraduate Session I

08:00 - 09:22, GMT+9 | May 17, 2025 | Saturday

Venue: Conference Room 5C, the 5th floor

Chaired by:



Prof. Yen-Wei Chu, National Chung Hsing University, Taiwan

Dr. Xiucai Ye, University of Tsukuba, Japan

Prof. Yang Xu, Peking University, China

08:00-08:12	**YA0229**
	Deep Learning-Based 3D Segmentation of White Matter Hyperintensities and Its Impact on Urinary Biomarker Prediction **Zi-Ling Su**[1], Yu-Jou Lai[1], Chia-Ying Lee[2] and Ting-Ying Chien[1] 1: Yuan Ze University, Taiwan 2: Radiological Diagnosis Division, Far Eastern Memorial Hospital
08:12-08:24	**YA0230**
	Multimodal Anomaly Detection Model for Amputation Risk Assessment in Diabetic Foot Patients **Cheng-Yu Lin**[1], Dun-Hao Chang[2], Chao-Ju Lin[2] and Ting-Ying Chien[1] 1: Yuan Ze University, Taiwan 2: Radiological Diagnosis Division, Far Eastern Memorial Hospital
08:24-08:36	**YA0231**
	Automated Detection of Demodex Mites in Eyelash Root Microscopic Images Using YOLOv11 and DETR Deep Learning Models **Ya-Ling Tseng**[1], Cheng-Yui Lin[1], Elsa Lin-Chin Mai[2] and Ting-Ying Chien[1] 1: Yuan Ze University, Taiwan 2: Radiological Diagnosis Division, Far Eastern Memorial Hospital
08:36-08:48	**YA0233**
	Constructing a Carbon Footprint Management and Decision-Aiding Framework for Medical Laboratory Operations: A Case Study of Taiwan **Yu Chiang,** Po-Chun Chen, Jhen-Teng, Shih-Yuan Gao, Chih-Lei Lu, Shih-Shan Tai, De-Rui Chen and Chi-Jie Lu Fu Jen Catholic University
08:48-09:00	**YA0234**
	Development an Intelligent Carbon Footprint Verification Management System for Health Examination Companies in Taiwan **Yi-Ting Tsai,** You-Hua Wang, Chi-Wen Jeng, Yu-Ying Chan, Hsin-Jou Chen, Guang-Wei Yu, De-Rui Chen and Chi-Jie Lu Fu Jen Catholic University, Taiwan

09:00-09:12	YA0237

Prediction of the occurrence of the first head and neck cancer and the development of the second lung cancer

Chi-Chang Chang, **Yun-Shan Hsieh** and Hsiao-Hui Hsu
Chung Shan Medical University Hospital, Taiwan

Venue: 八閣, the 9th floor

Opening Remarks

9:30-9:50 (GMT+9) | 17thMay

Conference Founder
Prof. Chi-Chang Chang
Chung-Shan Medical University, Taiwan

Conference Chair
Prof. Taka-Aki Sato
University of Tsukuba, Japan

Honorary Chair
Superintendent Prof. Ming-Che Tsai
Chung Shan Medical University Hospital, Taiwan

Rotating Chair
Prof. Tetsuya Sakurai
University of Tsukuba, Japan

Rotating Chair
Prof. Wen-Wei Chang
Chung-Shan Medical University, Taiwan

Keynote Speaker

9:50-10:40(GMT+9) | 17thMay

Hitoshi Nakagama

President, Japan Agency for Medical Research and Development (AMED) / Honorary President, National Cancer Center (NCC)

Hitoshi Nakagama has served as President of Japan Agency for Medical Research and Development (AMED) and Honorary President of National Cancer Center (NCC). He graduated from the University of Tokyo in 1982 and received Ph.D. in 1991. He then joined MIT, Center for Cancer Research, and worked with Prof. D.E. Housman on functional analysis of a tumor suppressor gene, WT1. After returning back to Japan in 1995, he took up a position at NCC Research Institute (NCCRI), and became Chief, Biochemistry Division (1997), Deputy Director (2007), and Director of NCCRI in 2011. He had worked at NCCRI on animal models of colon carcinogenesis induced by various environmental carcinogens and on DNA adductome to elucidate genetic/epigenetic alterations that play pivotal roles in driving cancer development. He also identified several tumor suppressive microRNAs regulating cell cycle arrest and/or apoptosis after exposure to environmental insults.

Positions and Employment:

- 1984 Clinical Staff, The 3rd Department of Internal Medicine, University of
- Tokyo, Faculty of Medicine
- 1988 Research Associate, University of Tokyo, Faculty of Medicine
- 1991 Postdoctoral Fellow, Center for Cancer Research, MIT, U.S.A.
- 1995 Section Head, Carcinogenesis Division, National Cancer Center Research
- Institute (NCCRI)
- 1997 Chief, Biochemistry Division, NCCRI
- 2007 Deputy Director, NCCRI
- 2011 Director, NCCRI
- 2012 Executive Director, National Cancer Center (NCC)
- 2016-April 1, 2025-March President, NCC
- 2025- April 1, President, Japan Agency for Medical Research and Development (AMED) / Honorary President, National Cancer Center (NCC)

Education:

- 1982 University of Tokyo, Faculty of Medicine, M.D.,
- 1992 University of Tokyo, Faculty of Medicine, D. M.Sc

Topic: A perspective on future healthcare delivery in Japan with whole genome analysis

Abstract—Cancer genomic medicine in Japan began with the implementation of the comprehensive genetic profiling (CGP) test under the national health insurance system in June 2019. From the outset of clinical implementation, the government has stored the genomic data from the CGP testing, along with relevant clinical information, in the Center for Cancer Genomics and Advanced Therapeutics (C-CAT) repository database, established at the National Cancer Center, Japan. To date, genomic data and clinical information from more than 100,000 patients has been collected in C-CAT and the data has been widely utilized by academia and industry since 2021. However, only around 10% of cancer patients who received the CGP test have gone on to receive personalized treatment reflecting the genetic alterations observed in their own tumors. To further expand on the opportunity for cancer patients to receive optimized treatments based on the results of their genetic profiling, the Japanese government has launched the Whole Genome Analysis (WGA) project. The project's implementation involves the strategic collection of whole genome sequence (WGS) data and clinical information under the "Action Plan for WGA 2022". The project aims to collect and analyze 100,000 WGS as well as multi-omics data of both cancer patients and those with intractable diseases, using high quality clinical information. The project also plans to integrate various other healthcare-related data, such as digitalized lifestyle data, pathological and imaging data. The project has been funded collaboratively by the Ministry of Health, Labour and Welfare (MHLW) and the Japan Agency for Medical Research and Development (AMED). Future perspectives on precision medicine by construction of integrated medical databases will be presented and discussed.

Student Essay Competition-Graduate

Session I

9:50-10:40, GMT+9 | May 17, 2025 | Saturday

Meeting ID: 854 7237 4956

Chaired by:

Dr. Hsien-Wei Ting, Taipei Hospital, Ministry of Health and Welfare, Taiwan

Dr. Chalong Cheewakriangkrai, Chiang Mai University, Thailand

Dr. Bolormaa Purevdorj, Medical Science University of Mongolia, Mongolia

Prof. Ahmet ALTUN, Sivas Cumhuriyet University, Turkiye

Master session (online)	
09:50-10:02	**YA5003**
	The Classification of COVID-19 CT Scans Using Deep Learning and Transfer Learning Algorithms **Jessline Hu** and Hsi-chieh Lee National Quemoy University, Taiwan
10:02-10:14	**YA5004**
	Breast Cancer Diagnosis by CT Scans Using CLAHE and Deep Learning Algorithms **Darryl Valencio Wijaya Oey** and Hsi-Chieh Lee National Quemoy University, Taiwan
10:14-10:26	**YA5005**
	Data-Driven Queue Management in Phlebotomy Services through A Multi-Step Ahead Forecasting Approach with Explainable Feature Selection **Kuo-Ching Kao** and Chi-Jie Lu Fu Jen Catholic University, Taiwan
10:26-10:38	**YA5006**
	Early Detection of Crop Health Using Machine Learning Techniques **Sih-Han Chen**[1], Gui-Chou Linag[1], Shu-Mei Dai[1] and Yen-Wei Chu[1,2] 1: National Chung Hsing University, Taiwan 2: Smart Sustainable New Agriculture Research Center (SMARTer), Taiwan

Poster Session 1
Predictive analysis and health monitoring for preventive medical service management

11:10-12:00, GMT+9 | May 17, 2025 Saturday

Venue: 八阁, the 9th floor

Chaired by:

Prof. Frank Shou-Cheng Tseng

National Kaohsiung University of Science and Technology, Taiwan

YA0017-A

Development and implementation of a patient-centered mobile app self-management program for patients with osteoarthritis: a randomized controlled trial

Jung-Hua Shao[1] and Su-Hui Chen[2]
1: Chang Gung University, Taiwan
2: Chang Gung University of Science and Technology, Taiwan

YA0045-A

The Impact of Quizizz Instant Feedback Mechanism on Learning Attention in Basic Nursing among Junior College Nursing Students

Pao-Yu Wang
Department of Nursing, MacKay Junior College of Medicine, Nursing and Management, Taiwan

YA0062-A

Detecting the Risk of suicide attempts among first-year College Students: Machine Learning approach

Li-Chung Lin[1], Chih-Han Leng[2] and Grace Yao[2]
1: Chung Yuan University, Taiwan
2: National Taiwan University, Taiwan

YA0077

Data-Driven Surgery Planning under Start Time-Dependent Uncertainty

Janine Rottmann and Kai Günder
Julius-Maximilians-Universität, Germany

YA0121-A

The Association between Age and Nutritional Status on Developmental Outcomes among Children with Down Syndrome in Indonesia

Hajeng Wulandari, Irwanto, Ahmad Suryawan, Mira Irmawati and Ariani
Universitas Airlangga, Surabaya, Indonesia

YA0140-A

Enhancing Drug-Drug Interaction Prediction with Mamba State-Space Models

Jong Hyeun Koa and Kyuri Jo
Chungbuk National University, Republic of Korea

YA0143-A

Understanding Depression without Bring Depressed --- The Innovative Teaching on Nursing Students' Learning Experience in Depression Education

Tienyi Tsao
MacKay Junior College of Medicine, Nursing and Management, Taiwan

YA0152-A

The impact of practical courses in alternative complementary therapies on nursing students: Taking "Kagaya Miyamoto Shiki music care" as an example

Tien-Hui Luo
Department of Nursing, MacKay Junior College of Medicine, Nursing and Management

YA0203-A

Telenursing on Diabetes Mellitus management among older person: A scoping review

Elaine Chow Hoi Yee, Tang Lok Ching, Fung Hiu Laam and Fung Kam Chi
School of Nursing, Tung Wah College, Hong Kong, China

Poster Session 2
AI intelligent technology and application in digital medical system

11:10-12:00, GMT+9 | May 17, 2025 Saturday

Venue: 八阁, the 9th floor

Chaired by:

Dr. William.Yu Chung Wang

University of Waikato, New Zealand

YA0019-A

What do they want? Expectations of an online self-management program for patients with rheumatoid arthritis - a qualitative study

Su-Hui Chen[1] and Jung-Hua Shao[2]
1: Department of Nursing, Chang Gung University of Science and Technology, Taiwan
2: School of Nursing, College of Medicine, Chang Gung University, Taiwan

YA0092-A

Analysis of Risk Factors for Comorbidity of Acute Exacerbation of Chronic Obstructive Pulmonary Disease and Non-ST-Segment Elevation Acute Coronary Syndrome

Hui Wang
Chongqing Rongchang Hospital of Traditional Chinese Medicine, China

YA0093-A

Machine learning model for early prediction of Asthma in Mycoplasma Pneumoniae Pneumonia

Rong Hu
Chongqing University Affiliated Three Gorges Hospital, China

YA0096

University Students' Perspectives on AI-Enabled Wearable Health Technologies: Key Insights for Healthcare Innovation

Haitham Alzghaibi
Department of Health Informatics, College of Applied Medical Sciences, Qassim University, Buraydah, Saudi Arabia

YA0098-A

Postoperative Recurrence Prediction of HCC Based on Adaptive Fusion of Multimodal Features

Jianwei Li and **Yonggang Lu**
Lanzhou University, China

YA0183-A

Multi-Modal Deep Learning for COVID-19 Severity Prediction

Soojung Ha, Juho Park and Kyuri Jo
Chungbuk National University, Cheongju, Republic of Korea

YA0185-A

Artificial Intelligence Methods for Intelligent Muscle Mass Measurement and Assessment System

Hui-Ci Huang[1], Wen-Hsien Ho[1] and Yen-Ming Chen[2]
1: Kaohsiung Medical University, Kaohsiung, Taiwan
2: National Kaohsiung University of Science and Technology, Kaohsiung, Taiwan

YA0021-A

Development and validation of a nomogram for arthritis: a cross-sectional study based on the NHANES

Yue Lin, Yaxin Feng, Shanke Wu, Hai Kang, Xi Han and Baoguo Wang
Guangdong Pharmaceutical University, China

