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Abstract & Proceeding Book

The 2nd Annual Health Research International Conference 2023

(AHR-iCON 2023)

19-20 July 2023

Faculty of Medicine, Prince of Songkla University

Global Health & Medical Sciences:

Research & Innovation

Towards Post-COVID Health Equity

Content

Welcome Message

Assoc. Prof. Roengsak Leetanaporn
Dean, Faculty of Medicine, Prince of Songkla University

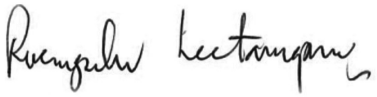
It is my great pleasure to welcome all delegates to the Annual Health Research International Conference 2023 (AHR-iCON 2023) at the Faculty of Medicine in the Prince of Songkla University (PSU).

This year, we organized the Second International conference, AHR-iCON 2023, with the theme of "Global Health & Medical Sciences: Research & Innovation towards Post-Covid Health Equity" during July 19-20, 2023 at Hat Yai campus, PSU. This international conference aims to disseminate the research and innovation findings on global health and medical sciences related to health equity in post-covid periods, to facilitate the researchers and stakeholders to share the needs and policies of research to improve population health and well-being as the target of Sustainable Development Goals (SDG), and to identify and coordinate collaborative research across countries to overcome health inequity. Topic focus on multiple areas of global health and medical sciences.

We aim to prioritize the well-being and good health of the population, as the target of SDG, requires the health sectors and policy support from multi-sectoral sectors as all affect health and inequities in health; therefore, the collaborative approach via Health in All Policies at global levels is needed. To bring forward the post-covid health equity, the research related to public health and medical sciences involving with various spectrums of stakeholders is crucial to be strengthened and disseminated.

We extend our thanks to the international scientific committee, keynote speakers, invited speakers, and reviewers for their contribution in making AHR-iCON 2023 a success, and we wish that you enjoy the conference.

Furthermore, we hope to see you all again during our next AHR-iCON in 2024.



Assoc. Prof. Roengsak Leetanaporn, M.D.
Dean of Faculty of Medicine, Prince of Songkla University

Preface

Prof. Tippawan Liabsuetrakul, M.D., Ph.D.
Vice Dean of Research Affairs, Faculty of Medicine, Prince of Songkla University
Chair of AHR-iCON 2023

Since 2020, the COVID-19 pandemic has had a profound global impact on society as a whole. Not only has it disrupted the health system and healthcare services, but it has also caused significant challenges worldwide. Even before the COVID-19 pandemic, low- and middle-income countries faced issues with healthcare services, health inequalities, and political dilemmas. While we have made some progress in alleviating the immediate effects of the crisis, there remains a pressing need to improve public health and medical sciences in order to achieve health equity.

To promote the advancement of post-COVID health equity, it is essential to strengthen and disseminate research in the fields of public health and medical sciences. This research should involve a diverse range of stakeholders. That is why the Faculty of Medicine at Prince of Songkla University in Thailand takes great pride in hosting the 2nd Annual Health Research International Conference 2023 (AHR-iCON 2023). The conference's theme, "Global Health & Medical Sciences: Research & Innovation towards Post-Covid Health Equity," encompasses various health fields, including Global Health, Biomedical Sciences and Biomedical Engineering, Pharmaceutical, Clinical, Health, and Data Sciences, Medical and Health Technology and Innovation, Post-COVID health inequity, as well as Monitoring and Evaluation of Healthcare.

This year's conference features distinguished international and national guest speakers who will inspire attendees to conduct invaluable research aimed at improving health and well-being. Furthermore, there will be research oral presentations to showcase the latest findings and insights. Additionally, special forums will be held on topics such as the hackathon, research to innovation, and the effects of climate on health.

The 2nd Annual Health Research International Conference 2023 (AHR-iCON 2023) aims to create a collaborative and innovative environment where researchers from various disciplines can come together to address the challenges of post-COVID health equity. By fostering dialogue, sharing knowledge, and promoting research-driven solutions, this conference strives to contribute to the improvement of global health and create a more equitable healthcare landscape.

Tippawan Liabsuetrakul

Prof. Tippawan Liabsuetrakul, M.D., Ph.D.
Vice Dean of Research Affairs, Faculty of Medicine, Prince of Songkla University
Chair of AHR-iCON 2023

International Scientific Committee

Name	Affiliation
1. Prof. Jos Vander Sloten, Ph.D.	Biomedical Engineering, Faculty of Engineering Science, KU Leuven, Belgium
2. Prof. Duško Kozić, M.D.	Radiology, Oncology Institute of Vojvodina, Center for Imaging Diagnostics, Faculty of Medicine, University of Novi Sad, Serbia
3. Prof. Espen Bjertness, Ph.D.	Department of Community Medicine and Global Health, Institute of Health and Society Faculty of Medicine, University of Oslo, Oslo, Norway
4. Prof. Rintaro Mori, M.D., Ph.D.	Graduate School of Medicine, Kyoto University, Kyoto, Japan
5. Prof. Kazuhiro Tateda, M.D.	Department of Microbiology and Infectious Diseases, School of Medicine, Toho University, Japan
6. Prof. Tippawan Liabsuetrakul, M.D., Ph.D.	Department of Epidemiology, Faculty of Medicine, Prince of Songkla University, Thailand
7. Prof. Surasak Sangkathat, M.D., Ph.D.	Department of Surgery, Faculty of Medicine, Prince of Songkla University, Thailand
8. Prof. Kittisak Sawanyawisuth, M.D., Ph.D.	Department of Medicine, Faculty of Medicine, Khon Kaen University, Thailand
9. Assoc. Prof. Desmond Chong, Ph.D.	Engineering Cluster, Singapore Institute of Technology, Singapore
10. Assoc. Prof. Luelak Lomlim, Ph.D.	Department of Pharmaceutical Chemistry, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Thailand
11. Assoc. Prof. Sarawut Kumphune, Ph.D.	Biomedical Engineering Institute, Chiang Mai University, Thailand
12. Dr. Boonchai Kijsanayotin	– Department of Clinical Epidemiology and Biostatistics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand – Health Information Standards Development Center (THIS), Thailand
13. Assoc. Prof. Surapong Chatpun, Ph.D.	Department of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Thailand
14. Asst. Prof. Varomyalin Tipmanee, Ph.D.	Department of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Thailand
15. Prof. Sakda Daduang, Ph.D.	Faculty of Pharmaceutical Sciences, Khon Kaen University, Thailand
16. Assoc. Prof. Hansuk Buncherd, Ph.D.	Faculty of Medical Technology, Prince of Songkla University, Thailand
17. Prof. Kiattawee Choowongkomon, Ph.D.	Department of Biochemistry, Faculty of Science, Kasetsart University, Thailand
18. Assoc. Prof. Manupat Lohitnavy, Ph.D.	Faculty of Pharmaceutical Science, Naresuan University, Thailand
19. Assoc. Prof. Sumit Kane	Melbourne School of Population and Global Health, The University of Melbourne, Australia

Working Committee

Honorary chair

Assoc. Prof. Ruangsak Leethanaporn, M.D.