YA0036-A

Development of Predictive Models for Ventilator Dependence and Weaning in Intracranial Hemorrhage Patients: A Deep Learning and Transfer Learning Approach

Hsueh-Yi Lu and Huang Jin Ru
National Yunlin University of Science and Technology, Taiwan

Poster Session 3
Early detection and diagnosis of diseases based on bioinformatics

11:10-12:00, GMT+9 | May 17, 2025 Saturday

Venue: 八阁, the 9th floor

Chaired by:

Prof. Hao-Yun Kao

Kaohsiung Medical University, Taiwan

YA0054-A

Connecting the 'Diabetes' Network – Constructing an Integrated Patient-Centered Diabetes Care Model in Rural Areas

Jun-Fan Chou, Yen-Tzu Chou, Yue-Hsi Lee, Jia-Yu Wei, Yin-Gju Xiao and Jun-Wei Chang
Ministry of Health and Welfare, Chishan Hospital, Taiwan

YA0060-A

Metabolism team uses balanced scorecard to improve diabetes care quality and effectiveness

Yen-Tzu Chou, Jun-Fan Chou, Yue-Hsi Lee and Jun-Wei Chang
Ministry of Health and Welfare Qishan Hospital, Taiwan

YA0075

Maternal Anti-HLA Class I Antibodies as Predictive Biomarkers for Preterm Birth: A Study in the Thai Population

Sirikul Laosrivichit[1], Pattarin Tangtanatakul[2] and Yong-Fei Wang[1]
1: Chulalongkorn University, Thailand
2: The Chinese University of Hong Kong Shenzhen, Guangdong, P. R. China

YA0139-A

Identification of tumor suppressor miRNA to regulate FXYD3 in pancreatic cancer cells

Ke Xin Yee and **Kuen-Haur Lee**
Taipei Medical University, Taiwan

YA0179-A

Basic Solution Properties and Antimicrobial Performance of Laurimino Bispropanediol as an Alternative Cosmetic Preservative

Joonwon Bae[1], Iyeon Kim[1], Minjeong Jeon[1], Seungbin Song[1], Sojung Yang[1], Seol-Hoon Lee[1], Taeshik Earmmen[2] and Sung-Hoon Park[3]
1: Dongduk Women's University, Seoul, Republic of Korea
2: Hongik University, Seoul, Republic of Korea
3: Soongsil University, Seoul, Republic of Korea

YA0184-A

The Relationship between Oral Health and Diabetes Control Indicators in Patients with Diabetes

Jou-Hsun Lee and Hsueh-Fen Chen
Kaohsiung Medical University, Kaohsiung, Taiwan

YA0187-A

Redox Responsive Coumarin-Triphenyliminophosphorane Fluorophores: A Novel Probe for Ferric Ion Detection

Yi-Chia Lin, Shiao-Chen Huang and **Chih-Chien Chu**
Chung Shan Medical University, Taiwan

YA0196-A

The role of Hemodialysis nurses in caring for patients with tertiary hyperparathyroidism undergoing parathyroidectomy: an experience at Ramathibodi Chakri Naruebodindra Hospital

Wilawan Premchun, Raphassa Praepataraprasit and Wasana Lavin
Ramathibodi chakri Naruebodindra Hospital, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand

YA0198-A

Specific antibody against a commensal streptococcal protein as a novel biomarker for the diagnosis and prognosis of systemic lupus erythematosus

Chiau-Jing Jung[1] and Yu-Min Kuo[2]
1: Taipei Medical University, Taiwan
2: National Taiwan University, Taiwan

YA0199-A

A Comparative Study of The effects of basic ECG interpretation training among outpatient nurses

Orawan Bootthumpan, Wasana Lavin and Nopamas Maneechote
Ramathibodi Chakri Naruebodindra Hospital, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand

Poster Session 4
Image-based intelligent diagnosis and disease analysis

11:10-12:00, GMT+9 | May 17, 2025 Saturday

Venue: 八阁, the 9th floor

Chaired by:

Prof. Wen-Wei Chang

Chung-Shan Medical University, Taiwan

YA0037-A

Trauma Analysis of a Gunshot Wound and Shotgun Wound by Digital Image Processing and Image Analysis

Duenprond Wipaswatcharayotin[1], Tayavee Chaitanarodge[1], **Kanyanat Rattanamanorom**[1], **Jetniphit Srisinghasongkram**[1] and Tawachai Monum[2]
1: Faculty of Criminology and Justice Administration Rangsit University
2: Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, Thailand

YA0043-A

Unsupervised Clustering for Sepsis Identification in Large-scale Patient Data: A Model Development and Validation Study

Na Li[1], Kiarash Riazi[1], **Jie Pan**[1], Kednapa Thavorn[2], Jennifer Ziegler[3], Bram Rochwerg[4], Hude Quan[1], Hallie C. Prescott[5], Peter Dodek[6] and Allan Garland[3]
1: University of Calgary, Canada
2: Ottawa Hospital Research Institute, Canada
3: University of Manitoba, Canada
4: McMaster University, Canada
5: University of Michigan, USA
6: St. Paul's Hospital and University of British Columbia, Canada

YA0044

Enhancing Fine-Grained Medical Image Classification Accuracy Via Test-Time Object Detection

Po-Chun Chuang[1,2] and Ye-In Chang[1]
1: National Sun Yat-sen University Taiwan
2: Department of Emergency Medicine Kaohsiung Chang Gung Memorial Hospital

YA0080

A Method to Assess Visual Fatigue Using Moving Ripple Patterns

Yu-Qi Chen, I-Chen Lin, Jyh-Da Wei and Chi-Jen Wu
Chang Gung University, Taiwan

YA0226-A

Detection of Contrast Agent Backflow in Coronary Angiography Images Based on U-Net Model

Yi Hsiu Liu, Miao Xuan Xiao and Ting Ying Chien
Yuan Ze University, Taiwan

YA0227-A

Drug Recognition Based on Deep Learning Models to Enhance Medication Safety

Kuan-Ti Chiang, Lin-Yi Cheng and Ting Ying Chien
Yuan Ze University, Taiwan

YA0228-A

Automated Blepharitis Detection via Lower Eyelid Contour Analysis Using YOLO and Image Processing Methods

Zi Ling Liu, Yu Ju Liu and Ting Ying Chien
Yuan Ze University, Taiwan

YA0076-A

A Motion Video Scoring System for Supporting Patient Rehabilitation

Cheng-Wei Liu and **Tzu-Hsien Yang**
National Cheng Kung University, Taiwan

YA0113-A

Attention-Based Imputation for Block-wise Missing Data in Multimodal Alzheimer's Disease Classification

Chen-ju Lin and Yin-ting Lin
Yuan Ze University, Taiwan

Poster Session 5
Machine Learning Approaches for Clinical Data Analysis

11:10-12:00, GMT+9 | May 17, 2025 Saturday

Venue: 八阁, the 9th floor

Chaired by:

Prof. Tetsuya Sakurai

University of Tsukuba, Japan

YA0167

Predicting Length of Stay in Appendectomy Patients: A Machine Learning Approach

Andrea Fidecicchi[1], Ida Santalucia[2], Antonella Toscano[1], Antonio D'Amore[3], Carlo Bernardo[3] and Giovanni Improta[1]
1: University of Naples "Federico II", Naples, Italy
2: University of Pavia, Pavia, Italy
3: A. Cardarelli Hospital, Naples, Italy

YA0188

Machine learning techniques are compared to evaluate their prediction performance for the length of stay (LOS) in patients undergoing appendicitis surgery

Arianna Scala[1], Ida Santalucia[2], Maria Triassi[1] and Giovanni Improta[1]
1: University of Naples "Federico II", Naples, Italy
2: University of Pavia, Pavia, Italy

YA0207

Machine learning performance comparison to calculate Length of Stay

Arianna Scala[1], Ida Santalucia[2], Paolo Montuori[1] and Giovanni Improta[1]
1: University of Naples "Federico II", Naples, Italy
2: University of Pavia, Pavia, Italy

YA0150

Neural Networks to predict LOS of Patients Having Heart Bypass Surgery

Ida Santalucia[1], Carlo Bernardo[2], Antonella Toscano[3], Emanuele Mario Caputi[2], Antonio D'Amore[2] and Maria Triassi[1]
1: University of Pavia, Pavia, Italy
2: A. Cardarelli Hospital, Naples, Italy
3: University of Naples "Federico II", Naples, Italy

YA0151

Comparison of machine learning techniques to evaluate performance in predicting hospital stay

Andrea Fidecicchi[1], Ida Santalucia[2], Antonella Toscano[1], Mario Massimo Mensorio[3], Emanuele Mario Caputi[3] and Maria Triassi[1]
1: University of Naples "Federico II", Naples, Italy
2: University of Pavia, Pavia, Italy
3: A. Cardarelli Hospital, Naples, Italy

YA0166

Machine learning methods comparisons to predict LOS performance for Patients undertaking Knee replacement Surgery

Andrea Fidecicchi[1], Ida Santalucia[2], Antonella Toscano[1], Mario Massimo Mensorio[3], Emanuele Mario Caputi[3] and Arianna Scala[1]
1: University of Naples "Federico II", Naples, Italy
2: University of Pavia, Pavia, Italy
3: A. Cardarelli Hospital, Naples, Italy

YA0071-A

Exploring the Potential of Health Informatics in Self-Management Programs to Enhance Quality of Life in Elderly Heart Failure Patients

Yi-Chun Kao
Chang Gung University, Taiwan

YA0052-A

Attack classification model using medical device network traffic data

Ko seung hyoung, Wang da woon, Lee jin hyung, Kim myung gwan, Park joon ho and Han hyun wook
CHA university, Republic korea

YA0026-A

Prediction of deterioration of patients with dyspnea in emergency department

Sung-Hyuk Choi[1], Byung Chul Ko[2], Gil Gon Kim[3] and Kyung Nam Kim[4]
1: Institute for trauma research, Korea university Guro hospital
2: KMI Co, Ltd
3: InnoRules Co, Ltd
4: Waycen Inc.

Student Essay Competition-Graduate

Session II & Session III

11:10-11:58, GMT+9 | May 17, 2025 | Saturday

Venue: Conference Room 5C, the 5th floor

Chaired by:

Prof. Hsi-Chieh Lee, National Quemoy University, Taiwan

Prof. Yonggang Lu, Lanzhou University, China

Prof. Ahmet Murat Özbayoğlu, TOBB University of Economics and Technology, Turkiye

Master Session	
11:10-11:22	**YA0232**
	Automated Segmentation of Circulating Tumor Cells in Culture Time-Series Images Based on Deep Learning Model **Hao-Ting Lee**[1], Ting-Ying Chien[1], Long-Sheng Lu[2], Hsien-Wei Ting[1,3] and Po-Han Chen[4] 1: Yuan Ze University, Taiwan 2: Taipei Medical University Hospital, Taiwan 3: Taipei Hospital, Ministry of Health and Welfare, Taiwan 4: CancerFree Biotech Ltd., Taiwan
PhD Session	
11:22-11:34	**YA0079**
	Developing Conceptual Framework for Integrating Machine Learning in Maternal Health Services Within Indonesia National Health **Daniel Chriswinanto Adityo Nugroho**[1,2], Sari R.K. Dewi[1], Jason C. Hsu[1], Yuan-Chii Gladys Lee[1] and Emily Chia-Yu Su[3] 1: Taipei Medical University, Taiwan 2: Universitas Kristen Duta Wacana, Indonesia 3: National Yang Ming Chiao Tung University, Taiwan
11:34-11:46	**YA0094**
	Deep Learning-Based Gesture Recognition for Enhanced Laparoscopic Suturing Skill Evaluation and Training **Dehlela Shabir**[1,2], Khaled Shaban[1] and Nikhil Navkar[2] 1: Qatar University, Doha, Qatar 2: Hamad Medical Corporation, Doha, Qatar
11:46-11:58	**YA0147**
	Empolying skin permeation coefficient prediction model in searching of possible operator exposure hazardous pesticides in Taiwan **Yueh Yi Lee**[1,2] and Yen-Wei Chu[1,3] 1: National Chung Hsing University, Taiwan 2: Agricultural Chemicals Research Institute, Ministry of Agriculture, Taiwan 3: Smart Sustainable New Agriculture Research Center (SMARTer), Taiwan

Session 1
Advanced Machine Learning for Disease Prediction

13:00-14:00, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5B, the 5th floor

Chaired by: Prof. Ahmet Murat Özbayoğlu

TOBB University of Economics and Technology, Turkiye

13:00-13:12	**YA0041**
	Real-Time Prediction of Emergency Department Admissions Using Machine Learning with Digital Twins Yuxin Wang and **Kezhi Li** University College London, United Kingdom
13:12-13:24	**YA0137-A**
	Enhancing Brain Tumor Detection Using CNN-Based Transfer Learning with Fine-Tuning and Data Augmentation **Rizal Dwi Prayogo** and Hidetaka Nambo Kanazawa University, Japan
13:24-13:36	**YA0055**
	Non-Invasive Detection of Cerebrovascular Diseases via Doppler Acoustic Signals and Machine Learning Approaches **Vidya Gopal T V**[1], Inayathullah Ghori[2], Avinash Eranki[1] and Renu John[1] 1: Indian Institute of Technology Hyderabad 2: Department of Cardiology, Kamineni Hospital, Hyderabad

13:36-13:48	**YA0163**
	Citywide District-Level Weekly Dengue Forecasting: Evaluation of Bayesian Spatiotemporal Models for Routine Surveillance **Gilian Therese B. Madrid**[1], Maria Regina Justina E. Estuar[1], Mark Anthony C. Tolentino[1], Timothy Robin Y. Teng[1], Elvira P. de Lara-Tuprio[1], Angelica Garcia[2], Rolando V. Cruz[3], Christian E. Pulmano[1] and Raphael B. Alampay[1] 1: Ateneo de Manila University, Philippines 2: Ateneo Center for Computing Competency and Research, Philippines 3: Quezon City Epidemiology and Surveillance Division, Philippines
13:48-14:00	**YA0173-A**
	Reduced Order Modelling of Congenital Heart Defects using Electrical Analogues for Clinical Applications **Rosaire Mongrain**, Frederic Michel, Morgan Chapados and Gabriel Altit McGill University, Canada

Session 2
Personalized Health and Explainable AI

13:00-14:12, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5E, the 5th floor

Chaired by: Prof. Hsi-Chieh Lee

National Quemoy University, Taiwan

13:00-13:12	**YA0005**
	Sex Dependency of Nonlinear Cerebrovascular CO2 Reactivity in the Postural Orthostatic Tachycardia Syndrome (POTS) **Shyan-Lung Lin**[1], Chia-Ju Shen[1], Shoou-Jeng Yeh[2], Ching-Kun Chen[1] and Han-Lin Tsai[1] 1: Feng Chia University, Taiwan 2: Cheng Ching Hospital, Taiwan
13:12-13:24	**YA0162-A**
	Exploring the Feasibility of Cortisol Level Prediction Using Multimodal Physiological Signals **Marina Saskovets**, Mykhailo Lohachov, Daniel Carl Karlsson and Zilu Liang Kyoto University of Advanced Science, Japan
13:24-13:36	**YA0047**
	Multi-Level Explainable AI for ECG-Based Atrial Fibrillation Detection: Exploring LIME, SHAP, and Grad-CAM for Clinical Interpretation **Jake Luo**[1], Amirsajjad Taleban[1], Patrick Noffke[2] and Rodney Sparapani[3] 1: University of Wisconsin-Milwaukee, Milwaukee, USA 2: Baxter International Inc. Milwaukee, USA 3: Division of Biostatistics, Medical College of Wisconsin, Milwaukee, USA

13:36-13:48	**YA0074**
	Reduction of Hemodialysis Complications in End-Stage Renal Disease Patients Using an Abdominal Voice Wearable Device **Chen Han, Chuan Chia Wang, Shu Jen Lin**, Chinchieh Chang, Yi Li Chen and Tung Jing Fang National Taipei University of Technology, Taiwan
13:48-14:00	**YA0157-A**
	Systematic Investigation of the Impact of Data Granularity on Feature Utility in SpO2-Based Sleep Apnea Detection **Nhung Huyen Hoang** and Zilu Liang Kyoto University of Advanced Science, Japan
14:00-14:12	**YA0031**
	Gender-based Analysis of Nonlinear Cerebral Autoregulation under Hyperventilation for Diabetes Mellitus Patients Han-Lin Tsai[1], **Shyan-Lung Lin[1]**, Shoou-Jeng Yeh[2], Ching-Kun Chen[1] and Chia-Ju Shen[1] 1: Feng Chia University, Taiwan 2: Cheng Ching General Hospital, Taiwan

Session 3
Predictive Analytics in Clinical Treatment Optimization

13:00-14:12, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5D, the 5th floor

Chaired by: Prof. Yen-Wei Chu

National Chung Hsing University, Taiwan

13:00-13:12	**YA0219-A**
	Epidemiological Trends and Predictive Modeling of Musculoskeletal and Connective Tissue Disease Mortality in the Philippines: A Time-Series and Demographic Analysis **Ralf Benjo Morilla**, Cesar Demayo and Mark Anthony Torres Mindanao State University-Iligan Institute of Technology, Philippines
13:12-13:24	**YA0061**
	Blood Degradation Products in the Subarachnoid Space as Predictors of Cerebral Vasospasm and Delayed Cerebral Ischemia Following Aneurysmal Subarachnoid Hemorrhage **Edgaras Misiulis**[1], Robertas Alzbutas[1], Algis Džiugys[2], Vytautas Petkus[1], Aidanas Preikšaitis[3] 1: Kaunas University of Technology, Lithuania 2: Laboratory of Heat-Equipment Research and Testing, Lithuanian Energy Institute, Lithuania 3: Clinic of Neurology and Neurosurgery, Vilnius University, Lithuania

13:24-13:36	**YA0126**
	A Comprehensive Approach for Mitigating Intradialytic Hypotension: Leveraging Enhanced Venous Return and Guided Respiratory Modulation in Patients with End-Stage Renal Disease **Shujen Lin, Chuanchia Wang, Chen Han** and Tungjing Fang National Taipei University of Technology, Taiwan
13:36-13:48	**YA0220-A**
	Diabetes Mellitus Mortality Trends in the Philippines: A 22-Year Regional Analysis **Jamerah Baniaga Sidic** and Cesar Guinanao Demayo MSU-Iligan Institute of Technology, Philippines
13:48-14:00	**YA0177-A**
	Few-Shot Learning for Multi-Omics Disease Classification with a MAML-Based Model **Ganghui Yi**, Jeongjin Ju and Kyuri Jo Chungbuk National University, Republic of Korea
14:00-14:12	**YA0221-A**
	Age- and Sex-Specific Trends in Infectious Disease Mortality in the Philippines: A Data-Driven Forecasting Approach **Angel Mae Frias Luga** and Cesar Guinanao Demayo MSU-Iligan Institute of Technology, Philippines

Special Session

Deep Learning for Biomolecular Interaction and Multi-Omics Integration

13:00-13:48, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5C, the 5th floor

Chaired by: Dr. Xiucai Ye

University of Tsukuba, Japan

13:00-13:12	**YA0239-A**
	A Memory Attention-Driven Framework with Biological Language Embedding for Predicting Protein-DNA Binding Residues **Shixuan Guan**, Xiucai Ye and Tetsuya Sakurai University of Tsukuba, Japan
13:12-13:24	**YA0240-A**
	Improved Efficiency and Interpretability for Peptide Prediction Based on Kolmogorov–Arnold Networks and Multi-scale Features **Li Wang**, Xiucai Ye and Tetsuya Sakurai University of Tsukuba, Japan
13:24-13:36	**YA0241-A**
	Multi-Omics Clustering with Large Language Model-Based Feature Extraction **Tianyi Shi**, Xiucai Ye and Tetsuya Sakurai University of Tsukuba, Japan

13:36-13:48	YA0242-A

A Capsule Network-Based Model for Predicting RNA-Small Molecule Binding Sites

Wenyu Xi, Xiucai Ye and Tetsuya Sakurai
University of Tsukuba, Japan

Session 4
Intelligent Non-Invasive Diagnostics and Rehabilitation

14:00-15:12, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5B, the 5th floor

Chaired by: Prof. Frank Shou-Cheng Tseng

National Kaohsiung University of Science and Technology, Taiwan

14:00-14:12	**YA0012-A**
	Clinical Validation of the Two-Compartment Coronary Artery Calcium Score System Using Cardiac CT and General CT images **Yu-Tai Shih**[1,2,3], Zhe-Yu Lin[1] and Jay Wu[1] 1: National Yang Ming Chiao Tung University, Taipei, Taiwan 2: Department of medical imaging, Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan 3: Tzu Chi University, Hualien, Taiwan
14:12-14:24	**YA0153**
	Intensity Standardization Approaches for Ischemic Stroke Diffusion-Weighted Imaging Segmentation using XGBoost Jasmine Thye Wei Wang[1], **See Pheng Hang[1],** Kok Haur Ong[2] and Hairuddin Achmad Sankala[2] 1: Universiti Teknologi Malaysia, Johor, Malaysia 2: Bioinformatics Institute (BII), A*STAR, Singapore 3: Hospital Kuala Lumpur, Kuala Lumpur, Malaysia

14:24-14:36	**YA0083**
	Designing an Interactive Tool for Physiotherapy to Support Diagnosing Musculoskeletal Disorders in Musicians Using Clinical Movement Analysis **Eduard Wolf**[1], Karsten Morisse[2] and Sven Meister[3] 1: Healthcare Department, Fraunhofer Institute for Software and Systems Engineering, Dortmund, Germany 2: Faculty of Engineering and Computer Science, University of Applied Sciences, Osnabrück, Germany 3: Health Informatics, Faculty of Health, Witten/Herdecke University, Witten, Germany
14:36-14:48	**YA0084**
	Diagnosis of Alzheimer's Disease with Deep Convolutional Neural Networks Using FDG-PET Brain Images **Lilia Lazli**[1], Farida Cheriet[1] and Mounir Boukadoum[2] 1: Polytechnique Montréal, University of Montreal 2: Université du Québec à Montréal (UQAM)
14:48-15:00	**YA0122-A**
	Synergistic Integration of Experimental Insights and Clinical Data for Mortality Prediction in Streptococcus-Induced Bacteremia **Yen-Hsiang Wang** and Chiau-Jing Jung Taipei Medical University, Taiwan
15:00-15:12	**YA0174-A**
	Feasibility and Usability Evaluation of a Home-Based Pulmonary Tele-rehabilitation System for Patients with Chronic Pulmonary Disease **Shih-Ying Chien**[1,2,3] 1: Department of Industrial Design Chang Gung University, Taoyuan, Taiwan 2: Department of Rehabilitation, Chang Gung Memorial Hospital, Taipei, Taiwan 3: Department of Medical Humanities and Education, National Yang Ming Chiao Tung University, Taipei, Taiwan

Session 5
Patient Engagement and Resource Optimization

14:12-15:24, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5E, the 5th floor

Chaired by: Prof. Wen-Wei Chang

Chung-Shan Medical University, Taiwan

14:12-14:24	**YA0050-A**
	Transformers for Time Series Electronic Helath Records: Advancing Diabetes Detection **Jie Pan[1],** Tianxia Jia[2], Seungwon Lee[1], Alexander Leung[1,2], Hude Quan[1], and Na Li[1] 1: Department of Community Health Sciences, University of Calgary, Calgary, Canada 2: Department of Mathematics and Statistics, University of Victoria, Victoria, Canada 3: Department of Medicine, University of Calgary, Calgary, Canada
14:24-14:36	**YA0064-A**
	Impacts of AI Scribes on Clinical Outcomes, Efficiency, and Documentation: A Systematic Review **Maxime Sasseville** Université Laval, Québec, Canada
14:36-14:48	**YA0081-A**
	Peer Support and Localised Service Provision in Times of Crisis: A case study on the role of social media communities for patients with Chronic Kidney Disease during COVID-19 **Lisa Garwood-Cross,** Paula Ormandy and Cristina Vasilica University of Salford

14:48-15:00	**YA0125-A**
	Importance of Monitoring Clinical Decision Support (CDS) Alerts in Electronic Health Records (EHR) for Variance **Sean Park** Sean Park Consulting
15:00-15:12	**YA0148**
	Smart Resource Optimization in Healthcare: An UI-driven Approach Integrating Deep Learning Models **Alexander Münzberg** and Heiko Meyer KMS Vertrieb und Services GmbH a Business Unit of the CompuGroup Medical SE & Co. KGaA, Deutschland, Germany
15:12-15:24	**YA0116**
	Privacy, Efficiency, and Regulation: A Tri-Party Evolutionary Game Model for Healthcare Data Flow **Ying Zhang** and Yang Xu Peking University, China

Session 6
Large Language Models and Decision Support

14:12-15:24, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5D, the 5th floor

Chaired by: Prof. Yonggang Lu

Lanzhou University, China

14:12-14:24	**YA0155-A**
	Communication Patterns in Pediatric Emergency Initial Consultations: A Qualitative and Quantitative Analysis **Suyoung Yoo**[1], Sejin Heo[2] and Meong Hi Son[2] 1: The Samsung Advanced Institute for Health Sciences & Technology (SAIHST), South Korea 2: Emergency department, samsung medical centre, South Korea
14:24-14:36	**YA0067**
	Comparing Large Language Models for Food-Microbiome Relation Extraction from Research Papers **Research Dawadi**[1], Jie Ting Tay[1], Agustin Martin-Morales[1], Thien Vu[1], Phap Tran Ngoc Hoang[1], Masaki Yamamoto[1], Naoki Watanabe[1], Yuki Kuriya[1] and Michihiro Araki[1,2] 1: Artificial Intelligence Center for Health and Biomedical Research, National Institutes of Biomedical Innovation, Health and Nutrition, Osaka, Japan 2: Kyoto University, Japan