Chair

Prof. Tippawan Liabsuetrakul, M.D., Ph.D.

Vice chair

Prof. Surasak Sangkathat, M.D., Ph.D.

Member

Prof. Kamolwish Laoprasopwattana, M.D.
Assoc. Prof. Utcharee Intusoma, M.D., Ph.D.
Prof. Virat Kirtsreesakul, M.D.
Assoc. Prof. Patrapim Sunpaweravong, M.D.
Asst. Prof. Thara Tuntanatip, M.D., Ph.D.
Assoc. Prof. Ninlapa Pruksanusak, M.D.
Assoc. Prof. Thitiworn Chusong, Ph.D.
Assoc. Prof. Varah Yuenyongviwat, M.D.
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Assoc. Prof. Weerawat Kiddee, M.D.
Asst. Prof. Jutuporn Pakpirom, M.D.
Assoc. Prof. Surapong Chatpun, Ph.D.
Assoc. Prof. Pritsana Raungrut, Ph.D.
Assoc. Prof. Wit Wichaidit, Ph.D.

Secretary

Mrs. Thanatta Nuntadusit

Secretary assistant

Miss Piyanat Seerakaew
Miss Janejira Nualmak

International Hybrid Conference

The 2nd Annual Health Research International Conference 2023 (AHR-iCON 2023)

Global Health & Medical Sciences: Research & Innovation Towards Post-COVID Health Equity

Background

COVID-19 pandemic has been widely affected to whole society globally since 2020 and the health system and healthcare services were also disrupted. Nowadays, the number of infected cases has been decreasing and the number of deaths is also lowered all over the world. The problems of healthcare services, health inequities, and political dilemmas are reported in low- and middle-income countries even before COVID-19 and rising during COVID-19 pandemic. Although the pandemic has been somewhat relieved, the challenges on how to improve public health and medical sciences towards health equity. Well-being and good health of population, as the target of Sustainable Development Goals (SDG), requires the health sectors and policy support from multi-sectoral sectors as all affect health and inequities in health; therefore, the collaborative approach via Health in All Policies at global levels is needed. To bring forward the post-covid health equity, the research related to public health and medical sciences involving with various spectrums of stakeholders is crucial to be strengthened and disseminated. Therefore, the Faculty of Medicine hosts the annual health research conference on the Global Health & Medical Sciences: Research & Innovation towards Post-Covid Health Equity as a theme of this 2nd Annual Health Research International Conference 2023 (AHR-iCON 2023) at Faculty of Medicine, Prince of Songkla University, Thailand.

Aims

1. To disseminate the research and innovation findings on global health and medical sciences related to health equity in post-covid periods.
2. To facilitate the researchers and stakeholders to share the needs and policies of research to improve population health and well-being as the target of SDG.
3. To identify and coordinate collaborative research across countries to overcome health inequity.

Venue

Conference Center and Health Science Library Building, Faculty of Medicine, Prince of Songkla University, Thailand

Date

19-20 July 2023

Important Date

Conference registration opening:	November 2022
Abstract and Full paper submission:	15 January 2023
Abstract Submission Deadline:	17 April 2023
Full paper Submission Deadline:	24 April 2023
Abstract Acceptance Notification:	15 May 2023
Full paper Acceptance Notification:	15 June 2023
Conference registration Deadline:	22 June 2023 (On site)
	30 June 2023 (On line)

Activities

1. Keynote Lecture
2. Plenary Sessions
3. Symposiums
4. Oral Presentations
5. Presentation of Awards

Topics

- Global Health
- Precision Medicine and Clinical Bioinformatics
- Biomedical Sciences and Biomedical Engineering
- Pharmaceutical, Clinical, Health, and Data Sciences
- Medical and Health Technology and Innovation
- Post-covid Health Inequity
- Monitoring and Evaluation of Healthcare

Conference Program

Day 1: July 19, 2023			
09.00–09.10 **ROOM: Kasem Limwongse**	**Open Speech**		
09.10–09.55 **ROOM: Kasem Limwongse**	**Topic:** The Control of Pore Forming Immune Effectors in Health and Diseases **Keynote Speaker:** Prof. James Whisstock, MA, Ph.D. Professor (Research), Biochemistry & Molecular Biology Monash Biomedicine Discovery Institute, Australia		
09.55–10.15	Break (Separate room) with Coffee break		
	ROOM 1: Pantipya Sanguanchua **Session 1**	**ROOM 2: Atirek Na Thalang** **Session 2**	**ROOM 3: Vicharn Panich** **Session 3**
10.15–10.40	**Topic:** Economic Impact of Post-Covid Pandemic: How responsive are our health systems?	**Topic:** Potential of cannabidiol for anti-inflammatory in the airways	**Topic:** Recent Advance in Epidemiological Research Method
	Invited Speaker	**Invited Speaker**	**Invited Speaker**
	Name: Prof. Dr. Syed Aljunid, M.D., MPH., Ph.D.	**Name:** Prof. Teerapol Srichana, Ph.D.	**Name:** Prof. Virasakdi Chongsuvivatwong, M.D., Ph.D.
	Affiliation: Public Health Medicine and Health Economics of National University of Malaysia, Universiti Kebangsaan Malaysia, MALAYSIA	**Affiliation:** Faculty of Pharmaceutical Science, Prince of Songkla University	**Affiliation:** Department of Epidemiology, Faculty of Medicine, Prince of Songkla University
10.40–10.55	**R1_OP1:** Zwolle risk score for early discharge strategy after PCI in STEMI: A retrospective study in Songklanagarind Hospital/Tawin Khaimook	**R2_OP1:** Gender difference in the association between triglycerides-to-high-density lipoprotein cholesterol ratio and apolipoprotein B level /Pattaranate Cheecharoen	**R3_OP1:** Predicting the need for intensive care unit in non-ST-segment elevation acute coronary syndrome patients: external validation of the ACTION ICU score/ Sorrawis Ronnapoom