14:36-14:48	**YA0088**
	Expanding Knowledge Graph with Structural Information to Improve Biomedical Question Answering System Performance Yun-Yang Gau[1], **Shu-Fang Lai[1]**, Tzi-Ping Gau[2] and Wei-Po Lee[1] 1: National Sun Yat-sen University, Kaohsiung, Taiwan 2: Kaohsiung Medical University Hospital, Kaohsiung, Taiwan
14:48-15:00	**YA0051**
	A Voice-based Triage for Type 2 Diabetes using a Conversational Virtual Assistant in the Home Environment Kelvin Summoogum[1], **Debayan Das[2]**, Sathish Kumaran[3] and Sumit Bhagra[4] 1: MiiHealth, Arizona, USA 2: MiiCare Ltd, London, UK 3: MiiCare Ltd, Bangalore, India 4: Mayo Clinic Health System, Minnesota, USA
15:00-15:12	**YA0171**
	Instruments for Predicting the Risk Factor for COPD in the Indonesian Community: Development and validation **Dian Meutia Sari**, Ratna Djuwita, Khobir A. K. Taufiqurahman and Muhammad Syauqie University of Indonesia
15:12-15:24	**YA0068**
	Risk Prediction and Interpretation for Fall Events Using Explainable AI and Large Language Models **Jake Luo[1]**, Masoud Khani[1], Jazzmyne Adams[2], Qiang Lu[3], Kristian O'Connor[1] and David R. Friedland[4] 1: University of Wisconsin-Milwaukee, Milwaukee, USA 2: Medical College of Wisconsin, Milwaukee, USA 3: China University of Petroleum, Beijing, China 4: University of South California, Los Angeles, United States

Session 7
Innovations in Digital Health Policy and Prognostic in Asia

13:48-15:24, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5C, the 5th floor

Chaired by: Dr. William.Yu Chung Wang

University of Waikato, New Zealand

13:48-14:00	**YA0078**
	Sensitivity and Specificity of Cognitive Adaptive Test/Clinical Linguistic Auditory Milestone Scale in Children 0-3 Years of Age in Indonesia **Firyal Nadiah Rahmah[1]**, Irwanto[1], Ayling Sanjaya[2], Azhar, Rafsanjani[1] and Salsabila, Nabilah, Rifdah[1] 1: Universitas Airlangga, Surabaya 2: Universitas Wijaya Kusuma, Surabaya
14:00-14:12	**YA0123-A**
	Validity and Reliability of Attention Deficit/Hyperactivity Disorder Symptom Checklist-4 (ADHD SC-4) Questionnaire Indonesian Version **Mery Susantri[1,2]**, Irwanto[1,2,3], Ahmad Suryawan[1,2] Mira Irmawati[1,2], Yunias Setiawati[1] 1: Universitas Airlangga, Surabaya 2: Soetomo General Academic Hospital, Surabaya 3: Airlangga University Hospital, Surabaya

14:12-14:24	**YA0073**
	Fostering Digital Health Innovation in Malaysia: The Role of Strategic Policies and Ecosystem Development **Nuraini Naim**[1], Yukiko Mori[1,2] and Tomohiro Kuroda[1,2] 1: Kyoto University, Japan 2: Kyoto University Hospital, Japan
14:24-14:36	**YA0146-A**
	Pharmacokinetic Genetic Influence of GSTP1 rs1695 and ABCC2 rs717620 on Platinum Chemotherapy Outcomes in Indonesian NSCLC Patients **Nadiya Nurul Afifah**[1,2], Indra Wijaya[3], Lanny Indah Permatasari[4], Hideru Obinata[1] and Melisa Intan Barliana[1] 1: Universitas Padjadjaran, Jatinangor, Indonesia 2: Universitas Esa Unggul, Jakarta, Indonesia 3: Padjadjaran University, Bandung, Indonesia 4: Gunma University Graduate School of Medicine, Maebashi, Gunma, Japan
14:36-14:48	**YA0164-A**
	A Comprehensive Analysis of Healthcare Costs Associated with Liver Cirrhosis in Taiwan **Yu-Chiao Wang** Yuanpei University of Medical Technology, Hsinchu, Taiwan
14:48-15:00	**YA0212**
	Numerical Investigation of Particle-Induced Turbulent Flow and Wall Shear Stress in Non-Newtonian Blood Flow within Realistic Vascular Geometries **Mongkol Kaewbumrung**[1], Chalermpol Plengsa-Ard[2] and Wasan Palasai[3] 1: Rajamangala University of Technology Suvarnabhumi, Thailand 2: Kasetsart University, Thailand 3: Princess of Naradhiwas University, Thailand

15:00-15:12	**YA5002-A**
	Can the reliability of Arabic dental disease websites be established? Insights from comprehensive infodemiological analyses of two prevalent dental conditions **Khalid Aboalshamat** Dental Public Health Division, Preventative Dentistry Department, College of Dental Medicine, Umm Al-Qura University, Makkah, Saudi Arabia
15:12-15:24	**YA0186-A**
	Fluid-Structure Interaction Analysis of Intracranial Arterial Stenosis (ICAD): A Comparative Study of Normal and High Blood Pressure Effects Muhammad Norikmal Muhamad Nazri[1], **Adi Azriff Basri[1]**, Ernnie Illyani Basri[1], Abdul Hanif Khan Yusof Khan[1], Eusni Rahayu Mohd Tohir[1], Mohd Fandi Al-Khafiz Kamis[2] and Masaaki Tamagawa[3] 1: Universiti Putra Malaysia 2: Universiti Putra Malaysia Teaching Hospital (HPUPM) 3: Kyushu Institute of Technology, Kitakyushu, Japan

Session 8
Data-Driven Approaches for Enhancing Healthcare Outcomes

15:40-17:40, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5B, the 5th floor

Chaired by: Prof. Hao-Yun Kao

Kaohsiung Medical University, Taiwan

15:40-15:52	**YA0022-A**
	Eating behaviour and diet-related chronic disease in Japan: the use of mobile devices in healthcare **Anna Brytek-Matera**[1, 2, 3] and Kazuchiro Yoshiuchi[2,3] 1: University of Wroclaw, Institute of Psychology, Poland 2: Department of Psychosomatic Medicine, The University of Tokyo Hospital 3: Department of Stress Sciences and Psychosomatic Medicine, Graduate School of Medicine, The University of Tokyo
15:52-16:04	**YA0035-A**
	Win-Win-Win: Improving Transfusion Safety with Verification and Record in a Seamless Process **Daisy Y. S. AU** Hong Kong Hospital Authority
16:04-16:16	**YA0066**
	Benefits of The Primaku Application in Monitoring Child Growth and Development According to Parents Perceptions **Wahyu Bagus Handoko**, Irwanto Irwanto and Muhammad Abbud Widitaputra Department of Child Health, Faculty of Medicine-Universitas Airlangga, Surabaya

16:16-16:28	**YA0170**
	Effectiveness of eHealth Interventions to Prevent Adolescent Pregnancy: a Systematic Literature Riview **Petriana E. Mahmud**[1], Dewi A. Bugis[2], Harianti Fajar[2], Tri Krianto[1], Kemal N. Siregar[1] and Muhammad Syauqie[1] 1: Universitas Indonesia 2: Programs of Nursing Science, Sekolah Tinggi Ilmu Kesehatan Pasapua Ambon
16:28-16:40	**YA0117**
	Network Density Analysis of Health Seeking Behavior in Metro Manila: A Retrospective Analysis on COVID-19 Google Trends Data **Michael T. Lopez II**, Cheska Elise Hung and Maria Regina Justina E. Estuar Ateneo de Manila University, Quezon City, Philippines
16:40-16:52	**YA0030-A**
	The Relationship of Fatty Food Consumption, History of Disease and Physical Activity with the Event of Adolescent Obesity in Indonesia **Julhan Irfandi**[1], Farahdila Mirshanti[2], Ummi Kalsum[3], Adelina Fitri[3], Nirmin F Juber and Bhisma Murti[1] 1: Sebelas Maret University Master's Program Public Health 2: Sebelas Maret University Doctoral Program Public Health 3: Jambi University Program Study of Public Health 4: New York University Abu Dhabi, Public Health Research Center
16:52-17:04	**YA0058-A**
	Effect of digital therapeutics on functional recovery of patients after anterior cruciate ligament injury **Xiao Li**, Jiedan Mu, Chen Fan, Xiuxiu Shi and Guishan Wang Department of Rehabilitation, Senior Department of Orthopedics, the Fourth Medical Center of PLA General Hospital

17:04-17:16	**YA0082**
	A Comparison of Different Large Language Models in Improving Dietary Habits Damir Kim, Rozalina Alkeyeva, Aknur Karabay, Aibota Sanatbyek, Makpal Kairat, Huseyin Atakan Varol and **Mei-Yen Chan** Nazarbayev University, Kazakhstan
17:16-17:28	**YA0013-A**
	Assessing Mobile Applications for Medicine Reminder Using Mobile App Rating Scale **Fatma Kantaş Yılmaz** and Pınar Ünkür University of Health Sciences, Tokat Gaziosmanpaşa University
17:28-17:40	**YA0015-A**
	A Study on the Relationship Between Digital Health Literacy and Cyberchondria Levels of Individuals Fatma Kantaş Yılmaz and **Pınar Ünkür** University of Health Sciences, Tokat Gaziosmanpaşa University

Session 9
Information Security and Health Science

15:40-17:28, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5E, the 5th floor

Chaired by: Prof. Yang Xu

Peking University, China

15:40-15:52	**YA0112**
	Cyber Attack Detection in the Internet of Health Things (IoHT) Using Ensemble Learning : a Primary Study **I-Pin Chang** Department of Industrial Management, National Taiwan University of Science and Technology, Taiwan
15:52-16:04	**YA0119**
	Security Threats of Lightweight and Anonymity-Preserving User Authentication Scheme for IoT-based Healthcare **Tian-Fu Lee** and Tsai-Ling Guo Tzu Chi University, Taiwan
16:04-16:16	**YA0190-A**
	The ECG interpretation and common misinterpretation of ECG among novice nurse in ICU division **Wasana Lavin**, Orawan Bootthumpan and Tiwaporn Donthong Ramathibodi Chakri Naruebodindra Hospital, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok

16:16-16:28	**YA0161-A**
	Predicting Glucose Levels: The Role of Physiological, Circadian, Behavioral and Demographic Features **Thilini Savindya Karunarathna**, Cleber Franca Carvalho and Zilu Liang Ubiquitous and Personal Computing Lab, Kyoto University of Advanced Science (KUAS)
16:28-16:40	**YA0197-A**
	Traditional Medicinal Plants used as Anticancer Remedies in the Philippines: A Systematic Ethnobotanical Review **Kathleen L. Cabanlit**[1,2], Mark Anthony J. Torres[1,2,3], and Cesar G. Demayo[1,2,3] 1: Department of Biological Sciences, College of Science and Mathematics, MSU-Iligan Institute of Technology, Philippines. 2: Center of Integrative Health, Premier Research Institute of Science and Mathematics, MSU-Iligan Institute of Technology, Philippines. 3: School of Interdisciplinary Studies/Institute of Peace and Development in Mindanao, MSU-Iligan Institute of Technology, Iligan City, Philippines.
16:40-16:52	**YA0208**
	Reliability of Dynamic Pupil Size Patterns in Children with Autism Spectrum Disorders **Yuan Ma** and Jeffrey Keith Spaneas Bland FOVE Inc., Japan
16:52-17:04	**YA0213**
	Sociodemographic Factors Associated with Overweight and Obesity among Adults in North Sulawesi Province, Indonesia: A Multinomial Logistic Regression Analysis **Eflita Meiyetriani**[1,2] and Budi Utomo[1] 1: Universitas Indonesia, Depok, Indonesia; 2: Southeast Asian Ministers of Education Organization-Regional Centre for Food and Nutrition (SEAMEO RECFON), Jakarta, Indonesia

17:04-17:16	**YA0103-A**
	Somatosensory Functions are Crucial for the Ability of Independence and Safety among Ambulatory Individuals with Stroke **Phouthasone Thavone**[1,2], Kunthida Mora[3], Matchali Chanlutin[3], Titichaya Wongtap[4] and Sugalya Amatachaya[1] 1: Khon Kaen University, Khon Kaen, Thailand 2: University of Health Sciences, Laos. 3: Physical Therapy Department, Amnatchareon Hospital, Amnatchareon, Thailand 4: Physical Therapy Department, Patumrachwongsa Hospital, Amnatchareon, Thailand
17:16-17:28	**YA0160**
	A Hybrid Architecture for Secure Health Information Exchange using FHIR, Blockchain, and IPFS **Christian Pulmano** and Proceso Fernandez Ateneo de Manila University, Philippines

Session 10
AI-Powered Patient Journey and Design Science Framework

15:40-17:16, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5D, the 5th floor

Chaired by: Dr. Ting-Ying Chien

Yuan Ze University, Taiwan

15:40-15:52	**YA0046-A**
	Bridging Innovation and Ethics: AI Integration for Personalized Psychological Care **Chen Hascalovitz** and Raywat Deonandan Faculty of Health Sciences, University of Ottawa, Ottawa, Canada
15:52-16:04	**YA0059**
	Exploring the Role of AI in Transforming Patient Journeys: Challenges and Opportunities in Surgery Time Prediction **Lena Hegel**[1], Jasmin Henze[1], Tom Strube[1], Mostafa Kamal Mallick[1], Peter Appelon Bliksted[2], Lars Ganzhorn Knudsen[2] and Anja Burmann[1] 1: Fraunhofer Institute for Software and Systems Engineering; Dortmund, Germany 2: Aarhus University Hospital, Aarhus, Denmark
16:04-16:16	**YA0091**
	Decision-Making Support on Grade Classification of Hallux Valgus with AI-based Approach Using Camera Photos of Radiation-free Fuu-Cheng Jiang[1], Cheng-Min Shih[2,3], **Dung-Lun Lee**[1], Chun-Ming Lai[1] and Yi-Ju Chiang[4,5] 1: Tunghai University, Taiwan 2: Taichung Veterans General Hospital, Taiwan 3: Hungkuang University, Taiwan

4: China University of Technology
5: National Chung-Shan Institute of Science & Technology, Taiwan

16:16-16:28	**YA0201-A**

Promoting AI Data Standardization in Nursing: Future Prospects for Nursing Practice, Research, and Education

Zhuolan Li and Guqing Zeng
University of South China

16:28-16:40	**YA0224**

Nutridetect- AI Nutrition companion, Simplifying One Meal at a Time

Thirupathi Kadari, **Tushar Sinha** and Kanchan Maurya
Babson College, Sync AI Inc. United States of America

16:40-16:52	**YA0144**

Multi-branch CNN for Smartphone-based Refractive Error Screening in Resource-limited Settings

Muhammad Syauqie[1], Sutanto Priyo Hastono[1], Kemal Nazaruddin Siregar[1], Nila Djuwita Farieda Moeloek[1] and Harry Patria[2]
1: Universitas Indonesia
2: University of Strathclyde, Glasgow, United Kingdom

16:52-17:04	**YA0114**

Towards smarter mHealth applications: a design science framework focuses on non-communicable diseases

Yuyu He, **William Yu Chung Wang** and Arnob Zahid
University of Waikato

17:04-17:16	**YA0211-A**

Ginseng-Epimedii formula ameliorated experimental Sjo¨gren's syndrome via reducing IL-6 production

Yacun Chen[1] and Xiang Lin[1,2]
1: the University of Hong Kong
2: the University of Hong Kong-Shenzhen Hospital(HKU-SZH), Shenzhen, China

Session 11
Computational Approaches in Genomics and Precision Medicine

15:40-17:28, GMT+9 | May 17, 2025 Saturday

Venue: Conference Room 5C, the 5th floor

Chaired by: Prof. Yen-Wei Chu

National Chung Hsing University, Taiwan

15:40-15:52	**YA0042**
	Cell-specific network-based cell type prediction via graph convolutional network using transcriptomics profiles **Joung Min Choi**[1] and Heejoon Chae[2] 1: Virginia Tech Blacksburg, Virginia, USA 2: Sookmyung Women's University, Seoul, Republic of Korea
15:52-16:04	**YA0072**
	Learning Description Logic Descriptions for the Pathway Ontology Classes **Tianyu, Qiu** Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China
16:04-16:16	**YA0085-A**
	WiNGS-AG: A Clinically-Oriented Genomic Data Aggregation Platform for Federated NGS Analytics **Goran Vinterhalter**, Nishkala Sattanathan, Muhammad Quamber Ali, Ian Segers, Geert Vandeweyer and Yves Moreau Department of Electrical Engineering, ESAT-STADIUS, KU Leuven, Belgium

16:16-16:28	**YA0090-A**
	Roles of G-quadruplexes in breast cancer transcriptional control **Huiling Shu**, Ke Xiao and Xiao Sun State Key Laboratory of Digital Medical Engineering, School of Biological Science and Medical Engineering, Southeast University, Nanjing, China
16:28-16:40	**YA0130-A**
	Quantification of Morphological Changes in Stem Cells for Quality Assessment **Ching-Fen Jiang** and Chia-Yuan Yuan Graduate Program of Smart Healthcare and Bioinformatics, I-Shou University, Kaohsiung, Taiwan
16:40-16:52	**YA0172-A**
	Exploring Gender Differences in Interstitial Glucose Dynamics through a Systematic Multiscale Entropy Analysis **Cleber França Carvalho**, Thilini Savindya Karunarathna and Zilu Liang Ubiquitous and Personal Computing Lab, Kyoto University of Advanced Science (KUAS)
16:52-17:04	**YA0097-A**
	Multi-omics analysis reveals the interaction between POSTN+ fibroblasts and myeloid cells in triple-negative breast cancer **Hongjia Liu** and Hongde Liu 1: Southeast University, School of Biological Science and Medical Engineering, State Key Laboratory of Digital Medical Engineering, China
17:04-17:16	**YA0070-A**
	ChatGPT-4 Assisted Data Abstraction in Systematic Review of Observational Studies: A Case Study Yimeng Li, **Sylvia Hsu**, Leon Jiang, Rong Wang, Su-Hsin Chang and Shi-Yi Wang York University, Canada

17:16-17:28	YA0225-A

Deep Learning-Based Classification of Human Foot Nail Deformations: A Multi-Factor Analysis

Elif Özge Yavuz, Mahmut Milayim, Fatma Gulru Erdogan and **Ahmet Murat Ozbayoglu**
TOBB University of Economics and Technology, Turkiye

Session 12 (Online)
Advanced Predictive Modeling for Healthcare Outcomes

10:30-11:42, GMT+9 | May 18, 2025 Sunday

Zoom ID: 854 7237 4956

Chaired by: Prof. Yi-Ju Tseng

National Yang Ming Chiao Tung University, Taiwan

10:30-10:42	**YA0087**
	Potentially Preventable Readmission (PPR) Following Discharge of Home Health Agency Patients in US: Factors in Play Other Than Adherence to Clinical Processes **Mohammad Ishtiaque Rahman** University of Maryland- Baltimore County, USA
10:42-10:54	**YA0063**
	Multicenter validation of a machine learning algorithm for mortality prediction at decision-critical timestamps in ICU sepsis patients **Johan Alfonso Castillo Caballero**, Camilo Andres Santos Ortiz and Carlos Augusto Fajardo Ariza Universidad Industrial de Santander Bucaramanga, Santander, Colombia
10:54-11:06	**YA0136**
	Explainable Prediction of Medicare End-Stage Renal Disease (ESRD) Service Demand in the U.S.: A County-Level Analysis of Demographic and Healthcare Variables **Mohammad Ishtiaque Rahman** Thomas More University 333 Thomas More Pkwy Crestview Hills, USA

11:06-11:18	**YA0215**
	Designing a Hybrid Transformer-LSTM Model to Enhance Ovarian Cancer Survival Analysis **Peter Kubare**[1], Nuudhano Hilma Nakale[1], Mulugeta Abrham Aragaw[1], Xiaojun Hei[1] and Yuan Tian[2] 1: Huazhong University of Science and Technology, China 2: Tongji Hospital Huazhong University of Science and Technology, China
11:18-11:30	**YA0154-A**
	MedCD: A Real-world Clinical Dataset and Reference Applications for Building Generative AI in Healthcare Ye Chen[1,2], Dongdong Huang[1], Qingli Zhou[1], Yuqiang Shen[1], Chang Li[1], Zhifeng Xu[2], **Lin Sheng**[2] and Kai Wang[1] 1: Department of Respiratory and Critical Care Medicine, The Fourth Affiliated Hospital of School of Medicine, Zhejiang University, Yiwu, China 2: Tiger Research, Shanghai, China
11:30-11:42	**YA0158**
	The 'Silent' Failures of Scoring CDSS: Challenge in Detecting Malfunctions **Hung-Ju Kuo**[1,2], Abdul Roudsari[1,2], Hung-Wen Chiu[3] and Alex Kuo[1] 1: University of Victoria, Victoria, BC V8P 5C2, Canada 2: Group of Health Informatics, National Healthcare Group, Singapore 3: Graduate Institute of Biomedical Informatics, College of Medical Science and Technology, Clinical Big Data Research Center, Taipei Medical University Hospital, Taipei City 110, Taiwan

Session 13 (Online)
Interoperability and Personalized Interventions for Improved Patient Care

12:00-13:12, GMT+9 | May 18, 2025 Sunday

Zoom ID: 854 7237 4956

Chaired by: Dr. Hsien-Wei Ting

Taipei Hospital, Ministry of Health and Welfare, Taiwan

12:00-12:12	**YA0156**
	An Interpretable AI Model for Alzheimer's Disease Detection using Retinal Images **Saeed Jamshidiha**[1], Alireza Rezaee[1], Farshid Hajati[2], Mojtaba Golzan[3] and Raymond Chiong[2,4] 1: University of Tehran, Tehran, Iran 2: University of New England, Armidale, Australia 3: University of Technology Sydney, Ultimo, Australia 4: The University of Newcastle, Callaghan, Australia
12:12-12:24	**YA0029**
	Enhancing Nursing Diagnosis Accuracy Using RAG and Llama 3.1 Shao-Kuo Tai, **Sheng-Ming Kuo** and Rung Ching Chen Chaoyang University of Technology, Taiwan
12:24-12:36	**YA0120**
	Custom FHIR extensions with Ontology Learning models for improving Data Integration and Interoperability in Healthcare Management Systems **Theresa Cherian**, William Yu Chung Wang and Arnob Zahid University of Waikato

12:36-12:48	**YA0214**
	Heart Murmur Detection and Clinical Outcome Prediction with a Hybrid Deep Learning Model using Phonocardiogram Recordings **Ehsan Karegar Foroogh**[1], Amirhosein Zobeiri[1], Farshid Hajati[2] and Alireza Rezaee[1] 1: University of Tehran, Tehran, Iran 2: University of New England, Armidale, Australia
12:48-13:00	**YA0149**
	Design, Implementation, and Evaluation of a Serious Game for Children with Juvenile Idiopathic Arthritis René Baranyi[1], Daniela Starritz[1], **Christoph Aigner**[2], Sylvia Winkler[1] and Thomas Grechenig[1] 1: INSO – Research Group for Industrial Software, Technical University of Vienna 2: INSO Industrial Software GmbH, Austria
13:00-13:12	**YA0127**
	Identification of Differential Epigenetic Landscape in NF2 and Non-NF2 Meningiomas Raghad Rabie El Ghali, Asma Saeed, Areeba Irfan, Syed Abdullah Basit and **Tanvir Alam** Hamad Bin Khalifa University, Qatar

Conference History

- **ICMHI 2017 | 2017.5.20-22 Taichung, Taiwan**

Theme: Computational Intelligence Technologies Meets Medical informatics -From Prediction to Prognosis

- **ICMHI 2018 | 2018.6.8-10 Tsukuba, Japan**

Theme: Seamless Ubiquitous Information Technologies and Applications over the Evolution of Medical Informatics

- **ICMHI 2019 | 2019.5.17-19 Xiamen, China**

Theme: Healthy data put to good use for better integrated care

- **ICMHI 2020 | 2020.8.14-16 Virtual Conference**

Theme: Medical Informatics Meets Quality Health Care -From Prediction to Prognosis

- **ICMHI 2021 | 2021.5.14-16 Virtual Conference**

Theme: Accelerating the Evolution of the Whole-evidence Approach to Promote Health

- **ICMHI 2022 | 2022.5.13-15 Virtual Conference**

Theme: Validation, Let the evidence speak!

- **ICMHI 2023 | 2023.5.12-14 Kyoto, Japan**

Theme: The Future of Digital Health in the Post-Pandemic

- **ICMHI 2024 | 2024.5.17-19 Yokohama, Japan**

Theme: Beyond the Future Healthcare Delivery

One Day Visit

May 18, 2025. (Sunday) 9:10~18:00

(Tip: Please arrive at "TKP GardenCity Kyoto" at 9:10 a.m. The following places are for reference, and the final schedule should be adjusted to the actual notice. Lunch is at your own expense)

(10:00-14:30) Morning Visit

Kiyomizu-dera

Kiyomizudera is one of the most celebrated temples of Japan. It was founded in 780 on the site of the Otowa Waterfall in the wooded hills east of Kyoto, and derives its name from the fall's pure waters. The temple was originally associated with the Hosso sect, one of the oldest schools within Japanese Buddhism, but formed its own Kita Hosso sect in 1965. In 1994, the temple was added to the list of UNESCO world heritage sites. Kiyomizudera is best known for its wooden stage that juts out from its main hall, 13 meters above the hillside. The stage affords nice views of the numerous cherry and maple trees below that erupt in a sea of color in spring and fall, as well as of the city of Kyoto in the distance. The main hall, which together with the stage was built without the use of nails, houses the temple's primary object of worship, a small statue of the eleven faced, thousand armed Kannon.