10.55–11.10	**R1_OP2:** Use of Antibiotics by Parents of Children Aged 3–6: A Cross-Sectional Study/ Dan Wang	**R2_OP2:** Development and functional characterization of autologous-patient ex vivo human hematopoietic stem cell-derived T lymphocyte for off-the-shelf cancer immunotherapy/Kajornkiat Meneechai	**R3_OP2:** The public's irrational use of antibiotics for upper respiratory tract infections: A cross-section study based on health belief model/Xi Wang
11.10–11.25	**R1_OP3:** Efficacy of cool spray for local anesthesia before intra-articular knee procedures/Chawin Kitsanasakul	**R2_OP3:** Genomic Diversity of Mycobacterium tuberculosis in Mandalay region, Myanmar/Aye Nyein Phyu	**R3_OP3:** Can a traction-internal rotation radiograph increase agreement and accuracy in detection of an unstable pattern in an intertrochanteric fracture?/Trisak Kingchan
11.25–11.40	**R1_OP4:** Effect of Critically Ill Patient's Skin Assessment and Monitoring Tools: The Coccyx Score/Uraiwan Sumranrat	**R2_OP4:** The incorporation of CD40 co-stimulatory molecule into CD19.28z CAR confers greater tumoricidal activity and T-cell persistence by modulating PD-1 expression/ Jakrawadee Julamanee	**R3_OP4:** Epidemiology and Final Outcomes of Patients with Reported Inconclusive HIV Antibody Test in Songklanagarind Hospital: A 9-year retrospective study/Papimon Sophark
11.40–11.55	**R1_OP5:** Self-esteem and depression in patients with adolescent idiopathic scoliosis/ Faiz Sannakit	**R2_OP5:** Comparative protein profiling of urinary extracellular vesicles in stage-specific breast cancer patients: Pilot study/Nilobon Jeanmard	**R3_OP5:** Do the different arm positions affect the exposure in a minimally invasive posterior scapular approach?: A cadaveric study/Supatat Chirattikalwong
11.55–12.10	**R1_OP6:** Validation of the "aMAP" Score for Predicting Hepatocellular Carcinoma Development in Chronic Hepatitis B Patients in Thailand/Supakorn Chaiwiriyawong		**R3_OP6:** Outcomes of routine screening for SARS-CoV-2 by RT-PCR in asymptomatic patients before elective operations/interventions/ Sitthi Mettasitthikorn
12.10–13.00	Lunch		
13.00–13.45 ROOM: Kasem Limwongse	**Topic:** The Role of Epidemiological and Economic Modelling during the COVID-19 Pandemic **Keynote Speaker:** Prof. Mark Jit, B.Sc., Ph.D., MPH. Professor of Vaccine epidemiology and Head of Department, Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, UK (Online)		

13.45–14.05	Break (Separate room) with Coffee break		
	ROOM 1: Pantipya Sanguanchua **Session 4**	**ROOM 2: Atirek Na Thalang** **Session 5**	**ROOM 3: Vicharn Panich** **Session 6**
14.05–14.20	**R1_OP7:** Factors associated with the incidence of coronavirus disease of 2019 in Muang Pattani District, Thailand/Lukman Dunthara	**R2_OP6:** Target Antigen Binding of Glycine-Serine Linker Augments CD37CAR-T Performance/Wannakorn Khopanlert	**R3_OP7:** The Role of Thai Local Herbs and Ingredients in Promoting Post-Pandemic Wellness and Medical Tourism for Sustainable Development Goal 3: A Critical Literature Review/Chengxiang Ma
14.20–14.35	**R1_OP8:** Comparison of the efficacy between longitudinal and transverse open skin incision in De Quervain's tenosynovitis: A randomized controlled trial/Nipat Panichnantho	**R2_OP7:** A preliminary study on gyroscope-based gait characteristics between left-affected side and right-affected side stroke patients/ Thanita Sanghan	**R3_OP8:** Neuroprognostication After Out-of-hospital Cardiac Arrest Using an Increase in Mean Platelet Volume/Tirapat Kongratanapasert
14.35–14.50	**R1_OP9:** Risk factor of recurrent thrombosis in patients with venous thromboembolism using warfarin therapy/Peerasit Sae-Lim	**R2_OP8:** The optimal distal screw length in distal radius plate fixation/Bunyaporn Wuttiworawanit	**R3_OP9:** The Development of Nursing Guidelines and Monitoring Tools for Symmetrical Peripheral Gangrene Prevention in Patients Using Vasopressors at MICU/Sayamon Noosen
14.50–15.05	**R1_OP10** Efficacy between Kinesiotaping versus elbow brace in Lateral epicondylitis patients: A randomized controlled trial: a preliminary study/ Titipong Kriengtaweekit	**R2_OP9:** Which populations are more vulnerable to public health measures during a pandemic? Analysis of longitudinal surveillance data of tuberculosis patients from 2017 to 2022 in Wuhan, China/Qian Fu	**R3_OP10:** Risk factors of bleeding during an amyloidosis biopsy/Watsamon Uraiwan
15.05–15.20	**R1_OP11:** Incidence of acute stroke and associated factors in patients suspected of stroke following to whole cell COVID-19 vaccination (CoronaVac) in Southern of Thailand: A multicenter study/Adithep Leevattananukool	**R2_OP10:** Digital image analysis of tumor patterns and a histological model for prognostic evaluation of invasive non-mucinous adenocarcinoma of the lung/Waratchaya Tirasarnvong	**R3_OP11:** The public's antibiotic use behavioral patterns and their determinants for upper respiratory tract infections: a latent class analysis based on consumer behavior model in China/Chenxi Liu

15.20–16.30 ROOM: Kasem Limwongse	**PSU–BCG HACKATHON**		
Day 2: July 20, 2023			
09.00–09.45 ROOM: Kasem Limwongse	**Topic:** Health Equity in Times of War and Conflict – Research Gaps **Keynote Speaker:** Prof. Espen Bjertness, Ph.D. Professor, Community Medicine and Global Health, Department of Community Medicine and Global Health, Institute of Health and Society, Faculty of Medicine, University of Oslo, Norway. (Online)		
09.45–10.40 ROOM: Kasem Limwongse	**Global Health Forum: Climate and Health Effect**		
10.40–11.00	Break (Separate room) with Coffee break		
	ROOM 1: Pantipya Sanguanchua **Session 7**	**ROOM 2: Atirek Na Thalang** **Session 8**	**ROOM 3: Vicharn Panich** **Session 9**
11.00–11.25	**Topic:** A pathway towards personalized cancer immunotherapy	**Topic:** When Machine Directly Talk with the Nerve and Brain: Brain–Computer Interfacing for Assistive and Preventive Technologies	**Topic:** Submicroscopic Malaria Infection: A Threat to Malaria Elimination
	Invited Speaker	**Invited Speaker**	**Invited Speaker**
	Name: Prof. Nattiya Hirankarn, M.D., Ph.D.	**Name:** Assoc. Prof. Yodchanan Wongsawat, Ph.D.	**Name:** Assist. Prof. Saranath Lawpoolsri Niyom, M.D., Ph.D.
	Affiliation: Cancer Immunotherapy Excellence Center, Faculty of Medicine, Chulalongkorn University and King Chulalongkorn Memorial Hospital	**Affiliation:** Department of Biomedical Engineering, Faculty of Engineering, Mahidol University	**Affiliation:** Department of Tropical Hygiene, Faculty of Tropical Medicine, Mahidol University