Fushimi Inari Taisha

Also known as “O-inari-san”, Inari shrines are the most familiar shrines to Japanese people.here are said to be some thirty thousand throughout the country, frequented by people of all ages. ushimi Inari Taisha is the head shrine with which all the others are affiliated. n the 1300 years since its establishment in 711AD, people have gathered here to pray for bountiful harvests, business prosperity, the safety of their home and family and the fulfillment of all kinds of other wishes.In recent years, the shrine’s Japanese worshippers have been joined by overseas visitors coming to pray or tour the shrine. Fushimi Inari Taisha is now known worldwide as one of the most iconic sights in Kyoto, and in Japan as a whole.

(14:30-16:00)Nara Park

Nara Park is a large park in central Nara. Established in 1880, it is the location of many of Nara's main attractions including Todaiji, Kasuga Taisha, Kofukuji and the Nara National Museum. It is also home to hundreds of freely roaming deer.

Considered the messengers of the gods, Nara's over 1000 deer have become a symbol of the city and have even been designated as a natural treasure. Deer crackers are for sale around the park, and some deer have learned to bow to visitors to ask to be fed. Nara's deer are surprisingly tame, although they can be aggressive if they think you will feed them, so make sure not to tease them with food.

The deer that live in Nara Park are wild animals that have been designated as natural treasure of Japan. Approximately 1,300 deer live in the park. These deer are not domesticated, but visitors can feed them with special deer crackers.

(17:30) Arrive at Shinsaibashi

Shinsaibashi is a district in the Chūō-ku ward of Osaka, Japan and the city's main shopping area. At its center is Shinsaibashi-suji (心斎橋筋), a covered shopping street, that is north of Dōtonbori and Sōemonchō, and parallel and east of Mido-suji street. Associated with Shinsaibashi, and west of Mido-suji street, is Amerika-mura, an American-themed shopping area and center of Osaka's youth culture. Major stores and boutiques concentrates are found around the area. Shinsaibashi is easily accessed via the subway.

(18:00) Back to TKP GardenCity Kyoto or Stay in Osaka.

附件2

Empolying skin permeation coefficient prediction model in searching of possible operator exposure hazardous pesticides in Taiwan

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[e]Smart Sustainable New Agriculture Research Center (SMARTer), Taichung City, Taiwan

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For operators, pesticides related activities including mixing, loading, and applicating, and when conducting these activities, the main pesticide exposure route is through skin, therefore, dermal absorption rate, is a very important reference value for pesticide safety evaluation, especially as it is used as a determined parameter for the second-tier risk assessment of operators. Besides the fact that published reference values of pesticide dermal absorption rate were limited, for now, there is no specific dermal absorption rate prediction model for pesticide. In this study, we not only had built a skin permeation coefficient (logKp) prediction model for pesticides, which based on quantitative structure properties relationships (QSAR), but also employed this model in the searching of operator exposure possible hazardous pesticides in Taiwan. Out of 155 licensed pesticides in Taiwan, 13 pesticides, including alpha-cypermethrin, beta-cyfluthrin, bifenthrin, bitertanol, cypermethrin, deltamethrin, fenpyroximate, gamma-cyhalothrin, lambda-cyhalothrin, quizalofop-p-ethyl, spinetoram, spirodiclofen, and tau-fluvalinate, were found to be possibly hazardous by comparing twenty-fifth percentile of predicting skin permeation coefficient logKp values and acceptable operator exposure level (AOEL) values listed by European Union Pesticides Database. In these 13 pesticides, the risk of 5 pesticide formulations, bifenthrin, bitertanol, cypermethrin, gamma-cyhalothrin, and lambda-cypermethrin were evaluated as “not acceptable”, due to the exposure doses, which were calculated by using USEPA Occupational Pesticide Handler Exposure Calculator (OPHEC) and based on the operator activities in Taiwan, were higher than the AOEL values. This study shows that the skin permeation coefficient prediction model not only could be employed in risk assessment, but also, this integrate strategy is a feasible tool for operator hazardous pesticide searching.

CCS CONCEPTS • Machine learning • Modeling and simulation • Applied computing

Additional Keywords and Phrases: Pesticides risk assessment, Dermal absorption rate, Skin permeation coefficient, Quantitative structure properties relationships, Acceptable operator exposure level

1 INTRODUCTION

In Taiwan, there are about four-hundred pesticide active ingredients, and thousands of pesticide formulation on the market. Finding the possible hazardous pesticide formulation for operators is a time consuming and labor costing challenge. Combining in silico method and risk assessment can be a solution. For pesticide operator exposure risk assessment, the European Food Safety Authority (EFSA) had published the assessment guidance (3), which was based on the tiered assessment method (9). The doctrine of the assessment is comparing the calculated exposure dose with acceptable operator exposure level (AOEL), and if the exposure dose is higher than AOEL, which means the pesticide could be hazardous, the next tiered assessment should be proceeding, or the risk is not acceptable. In exposure dose calculating, dermal absorption rate or skin permeation coefficient is a critical factor (12), due to the dermal exposure can contribute as high as 22.5% of daily total activity exposure dose (7), and the amount of pesticide on skin absorbed into body depends on dermal absorption rate (3, 5, 13). Although Japan, EU and North America pesticide registration regulations accept in vitro and in vivo test of dermal absorption rate (2, 5, 10), in silico method is more efficient and cost saving. Unfortunately, dermal absorption rate or skin permeation coefficient prediction model for pesticide is seldom.

T For finding possible hazardous pesticide formulation for operators, in this study, both AOEL and skin permeation coefficient of pesticide are considered. Not only a skin permeation coefficient prediction model based on quantitative structure properties relationships (QSAR) had been built to fill the pesticide skin permeation coefficient model lacking gap, but also the model had been employed in the tiered risk assessment to find these possible hazardous pesticides formulations efficiently.

2 MATERIAL AND METHOD

2.1 Chemical and Pesticide Data Source and Descriptors Generating

Skin permeation coefficients in logKp of 235 chemicals and 7 pesticides were retrieved from the literature (15, 16). Chemical and pesticide structures were downloaded from PubChem (14). Total 5,666 descriptors of each chemical and pesticide were generated by Alvadesc 2.0.14 (11), but the descriptors were deleted as if they are not applicable for all chemicals and pesticides, at last, 4169 descriptors of each chemical and pesticide were remained for the skin permeation coefficient prediction model building, external validation, and coefficient prediction.

2.2 Skin Permeation Coefficient Prediction Model Building

Chemical descriptor values were sent to Weka 3.8.6 (6) to build 8 models, including linear regression (model 1), support vector machines (SVM) (model 2), SVM with polynomial kernel (model 3), SVM with PUK kernel (model 4), SVM with Radial basis function kernel (model 5), SVM with decision stump (model 6), SVM with principal component analysis (PCA) (model 7), SVM with feature selection (model 8). When building models, 10-fold cross validation was used. Above mentioned seven pesticides were used for external validation, and then the performances of models were determined by Mean absolute error (MAE), mean squared error (MSE), root-mean-square deviation (RMSE), and mean absolute percentage error, which were all calculated by KNIME

version 4.5.2 (8). Target pesticide skin permeation coefficients, logKp, were predicted by the best performance model subsequently.

2.3 In Searching of Pesticides with Low Acceptable Operator Exposure Level (AOEL) and High Predicting Skin Permeation Coefficient

By searching Taiwan licensed pesticide active ingredient in EU pesticide database (4), 155 pesticides were with AOEL values listed, and skin permeation coefficients of these pesticide were predicted by the above mentioned selected model. Twenty-five percentile was used as a threshold to select low AOEL value and high skin permeation coefficient pesticides. After cross comparing, recurring pesticides were selected as potential hazardous pesticides for operators.

2.4 Pesticide Applicator Risk Assessment

Application exposure doses of these potential hazardous pesticides were calculated by Occupational Pesticide Handler Exposure Calculator (OPHEC) (17). The input values for OPHEC of each pesicide were retrieved from Taiwan pesticide authority website (1). The worst case application scenarios, such as the highest application rate, the highest acer crop, or upward spraying crops were chosen for pesticide formulations. The dermal absorption rates were set according to the pesticide formulation base, organic solvent and water solvent are 70% and 50%, respectively (2). For fitting Taiwan operator pesticide applicating status faithfully, single layer outfit with gloves and no respiratory equipment were chosen as the personal protective equipment (PPE). When the calculated exposure dose is higher than the AOEL value, then the pesticide will be listed as a hazardous pesticide for operators.

3 RESULTS

3.1 Skin Permeation Coefficient Prediction Model Performances

As shown in Figure 1, for model performance indicators, such as MAE, MSE, RMSE, and mean absolute percentage error, model 4 has lower indicators than other models, therefore, model 4 was chosen as pesticide skin permeation coefficient logKp prediction model for subsequently logKp prediction.

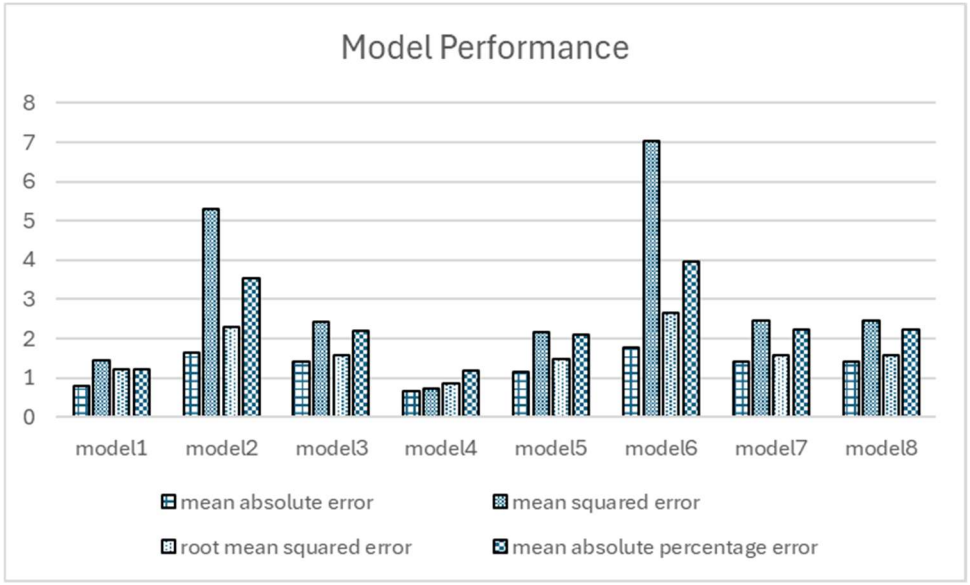

Figure 1. Model performance indicators MAE, MSE, RMSE, and mean absolute percentage error for 8 models. Model 4 has the best performance.

3.2 Pesticides with High Skin Permeation Coefficient and Low AOEL

Forty-one pesticides are falling into the 25 percentile high skin permeation coefficient logKp category (logKp >1.797), and 44 pesticides are in the 25 percentile low AOEL category (AOEL <0.01 mg/kg bw/day). After comparing two categories, 14 recurring pesticides were found as potential hazardous pesticides for operators. However, in 14 pesticides, famoxadone was deleted in the following study because of no listed usage crop of it in Taiwan. The prediction logKp and AOEL of 13 pesticides were shown in Table 1, the logKp range is from 1.811 to 1.861, and the AOEL range is from 0.0003 to 0.01 mg/kg bw/day.

Table 1: The prediction skin permeation coefficient logKp and AOEL of 13 pesticides.

Pesticides	Prediction logKp	AOEL (mg/kg bw/day)
Alpha-Cypermethrin	1.846	0.0005
Beta-Cyfluthrin	1.837	0.01
Bifenthrin	1.845	0.0075
Bitertanol	1.823	0.01
Cypermethrin	1.846	0.0025
Deltamethrin	1.827	0.0075
Fenpyroximate	1.827	0.005
Gamma-Cyhalothrin	1.838	0.0003
Lambda-Cyhalothrin	1.838	0.00063
Quizalofop-P-Ethyl	1.811	0.01
Spinetoram	1.861	0.0065
Spirodiclofen	1.835	0.009
Tau-Fluvalinate	1.822	0.0044

3.3 Risk Assessment of Potential Hazardous Pesticides for Operators

As shown in Table 2, the calculated exposure doses of pesticide formulation bifenthrin, bitertanol, cypermethrin, gamma-cyhalothrin, and lambda-cypermethrin are 0.01467, 0.01127, 0.02123, 0.00099, and 0.05741 mg/kg

bw/day, which are higher than individual AOEL values 0.0075, 0.01, 0.0025, 0.0003, 0.00063 mg/kg bw/day, and this means some formulations of these 5 pesticides are hazardous pesticides for operators in Taiwan pesticide application scenarios.

Table 2: The important input values for OPHEC and the calculated exposure dose. The calculated exposure doses, which are higher than AOEL, are in bold font.

Pesticides	Formulation (w/w)	Application rate (L)	Crop type	Exposure dose (mg/kg bw/day)
Alpha-Cypermethrin	3%[2]	5	Wax Apple	0.00071
Beta-Cyfluthrin	2.9%[2]	3	Wax Apple	0.00041
Bifenthrin	2.5%[3]	2.6	Orange	**0.01467**
Bitertanol	28%[2]	0.42	Banana	**0.01127**
Cypermethrin	5%[2]	2	Carrot	**0.02123**
Deltamethrin	2.8%[2]	3	Carrot	0.00178
Fenpyroximate	5%[3]	3	Grape Vine	0.00227
Gamma-Cyhalothrin	1.5%[1]	0.5	Eggplant	**0.00099**
Lambda-Cyhalothrin	2.8%[2]	2	Pear	**0.05741**
Quizalofop-P-Ethyl	5%[2]	2	Beans	0.00399
Spinetoram	5.87%[3]	2.6	Corn	0.00232
Spirodiclofen	30%[3]	1.2	Wax Apple	0.001265
Tau-Fluvalinate	25%[2]	0.7	Guava	0.000834

1 Capsule suspension; 2 Emulsifiable concentrate; 3 Suspension concentrate

4 DISCUSSION

There are lots of pesticide formulations are on the market, which making fast and efficiently finding possible hazardous pesticide for operator is a challenge for a long time. In this study, by considering AOEL and employing a skin permeation coefficient prediction model, hazardous pesticide formulations are screened. Meanwhile, for the model building, eight models had been built, the best performance model is model 4. Although the skin permeation coefficient of pesticides for external validation, and there is no pesticide data in the training set, the performance of the chosen model is still acceptable and is useful in the following risk assessment.

Previously, pesticide operator risk assessments did not incorporate skin permeation coefficients, as converting these coefficients to dermal absorption rates is challenging. Furthermore, lot of limitations are set for using pesticide active ingredient dermal absorption rate as formulations dermal absorption rate in the risk assessment (2). As the determine factors of the risk are safety limit AOEL, dermal absorption rate, which in here is skin permeation coefficient, and pesticide application scenarios, in this study, by employing skin permeation coefficient prediction model, AOEL values, and pesticide formulation, successfully achieved the goal of finding hazardous pesticide formulation efficiently. The only fly in the ointment is that the exposure dose calculated is still based on the default dermal absorption rate, therefore, for evaluators' convenience, in the future, more studies should be conducted to predict the dermal absorption rate.

5 CONCLUSIONS

In this study, a pesticide skin permeation coefficient prediction model had been successfully built, perfectly employed in the pesticide operator risk assessment, and furthermore, finding five hazardous pesticide formulations for operators. Not only it is the first attempt that using a skin permeation prediction model in

pesticide operator risk assessment, but also, by using this strategy, hazardous pesticide formulations are efficiently screened and really helpful for pesticide operators and risk evaluators.

REFERENCES

[1] Animal and Plant Health Inspection Agency, Ministry of Agriculture, Taiwan. 2025. Pesticide Information System. Retrieved February 12, 2025, from https://pesticide.aphia.gov.tw/information/

[2] European Food Safety Authority (EFSA). 2017. Guidance on dermal absorption. EFSA Journal 15, 6 (June 2017), e04873. https://doi.org/10.2903/j.efsa.2017.4873

[3] European Food Safety Authority (EFSA). 2014. Guidance on the assessment of exposure of operators, workers, residents, and bystanders in risk assessment for plant protection products. EFSA Journal 12, 10 (October 2014), 3874. https://doi.org/10.2903/j.efsa.2014.3874

[4] European Commission. 2025. EU Pesticide Database. Retrieved February 12, 2025, from https://food.ec.europa.eu/plants/pesticides/eu-pesticides-database_en

[5] Food and Agricultural Materials Inspection Center, Japan. 2025. Data requirements for registration of agricultural chemicals. Retrieved February 12, 2025, from https://www.acis.famic.go.jp/eng/shinsei/6278_2nd_e.pdf

[6] Frank E., Hall M. A., and Witten I. H. 2016. The WEKA Workbench. Online Appendix for "Data Mining: Practical Machine Learning Tools and Techniques." Morgan Kaufmann, Fourth Edition.

[7] Isabelle B., Pierre L., Severine J., Laetitia R., Sylvain D., and Pierre M. 2006. Pesticide contamination of workers in vineyards in France. Journal of Exposure Science & Environmental Epidemiology 16, 2 (March 2006), 115–124

[8] KNIME. 2024. KNIME: The Konstanz Information Miner (Version 4.5.2). Retrieved February 12, 2025, from https://www.knime.com

[9] Krieger R. I. 1995. Pesticide exposure assessment. Toxicology Letters 82–83 (December 1995), 65–72.

[10] Kristie M. S., Manoj A., Jonathan M. A., Eric F., Jon R. H., Hans R., Prakashchandra S., Christiane W., and Richard P. 2017. Dermal absorption for pesticide health risk assessment: Harmonization of study design and data reporting for North American Regulatory submissions. Regulatory Toxicology and Pharmacology 90 (November 2017), 197–205.

[11] Alvascience. 2025. alvaDesc (Version 2.0.14). Retrieved February 12, 2025, from https://www.alvascience.com/alvadesc/

[12] Neil G. C. 1993. Pesticide exposure: Overview of the tier approach. In Methods of Pesticide Exposure Assessment, Patricia B. C., Sesh I., Pamela A. M., and Marco M. (Eds.). Springer Science+Business Media, LLC, New York, USA, 117–127.

[13] Organisation for Economic Co-operation and Development (OECD). 2004. OECD guideline for the testing of chemicals: Skin absorption – in vivo method. https://doi.org/10.1787/9789264071063-en

[14] PubChem. 2025. PubChem Database. Retrieved February 12, 2025, from https://pubchem.ncbi.nlm.nih.gov/

[15] Rikke H. and Jesper B. N. 2009. Dermal absorption of pesticides—Evaluation of variability and prevention. Danish Environmental Protection Agency. Retrieved February 12, 2025, from https://www2.mst.dk/udgiv/publications/2009/978-87-7052-980-8/pdf/978-87-7052-981-5.pdf

[16] Trevor N. B., James M. A., Peter E., Ida K., and Jon A. A. 2016. Dermal permeation data and models for the prioritization and screening-level exposure assessment of organic chemicals. Environment International 94 (September 2016), 424–435.

[17] U.S. Environmental Protection Agency (USEPA). 2021. Occupational Pesticide Handler Exposure Calculator. Retrieved February 10, 2025, from https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/occupational-pesticide-handler-exposure-data

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***Title can be chosen from: master student, Phd candidate, assistant professor, lecture, senior lecture, associate professor, full professor**

附件3

Employing skin permeation coefficient prediction model in searching of possible operator exposure hazardous pesticides in Taiwan

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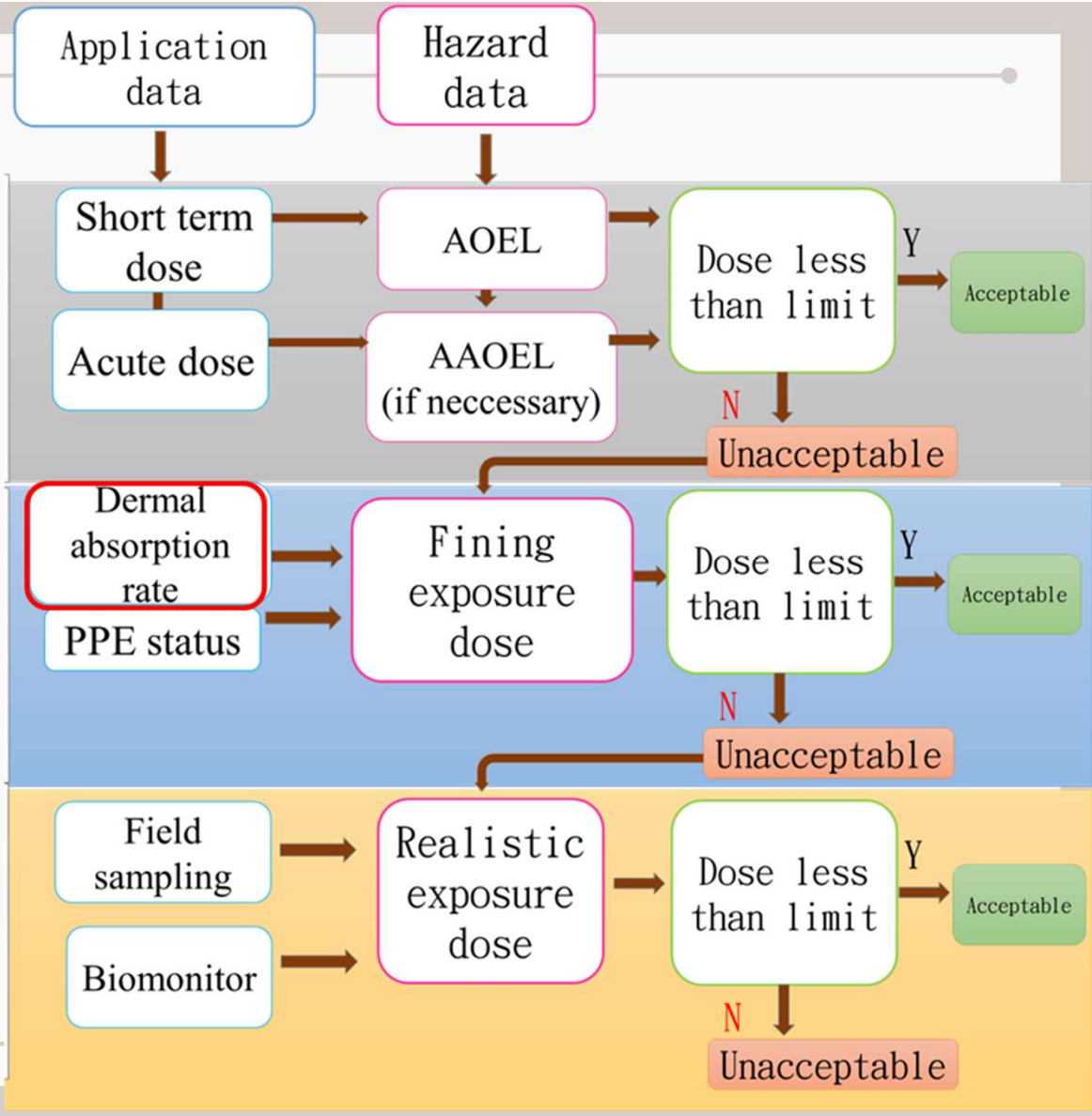
Research Background
Tiered Risk Assessment

- Pesticide operator exposure risk assessment: Comparing the calculated exposure dose with acceptable operator exposure level (AOEL)
- In exposure dose calculating, dermal absorption rate or skin permeation coefficient is a critical



EFSA., *Guidance on the assessment of exposure of operators, workers, residents and bystanders in risk assessment for plant protection products*, EFSA Journal. 2014; 12 (10):3874.

Research Background

Dermal Absorption Plays An Important Role in Pesticide Operator Exposure Safety

Table 4. Dermal contaminations of workers during mixing and spraying with backpacks and during vinework (mg of active ingredient).

	Hands		Body		Inhalation		Total
	Mixing	Spraying	Mixing	Spraying	Mixing	Spraying	
Backpack sprayers							
A (239)	20.679	5.310	0.414	209.71	0.212	0.862	237.187[a]
B (240)	2.197	0.969	0.290	1.170	0.039	0.003	4.668[a]
C (226)	0.115	0.689	0.048	0.124	0.026	0.001	1.003
D (245)	2.610		125.076		4.426		132.112
Vine workers	Whole day		Whole day		Whole day		
E (215)	0.451		0.434		0.043		0.928
F (220)	0.700		0.456		NA		1.156
G (221)	0.865		0.785		0.003		1.653
H (238)	1.348		0.470		NA		1.818
I (237)	0.279		0.301		0.001		0.581
J (236)	0.106		1.219		0.026		1.351
K (235)	0.307		2.327		NA		2.634

[a]Except the cleaning phase assessed on hands, head and forearms: 0.696 mg for A, 5.372 mg for B.

- Respiratory exposure averaged 2.9 % of the total contamination (range 0.02–16.3%).
- The average contribution to daily dermal exposure was 51.7% and 22.5% for mixing/loading and application, respectively

Isabelle, B et al., *Pesticide contamination of workers in vineyards in France.* J Expo Sci Environ Epidemiol. 2006; 16: 115-124.

Problem Description

- In exposure dose calculating, dermal absorption rate or skin permeation coefficient is a critical factor.

Neil G. C., *Pesticide exposure: Overview of the tier approach. In Methods of Pesticide Exposure Assessment*, 1993.

- No specific model for predicting pesticide skin permeation coefficient (logKp).
- In Taiwan, there are about four-hundred pesticide active ingredients, and thousands of pesticide formulation on the market. How to find potential hazardous formulation is a problem.