11.25–11.40	**R1_OP12:** Experience during COVID-19 Pandemic: The Effects on Prehospital Time Intervals of Emergency Medical Services in Thailand/Patiman Chanrak	**R2_OP11:** Serum Sodium Level is Predictive for Kidney Injury or Hyponatremia after Modest-volume Paracentesis (<5L) to Release Ascites in Asian Cirrhotic Patients/Chayathorn Aramcharoen	**R3_OP12**: The Cost of Breast Cancer In Indonesia 2023/R. Soeko W. Nindito D.
11.40–11.55	**R1_OP13:** Epidemiology, seasonal variability, and factors determining mortality in patients with acute appendicitis in Thailand: A study using data from the National Health Security Office/ Nattaya Khiawthuam	**R2_OP12:** Discriminative ability on endurance impairment relating to hyperkyphosis using the block method/Roongnapa Intaruk	**R3_OP13:** Analysis of spatial and temporal patterns of COVID-19 incidence in Thailand/ Nualnapa Paekpan
11.55–12.10	**R1_OP14:** $PM_{2.5}$ and respiratory symptoms in urban and suburban schoolchildren in Ho Chi Minh City, Vietnam/Huynh Ngoc Thanh	**R2_OP13:** The correlation and accuracy of serum Interferon gamma inducible Protein 10 (IP-10) with Interferon Gamma Release Assays (IGRAs) in diagnosis of latent tuberculosis in health care workers/Theerapat Buppodom	**R3_OP14:** Adherence with sputum collection and quality of sputum in tuberculosis screening during pregnancy in Yogyakarta, Indonesia: a cross-sectional study in pregnant women and healthcare workers/Dzerlina Syanaiscara Rahari
12.10–13.00	Lunch		
13.00–13.45 **ROOM: Kasem Limwongse**	**Topic:** Routine to Research to Health Care Practice and Recommendations: Real Examples of Ebm Implementation **Keynote Speaker:** Prof. Pisake Lumbiganon, M.D., M.S. Professor, Obstetrics & Gynecology, Khon Kaen University, Thailand, Cochrane Thailand (Onsite)		
13.45–14.05	Break (Separate room) with Coffee break		

	ROOM 1: Pantipya Sanguanchua Session 10	ROOM 2: Atirek Na Thalang Session 11	ROOM 3: Vicharn Panich Session 12
14.05–14.30	**Topic:** Research challenge in molecular genetic for precision medicine	**Topic:** Current and future medical innovations in precision medicine	**Topic:** Research integrity and misconduct
	Invited Speaker	**Invited Speaker**	**Invited Speaker (online)**
	Name: Prof. Manop Pithukpakorn, M.D., Ph.D.	**Name:** Assist. Prof. Amornpun Sereemaspun, M.D., Ph.D.	**Name:** Sunaina Singh, Ph.D.
	Affiliation: Faculty of Medicine Siriraj Hospital, Mahidol University	**Affiliation:** Faculty of Medicine, Chulalongkorn University	**Affiliation:** Experienced STEM editor, Editage
	ROOM 1: Pantipya Sanguanchua Session 13	**ROOM 2: Atirek Na Thalang Session 14**	**ROOM 3: Vicharn Panich Session 15**
14.30–14.55	**Topic:** Climate change and maternal, newborn, child and adolescent health and well-being	**Topic:** Preclinical study of TB vaccine development	**Topic:** Noninvasive test in hepatology daily practice
	Invited Speaker	**Invited Speaker**	**Invited Speaker**
	Name: Prof. Quazi Monirul Islam	**Name:** Assist. Prof. Nawamin Pinpathomrat, M.D., Ph.D.	**Name:** Assoc. Prof. Pimsiri Sripongpun, M.D.
	Affiliation: International Centre for Migration, Health and Development, Switzerland Former WHO Director and Country Representative to Thailand and Namibia	**Affiliation:** Department of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University	**Affiliation:** Department of Internal Medicine, Faculty of Medicine, Prince of Songkla University
14.55–15.00	Break (move to ROOM: Kasem Limwongse)		
15.00–16.00 ROOM: Kasem Limwongse	**Research to Innovation: PSU experience**		
16.00–16.30 ROOM: Kasem Limwongse	**Award announcement**		

Keynote Speaker

Prof. James Whisstock, MA, Ph.D.
Professor (Research), Biochemistry & Molecular Biology,
Monash Biomedicine Discovery Institute, Australia

Prof. James Whisstock is a visionary in structural biology, renowned for his groundbreaking research. His expertise in protein structures and interactions has shed light on disease mechanisms and guided therapeutic approaches. Collaborating with scientists globally, he has made significant contributions to the field, earning prestigious recognition. Prof. Whisstock is dedicated to mentoring the next generation of researchers, fostering scientific curiosity and innovation. Alongside his scientific pursuits, he values work-life balance and enjoys exploring the natural world. Prof. James Whisstock's legacy as a trailblazer in structural biology continues to inspire advancements in biomedical research and our understanding of the intricate molecular processes underlying health and disease.

Topic: The control of pore forming immune effectors in health and diseases
Date: 19 July 2023
Time: 09.10-09.55 a.m.

Keynote Speaker

Prof. Mark Jit, B.Sc., Ph.D., MPH.
Professor of Vaccine epidemiology and Head of Department,
Department of Infectious Disease Epidemiology,
London School of Hygiene and Tropical Medicine, UK

Prof. Mark Jit, a renowned epidemiologist at the London School of Hygiene & Tropical Medicine, has shaped global health policy through his expertise in infectious disease modeling and vaccination strategies. His groundbreaking research has provided crucial insights into disease transmission and intervention strategies. Collaborating with international organizations and governments, Prof. Jit has made a significant impact on public health. As a mentor and educator, he inspires the next generation of epidemiologists. With an unwavering commitment to disease control and prevention, Prof. Jit continues to drive innovations in global health, leaving a lasting legacy in the field.

Topic: The role of epidemiological and economic modelling during the COVID-19 pandemic
Date: 19 July 2023
Time: 01.00-01.45 p.m.

Keynote Speaker

Prof. Espen Bjertness, Ph.D.
Professor, Community Medicine and Global Health
Department of Community Medicine and Global Health Institute of Health and Society, Faculty of Medicine University of Oslo, Norway

Prof. Espen Bjertness is a distinguished researcher and professor at the University of Oslo, Norway, specializing in health equity research. With a deep commitment to addressing health disparities, he has made substantial contributions to understanding and reducing inequalities in health outcomes among diverse populations. Prof. Bjertness's expertise lies in epidemiology, social determinants of health, and global health. He has led groundbreaking studies and influenced policy interventions aimed at promoting fairness and improving access to healthcare. Through his relentless pursuit of health equity, Prof. Bjertness continues to shape the field, advocating for inclusive and equitable healthcare systems that prioritize the well-being of all individuals.

Topic: Health equity in times of war and conflict – research gaps
Date: 20 July 2023
Time: 09.00–09.45 a.m.

Keynote Speaker

Prof. Pisake Lumbiganon, M.D., M.S.
Professor, Obstetrics & Gynecology, Khon Kaen University, Thailand
Cochrane Thailand

Prof. Pisake Lumbiganon is a highly respected figure in obstetrics and gynecology, renowned for his contributions to women's healthcare. With extensive expertise in maternal health and evidence-based clinical practice, he has made significant research advancements.Prof. Lumbiganon's leadership roles in professional organizations and international initiatives have driven global collaborations to improve maternal and child health. He is dedicated to medical education, mentoring future healthcare professionals. Through his work, Prof. Lumbiganon has positively influenced healthcare policies and clinical guidelines, ultimately improving outcomes for women and infants worldwide. His legacy as a leader and advocate for women's health continues to inspire the field of obstetrics and gynecology.

Topic: Routine to Research to Health Care Practice and Recommendations: real examples of ebm implementation
Date: 20 July 2023
Time: 01.00-01.45 p.m.

Invited Speakers 19 July 2023: 10.15-10.40 a.m.

Economic Impact of Post-Covid Pandemic: How responsive are our health systems?

ROOM 1: Pantipya Sanguanchua

10.15 - 10.40

Prof. Dr. Syed Aljunid, M.D., MPH., Ph.D.

Public Health Medicine and Health Economics of National University of Malaysia, Universiti Kebangsaan Malaysia, MALAYSIA

Potential of cannabidiol for anti-inflammatory in the airways

ROOM 2: Atirek Na Thalang

10.15 - 10.40

Prof. Teerapol Srichana, Ph.D.

Faculty of Pharmaceutical Science, Prince of Songkla University

Recent Advance in Epidemiological Research Method

ROOM 3: Vicharn Panich

10.15 - 10.40

Prof. Virasakdi Chongsuvivatwong, M.D., Ph.D.

Department of Epidemiology, Faculty of Medicine, Prince of Songkla University

Invited Speakers 20 July 2023: 11.00-11.25 a.m.

A pathway towards personalized cancer immunotherapy

ROOM 1: Pantipya Sanguanchua

11.00 - 11.25

When Machine Directly Talk with the Nerve and Brain: Brain-Computer Interfacing for Assistive and Preventive Technologies

ROOM 2: Atirek Na Thalang

11.00 - 11.25

Submicroscopic Malaria Infection: A threat to Malaria Elimination

ROOM 3: Vicharn Panich

11.00 - 11.25

Prof. Nattiya Hirankarn, M.D., Ph.D.

Cancer Immunotherapy Excellence Center, Faculty of Medicine, Chulalongkorn University and King Chulalongkorn Memorial Hospital

Assoc. Prof. Yodchanan Wongsawat, Ph.D.

Department of Biomedical Engineering, Faculty of Engineering, Mahidol University

Assist. Prof. Saranath Lawpoolsri Niyom, M.D., Ph.D.

Department of Tropical Hygiene, Faculty of Tropical Medicine, Mahidol University

Invited Speakers 20 July 2023: 02.05-02.30 p.m.

Research challenge in molecular genetic for precision medicine

ROOM 1: Pantipya Sanguanchua

14.05 - 14.30

Prof. Manop Pithukpakorn, M.D., Ph.D.

Faculty of Medicine Siriraj Hospital, Mahidol University

Current and future medical innovations in precision medicine

ROOM 2: Atirek Na Thalang

14.05 - 14.30

Assist. Prof. Amornpun Sereemaspun, M.D., Ph.D.

Faculty of Medicine, Chulalongkorn University

Research integrity and misconduct

ROOM 3: Vicharn Panich

14.05 - 14.30

Sunaina Singh, Ph.D.

Experienced STEM editor, Editage

Invited Speakers 20 July 2023: 02.30-02.55 p.m.

Climate change and maternal, newborn, child and adolescent health and well-being

ROOM 1: Pantipya Sanguanchua

14.30 - 14.55

Prof. Quazi Monirul Islam

International Centre for Migration, Health and Development, Switzerland
Former WHO Director and Country Representative to Thailand and Namibia

Preclinical study of TB vaccine development

ROOM 2: Atirek Na Thalang

14.30 - 14.55

Assist. Prof. Nawamin Pinpathomrat, M.D., Ph.D.

Department of Biomedical Sciences and Biomedical Engineering,
Faculty of Medicine,
Prince of Songkla University

Noninvasive test in hepatology daily practice

ROOM 3: Vicharn Panich

14.30 - 14.55

Assoc. Prof. Pimsiri Sripongpun, M.D.

Department of Internal Medicine,
Faculty of Medicine,
Prince of Songkla University

PSU-BCG HACKATHON

Prince of Songkla University (PSU) has its mission to support our students and staffs to translate knowledge from their laboratories to the industry, which will benefit society and the nation. And one of the goals of this operation is to support innovation derived from Bio-Circular-Green (BCG) economic concept.
The Research and Development Office (RDO) together with Faculty of Medicine then hold a business idea competition on the theme 'PSU-BCG Hackathon', with an aim to support creativity that benefits Thai society

Objectives

1. To support creative business ideas focusing on BCG innovation that offers a societal benefit
2. To build the capacity of young researchers with the potential to engage in higher level of competition
3. To support the translation of BCG innovation into commercialization, industrial use, or community benefit

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Global Health Forum: Climate and Health Effect

20 July 2023 | 09.45-10.40 am.

Moderator

Prof. Tippawan Liabsuetrakul
Department of Epidemiology, Faculty of Medicine, Prince of Songkla University

Speaker

Dr. Bordin Vongvitayapirom
Team Leader
Senior Manager, Sustainability & Climate Centre of Excellence
Deloitte Touche Tohmatsu Jaiyos Advisory Co., Ltd. Bangkok, Thailand

Join us at the Global Health Forum on Climate and Health Effect, focusing on the profound impact of climate change on global health on the following:

- Explore the nexus between climate and infectious diseases, maternal and perinatal health, and gastrointestinal diseases.
- Learn from leading experts and visionaries as they present innovative solutions to address these pressing challenges.
- Discover how climate variations contribute to the spread of infectious diseases, understand the risks to maternal and perinatal health, and explore strategies to combat gastrointestinal diseases.
- Connect with professionals, collaborate on groundbreaking initiatives, and be part of a global movement driving positive change.