Study Objectives

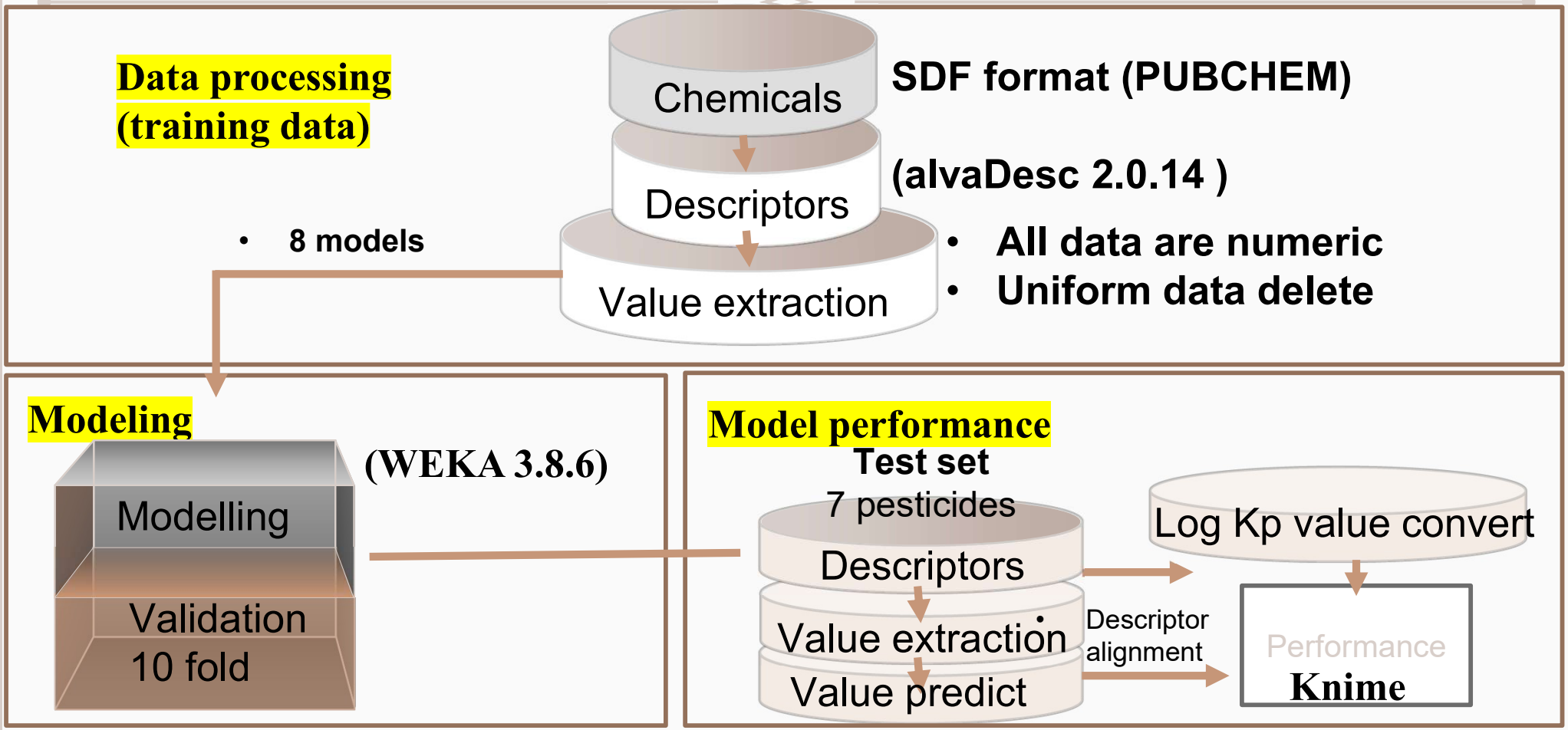
1. Build and validate a quantitative structure properties relationships (QSAR)-based model to predict pesticide skin permeation.
2. Apply model in operator risk assessment by predicting skin permeation value for pesticides with acceptable operator exposure level (AOEL).
3. Find possible hazardous pesticide formulations in Taiwan for operators.

Materials and Methods - Build a Skin Permeation Prediction Model

Data Collection

- 235 chemicals and 7 pesticides skin permeation data were retrieved from literatures.
  - Rikke H., et al. Danish Environmental Protection Agency. 2009; https://www2.mst.dk/udgiv/publications/2009/978-87-7052-980-8/pdf/978-87-7052-981-5.pdf
  - Trevor N. B., et al. Environment International. 2016; 94: 424–435.

Materials and Methods- Models building and evaluating



- Alvascience. 2025. alvaDesc (Version 2.0.14). https://www.alvascience.com/alvadesc/
- Frank E., et al., *Data Mining: Practical Machine Learning Tools and Techniques*. 2016.

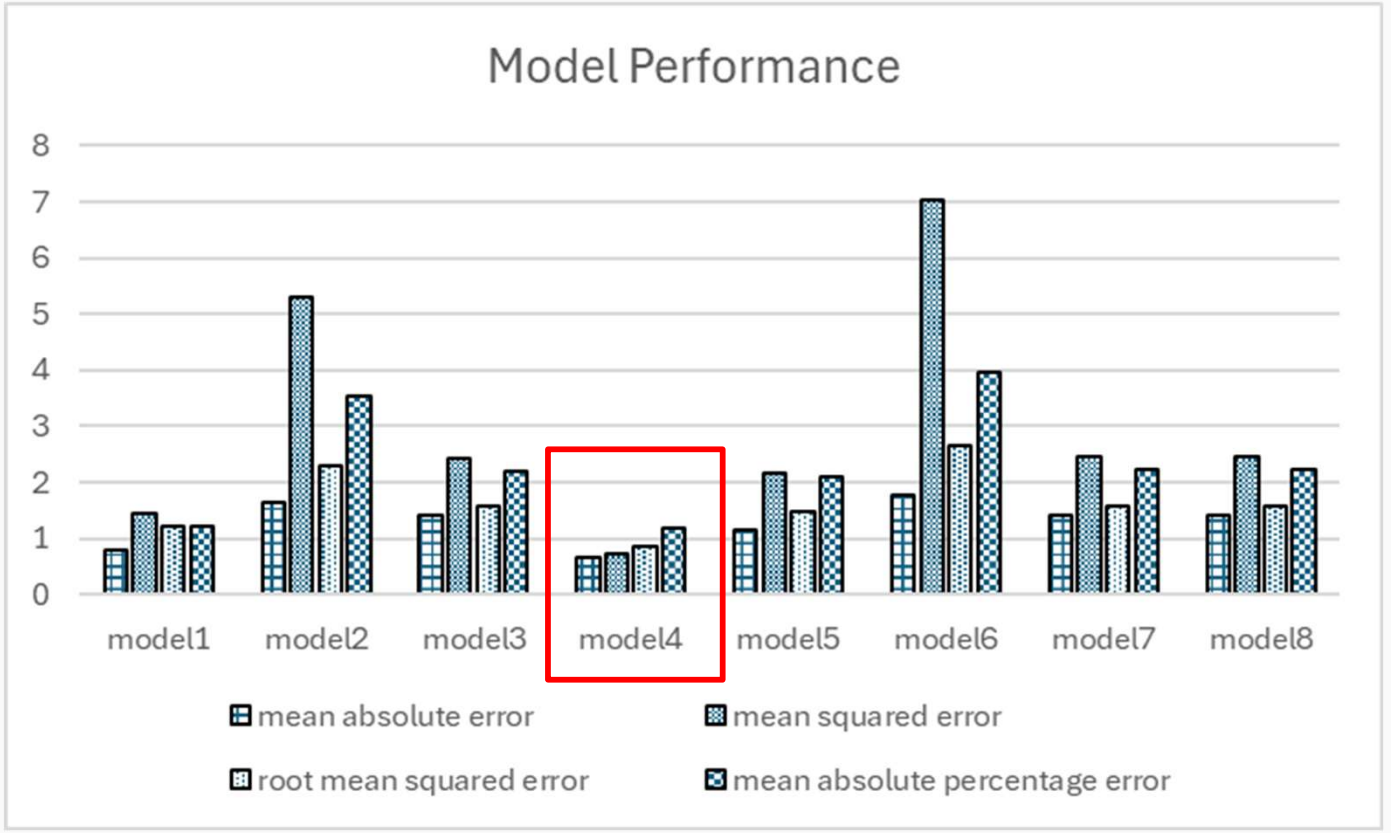
Materials and Methods – Risk Assessment

- Twenty-five percentile was used as a threshold to select low AOEL value and high skin permeation coefficient pesticides
- Operator exposure doses calculated using USEPA Occupational Pesticide Handler Exposure Calculator (OPHEC).

- European Commission. EU Pesticide Database. 2025. https://food.ec.europa.eu/plants/pesticides/eu-pesticides-database_en
- U.S. Environmental Protection Agency (USEPA). Occupational Pesticide Handler Exposure Calculator. 2021. https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/occupational-pesticide-handler-exposure-data

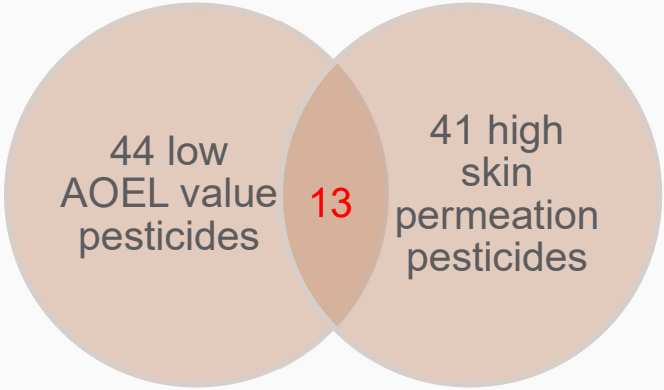
Results - Model Performance

- Model performance indicators MAE, MSE, RMSE, and mean absolute percentage error for 8 models. Model 4 has the best performance.



Results - Identify Potential High Risk Pesticides

Pesticides	Prediction logKp	AOEL (mg/kg bw/day)
Alpha-Cypermethrin	1.846	0.0005
Beta-Cyfluthrin	1.837	0.01
Bifenthrin	1.845	0.0075
Bitertanol	1.823	0.01
Cypermethrin	1.846	0.0025
Deltamethrin	1.827	0.0075
Fenpyroximate	1.827	0.005
Gamma-Cyhalothrin	1.838	0.0003
Lambda-Cyhalothrin	1.838	0.00063
Quizalofop-P-Ethyl	1.811	0.01
Spinetoram	1.861	0.0065
Spirodiclofen	1.835	0.009
Tau-Fluvalinate	1.822	0.0044



- Forty-one pesticides are falling into the 25 percentile high skin permeation coefficient logKp category, and 44 pesticides are in the 25 percentile low AOEL.
- Thirteen recurring pesticides were noted as potential hazardous pesticides for operators.

Results – Exposure Dose Calculate and Risk Assessment

Pesticides	Formulation (w/w)	Application rate (L)	Crop type	Exposure dose (mg/kg bw/day)
Alpha-Cypermethrin	3%[2]	5	Wax Apple	0.00071
Beta-Cyfluthrin	2.9%[2]	3	Wax Apple	0.00041
Bifenthrin	2.5%[3]	2.6	Orange	**0.01467**
Bitertanol	28%[2]	0.42	Banana	**0.01127**
Cypermethrin	5%[2]	2	Carrot	**0.02123**
Deltamethrin	2.8%[2]	3	Carrot	0.00178
Fenpyroximate	5%[3]	3	Grape Vine	0.00227
Gamma-Cyhalothrin	1.5%[1]	0.5	Eggplant	**0.00099**
Lambda-Cyhalothrin	2.8%[2]	2	Pear	**0.05741**
Quizalofop-P-Ethyl	5%[2]	2	Beans	0.00399
Spinetoram	5.87%[3]	2.6	Corn	0.00232
Spirodiclofen	30%[3]	1.2	Wax Apple	0.001265
Tau-Fluvalinate	25%[2]	0.7	Guava	0.000834

- Five pesticides were found hazardous due to calculated exposure doses higher than AOELs: Bifenthrin, Bitertanol, Cypermethrin, Gamma-cyhalothrin, Lambda-cyhalothrin.

Discussion - Model Application

- The prediction model was successfully applied to real-world risk assessments.
- Employing skin permeation prediction model into pesticide operator risk assessment did efficiently identifying potential hazardous pesticide formulations in Taiwan.

Conclusions

- First successful QSAR model for pesticide skin permeation coefficients.
- Model aids rapidly identification of potential hazardous pesticide formulations in Taiwan.

Q&A

Do you have any questions?

Discussion - Model Application

- Exposure doses currently based on default absorption rates.
- Future work required for precise dermal absorption prediction.

Materials and Methods - Descriptors generated, models building and evaluating

- Descriptors generated using Alvadesc software (alvaDesc 2.0.14).
- 8 machine learning models built using WEKA software. (WEKA 3.8.6)
- Evaluated by MAE, MSE, RMSE, and percentage error.

- Alvascience. 2025. alvaDesc (Version 2.0.14). https://www.alvascience.com/alvadesc/
- Frank E., et al., *Data Mining: Practical Machine Learning Tools and Techniques*. 2016.

Smith J, et al. Nature. 2020;586(7828):123-127.