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Panelists

Infectious expert
Prof. Kamolwish Laoprasopwattana
Department of Pediatrics,
Faculty of Medicine,
Prince of Songkla University

MPH expert
Prof. Quazi Monirul Islam
Senior Specialist
International Centre for Migration, Health and Development

GI expert
Asst. Prof. Naichaya Chamroonkul
Department of Internal Medicine,
Faculty of Medicine,
Prince of Songkla University

PSU Prince of Songkla University | PSU Faculty of Medicine Prince of Songkla University

RESEARCH TO INNOVATION: PSU EXPERIENCE

As innovation can drive the organization with more advantages than others, this time, our speakers will share their ideas and experience on how to turn basic research to innovations based on their routine work and being as an innovator at the same time. Also, with great pleasure, our invited speaker, as a director of Chula Medical Innovation Center, Faculty of Medicine, Chulalongkorn University, will share his experience and relevant facilities which have been driving the organization toward a robust innovation ecosystem.

Moderator

Assoc. Prof. Pittayapon Pitathawatchai, M.D.
Vice Dean of Innovation,
Faculty of Medicine,
Prince of Songkla University

Panelists

Assoc. Prof. Surapong Chatpun, Ph.D.
Department of Biomedical Sciences and Biomedical Engineering
Faculty of Medicine, Prince of Songkla University

Assoc. Prof. Jakrawadee Julamanee, M.D., Ph.D.
Hematology Unit Division of Internal Medicine
Faculty of Medicine, Prince of Songkla University

Speaker

Assist. Prof. Amornpun Sereemaspun, M.D., Ph.D.
Head of the Nanomedicine Research Unit and Director of the Chula Medical Innovation Center

20th July 2023
03.00 - 04.00 p.m.

The 2nd Annual Health Research International Conference 2023 (AHR-iCON 2023)

Global Health & Medical Sciences: Research & Innovation Towards Post-COVID Health Equity

Date: 19-20 July 2023

Faculty of Medicine, Prince of Songkla University

Oral Presentation

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R1_OP1	**Zwolle Risk Score for Early Discharge Strategy after Pci In Stemi: A Retrospective Study in Songklanagarind Hospital** *Tawin Khaimook, Ply Chicharoen* Cardiology Unit, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 37
R1_OP2	**Use of Antibiotics by Parents of Children Aged 3-6: A Cross-Sectional Study** *Xinhong Guo[1], Xi Peng[1], Dan Wang[2]* [1]The First Affiliated Hospital of Shihezi University Medical College, Shihezi, China. [2]School of Management, Hubei University of Chinese Medicine, Wuhan, China.	p 38
R1_OP3	**Efficacy of Cool Spray for Local Anesthesia before Intra-Articular Knee Procedures** *Chawin Kitsanasakul, Prapakorn Klabklay, Wachiraphan Parinyakhup* Department of Orthopedics, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 39
R1_OP4	**Effect of Critically Ill Patient's Skin Assessment and Monitoring Tools: The Coccyx Score** *Uraiwan Sumranrat* Nursing Department, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 40

R1_OP10	**Efficacy between Kinesiotaping versus Elbow Brace in Lateral Epicondylitis Patients a Randomized Controlled Trial: A Preliminary Study** *Titipong Kriengtaweekit[1], Warangkana Fongsri[1], Suttipong Tipchatyotin[2], Pattavear Punyapet[1]* [1]Department of Orthopedic, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Department of Rehabilitation, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 46
R1_OP11	**Incidence of Acute Stroke and Associated Factors in Patients Suspected of Stroke Following to Whole Cell COVID-19 Vaccination (CoronaVac) in Southern of Thailand: A Multicenter Study** *Adithep Leevattananukool[1], Suwanna Setthawatcharawanich[1], Pattaranun Luangdilok[2], Pornpong Jitpratoom[3], Kotchakorn Duangjino[4], Ratchasiri Charoensubsakul[5], Komkrit Panyawattanakit[6], Pharanpong Taemeeyapradit[7], Wuttipong Vilaivarangkul[8], Tabtim Chongsuvivatwong[9], Suparat Chaisurajinda[10], Thongdaeng Foongyai[11], Umarudee Toamard[12], Saranyu Chusri[13]* [1]Neurology Unit, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Division of Medicine, Trang Hospital, Trang, Thailand. [3]Division of Medicine, Chumphon Khet Udomsakdi Hospital, Chumphon, Thailand. [4]Division of Medicine, Pattani Hospital, Pattani, Thailand. [5]Division of Medicine, Maharaj Nakhon Si Thammarat Hospital, Nakhon Si Thammarat, Thailand. [6]Division of Medicine, Surat Thani Hospital, Surat Thani, Thailand. [7]Division of Medicine, Songkhla Hospital, Songkhla, Thailand. [8]Division of Medicine, Satun Hospital, Satun, Thailand. [9]Division of Medicine, HatYai Hospital, Songkhla, Thailand. [10]Division of Medicine, Yala Hospital, Yala, Thailand. [11]Division of Medicine, Fort Wachirawut Hospital, Nakhon Si Thammarat, Thailand. [12]Division of Medicine, Krabi Hospital, Krabi, Thailand. [13]Infectious Disease Unit, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 47

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R2_OP2	**Development and Functional Characterization of Autologous-Patient Ex Vivo Human Hematopoietic Stem Cell-Derived T Lymphocyte for Off-The-Shelf Cancer Immunotherapy** *Kajornkiat maneechai[1,2], Wannakorn Khopanlert[1,2], Phakaporn Udomsak[2], Panarat Noiperm[2], Pongtep Viboonjuntra[2] and Jakrawadee Julamanee[2]* [1]Division of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 53
R2_OP3	**Genomic Diversity of *Mycobacterium Tuberculosis* in Mandalay Region, Myanmar** *Aye Nyein Phyu[1,2], Si Thu Aung[3], Prasit Palittapongarnpim[4], Kyaw Ko Ko Htet[2], Surakameth Mahasirimongko[l5], Wuthiwat Ruangchai[4], Bharkbhoom Jaemsai[4], Htin Lin Aung[6], Htet Myat Win Maung[2], Angkana Chaiprasert[7], Petchawan Pungrassami[8], Virasakdi Chongsuvivatwong[2]* [1]National Tuberculosis Programme, Department of Public Health, Ministry of Health, Mandalay, Myanmar. [2]Department of Epidemiology, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [3]Department of Public Health, Ministry of Health, Keng Tung, Myanmar. [4]Pornchai Matangkasombut Center for Microbial Genomics, Department of Microbiology, Faculty of Science, Mahidol University, Bangkok, Thailand. [5]Medical Life Sciences Institute, Department of Medical Sciences, Ministry of Public Health, Nonthaburi, Thailand. [6]Department of Microbiology and Immunology, University of Otago, Dunedin, New Zealand. [7]Office of Research and Innovation, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. [8]Department of Disease Control, Ministry of Public Health, Nonthaburi, Thailand.	p 54

R2_OP4	**The Incorporation of CD40 Co-Stimulatory Molecule into CD19.28z Car Confers Greater Tumoricidal Activity and T-Cell Persistence by Modulating PD-1 Expression** *Jakrawadee Julamanee[1], Wannakorn Khopanlert[1,2], Kajornkiat Maneechai[1,2]* *Usanarat Anurathapan[3], Suradej Hongeng[3], Pongtep Viboonjuntra[1]* [1]Stem Cell Laboratory, Hematology Unit, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Division of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [3]Division of Hematology and Oncology, Department of Pediatrics, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand.	p 55
R2_OP5	**Comparative Protein Profiling of Urinary Extracellular Vesicles in Stage-Specific Breast Cancer Patients: Pilot Study** *Nilobon Jeanmard[1], Rassanee Bissanum[1], Hutcha Sriplung[2], Sawanya Charoenlappanit[3], Sittiruk Roytrakul[3], Raphatphorn Navakanitworakul[1]* [1]Department of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Department of Epidemiology, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [3]National Center for Genetic Engineering and Biotechnology (BIOTEC), National Science and Technology Development Agency (NSTDA), Pathum Thani, Thailand.	p 78
R2_OP6	**Target Antigen Binding of Glycine-Serine Linker Augments CD37CAR-T Performance** *Wannakorn Khopanlert[1,2], Napat Prompat[3], Jirakrit Saetang[4], Kajornkiat Maneechai[1,2], Pongtep Viboonjuntra[1], Varomyalin Tipmanee[2], Seitaro Terakura[5], Jakrawadee Julamanee[1]* [1]Stem Cell Laboratory, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Division of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [3]Faculty of Medical Technology, Prince of Songkla University, Songkhla, Thailand. [4]International Center of Excellence in Seafood Science and Innovation, Faculty of Agro-Industry, Prince of Songkla University, Songkhla, Thailand. [5]Department of Hematology and Oncology, Nagoya University Graduate School of Medicine, Japan.	p 56

R2_OP12	**Discriminative Ability on Endurance Impairment Relating to Hyperkyphosis Using the Block Method** *Roongnapa Intaruk[1,2], Pakwipa Chokphukiao[2,3], Puttipong Poncumhak[2,4], Pipatana Amatachaya[2], Sugalya Amatachaya[1,2], Jittima Saengsuwan[5], Thiwabhorn Thaweewannakij[1,2]* [1]School of Physical Therapy, Faculty of Associated Medical Science, Khon Kaen University, Khon Kaen, Thailand. [2]Improvement of Physical Performance and Quality of Life (IPQ) Research Group, Khon Kaen University, Khon Kaen, Thailand. [3]Department of Physical Therapy, Faculty of Allied Health Sciences, Naresuan University, Phitsanulok, Thailand. [4]School of Allied Health Sciences, University of Phayao, Phayao, Thailand. [5]Department of Rehabilitation Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand.	p 62
R2_OP13	**The Correlation and Accuracy of Serum Interferon Gamma Inducible Protein 10 (IP-10) with Interferon Gamma Release Assays (IGRAs) in Diagnosis of Latent Tuberculosis in Health Care Workers** *Theerapat Buppodom[1], Nawamin Pinpathomrat[2], Bunya Seeyankem[2], Sarayut Lucien Geater[1], Warangkana Keeratichananont[1]* [1]Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Department of Biomedical Sciences and Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 63

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R3_OP4	**Epidemiology and Final Outcomes of Patients with Reported Inconclusive HIV Antibody Test in Songklanagarind Hospital: A 9-Year Retrospective Study** *Papimon Sophark[1], Somporn Sretrirutchai[2], Pisud Siripaitoon[1]* [1]Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand. [2]Division of Pathology, Faculty of Medicine Prince of Songkla University, Songkhla, Thailand.	p 67
R3_OP5	**Do the Different Arm Positions Affect the Exposure in a Minimally Invasive Posterior Scapular Approach?: A Cadaveric Study** *Supatat Chirattikalwong, Chaiwat Chuaychoosakoon, Prapakorn Klabklay* Department of Orthopedics, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.	p 68

R3_OP12	**The Cost of Breast Cancer on Indonesia 2023** *R. Soeko W. Nindito D.[1], Wahyuni Prabayanti[1], Frieda Ani Noor[2]* [1]Kanker Dharmais Hospital. [2]Kusuma Husada Surakarta University.	**p 75**
R3_OP13	**Analysis of Spatial and Temporal Patterns of COVID-19 Incidence in Thailand** *Nualnapa Paekpan, Apiradee Lim, Rattikan Saelim* Faculty of Science and Technology, Prince of Songkla University, Pattani, Thailand.	**p 76**
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Abstract of Oral Presentation

The 2nd Annual Health Research International Conference (AHR-iCON 2023)

Global Health & Medical Sciences: **Research & Innovation**

Towards Post-COVID Health Equity

Zwolle Risk Score for Early Discharge Strategy after PCI in STEMI: A Retrospective Study in Songklanagarind Hospital

Tawin Khaimook, Ply Chicharoen

Cardiology Unit, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.

Abstract:

Background: Patients diagnosed with STEMI usually need monitoring in the cardiac critical care unit as there are potential post-STEMI complications such as reinfarction, malignant arrhythmia or mechanical complications (acute mitral regurgitation, VSD, LV rupture). Therefore, high resources are needed, but the rate of these complications can be very low in some groups of patients who can be identified by aa risk score. The Zwolle score is one of the risk assessments scores that can distinguish STEMI patients who can be safely discharged in 48-72 hours. The validity of the Zwolle risk score (ZRS) has not been well established in the Thai population.

Objectives: To validate the Zwolle score in the setting of STEMI in a Thai population and study the associations with length of stay, survival at 30 days and other associated factors in each patient risk group.

Methods: Patients admitted over a seven-year period (2014 to 2021) for STEMI and treated with PCI were included in the study. The hospital electronic medical records were reviewed for the patients' demographic data, ZRS, length of stay, 30-day mortality and other associated information. Low risk was defined as a ZRS ≤3.

Results: A total of 689 patients were recruited. The median ZRS was 3 (interquartile range [IQR] 2-6), with 355 patients (51.5%) being classified as low risk. The thirty-day mortality was 5.95% (41 patients). Compared to other patients, high-risk patients had longer length of stay (median 3 [IQR 2-5] vs. 2 [IQR 2-3] days, p<0.01), and higher 30-day mortality (10.8% vs. 2.6%, p<0.01), yielding a positive predictive value of 87.8% for the proposed cut off. The ZRS showed good discriminative power (C-statistic: 0.709, 95% CI 0.654-0.763).

Conclusion: The median ZRS in Thai patients admitted for STEMI and treated with PPCI showed good discriminative power in each patient risk group but there were still limitations. Further studies are recommended.

Keywords: STEMI, coronary angiography, early discharge, mortality

Use of Antibiotics by Parents of Children Aged 3–6: A Cross-Sectional Study

Xinhong Guo[1], Xi Peng[1], Dan Wang[2]

[1]The First Affiliated Hospital of Shihezi University Medical College, Shihezi, China.

[2]School of Management, Hubei University of Chinese Medicine, Wuhan, China.

Abstract:

Background: Preschool children are at particular risk of receiving unnecessary antibiotics.

Objectives: To explore parents' use of antibiotics for children aged 3–6 years and its influencing factors based on a Knowledge–Attitude–Practice (KAP) Model.

Methods: A cross-sectional study was conducted in Shihezi in the western region of China from March to June September 2022. The self-administered questionnaire based on a KAP model was applied for measuring parents' knowledge, attitudes and practical self-use of antibiotics. For knowledge items, the correct response was given a score of 1, while incorrect and uncertain response were given a score of 0. The response of attitudes and practice items were based on Likert-5 scale. The median value was set as the cutoff point for the knowledge, attitude and practice dimensions. The logistic model was applied for exploring the influencing factors based on the KAP model.

Results: A total of 1059 parents of children in five kindergartens were enrolled in this study. The results showed that 68.51% parents had self-used antibiotics for their children. The parents had an average score of 10.30±3.68 for knowledge (range=0~16), 3.85±0.38 for attitudes and 4.26±0.37 for practice. Based on cutoff level, 57.32% and 63.83% respondents had good knowledge and attitudes respectively, while around half of the respondents had good practice of antibiotics use. The logit model results showed that age, gender, income, educational level, and weekly time spent with children (days) were significantly associated with parents' knowledge. Knowledge scores, income, education and gender were significant predictors of parents' attitudes towards antibiotics use for children. As for the practical use, attitudes scores and time spent with children were significant predictors of parents' use of antibiotics.

Conclusion: Most parents had relatively medium level of knowledge and practice. Changing parents' attitudes on appropriate use of antibiotics and increasing the amount of time parents spend with their children would contribute to the rational use of antibiotics.

Keywords: preschool children, KAP model, antibiotics

Efficacy of Cool Spray for local Anesthesia before Intra-Articular Knee Procedures

Chawin Kitsanasakul, Prapakorn Klabklay, and Wachiraphan Parinyakhup

Department of Orthopedics, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.

Abstract:

Background: The intraarticular knee injection is a painful procedure in the orthopedic clinic. There are many methods for local anesthesia before intraarticular injection, but there is no agreement on the most effective method.

Objective: To evaluate efficacy and satisfaction after using a cool spray for pain reduction at the puncture site of knee injections.

Methods: A randomized controlled trial was conducted among patients with knee osteoarthritis and synovitis were included. Patients were assessed with a verbal numerical rating scale (VNRS) for pain at before, during and 15 minutes after an intraarticular knee injection.

Results: 8 patients were participated in the study, with a mean age of 63.13 (10.01) years. The normal saline solution spray group had similar VNRS results compared to the cool spay group for VNRS before the injection [4.3 (5.1) to 7 (2.9); p=0.374], VNRS during the injection [4.0 (1.0) to 6.2 (3.1); p=0.292], and 15 minutes after the injection [1.0 (1.0) to 2.2 (1.9); p=0.364] and overall satisfaction [9.7 (0.6) to 9.4 (0.9); p=0.665, respectively].

Conclusion: The NSS spray group had similar results in VNRS scores compared to the cool spay group before, during, and 15 minutes after the injections. There differences were not significant because this study had a small of sample size.

Keywords: intraarticular knee injection, cool spray, alkane spray, knee osteoarthritis, local anesthesia

Effect of Critically Ill Patient's Skin Assessment and Monitoring Tools: The Coccyx Score

Uraiwan Sumranrat

Nursing Department, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.

Abstract:

Background: An important complication for critically ill patients is pressure injuries (PIs). The majority of PI sites are located in the coccyx area. There are multiple risk factors for pressure injuries, including age, immobility, poor blood perfusion, malnutrition, and vasopressor medication infusion. Coccyx PIs not only involve skin problems and pain, but they also have a negative impact on a patient's psychosocial well-being and quality of life and can cause financial burdens.

Objectives: To develop a Skin Assessment and Monitoring tool, and also a nursing guideline specifically for coccyx PI prevention, named the Coccyx Score.

Methods: The Root Cause Analysis and Plan-Do-Study-Act (PDSA) processes were used as the study framework. This tool is composed of two parts. The first part is the coccyx bone and skin appearance assessment, which assesses the individual PI risk factors to define the patient's risk level (mild, moderate, or severe). The second part is recommending the nursing interventions that are suitable for each coccyx PI level. This tool was validated by three enterostomal therapy nurses.

Results: From 2021 to 2022, after all Medical Intensive Care Unit (MICU) nurses had used the Coccyx Score Tool, the incidence of coccyx PI at the MICU decreased from 2.24 to 0.44/1,000 admission days. Nurses are well qualified to lead in the prevention of PIs in critical care units.

Conclusion: Every critically ill patient requires an appropriate PI assessment tool and appropriate interventions to prevent PIs. Further experimental studies should be conducted to test the effectiveness of this guideline.

Keywords: critically ill patients, pressure injuries, skin assessment tool

Self-Esteem and Depression in Patients with Adolescent Idiopathic Scoliosis

Faiz sannakit[1], Weera Chaiyamongkol[1], Jarurin Pitanupong[2]

[1]Department of Orthopedics, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand.

[2]Department of Psychiatry, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand.

Abstract:

Background: Adolescent idiopathic scoliosis (AIS) is an adolescent onset spinal deformity, often leading to lowered self-esteem which can negatively affect the mental health of these patients. AIS happens at a time of particular psychological development and a link between AIS and mental health problems has been observed.

Objectives: To assess the prevalence of and determine factors associated with depressive risk in adolescent idiopathic scoliosis patients at an outpatient clinic.

Methods: A cross-sectional study of adolescents aged 10-18 years who were diagnosed with AIS at Songklanagarind Hospital between September 2022 and February 2023 was conducted. Demographic and physical exam data, radiographs, treatment, their families and family socioeconomic status. Children's Depression Inventory (CDI) and Rosenberg self-esteem scales was completed by the children themselves. The CDI score of >15 was used as a cutoff for depressive risk patients.

Results: The study included 36 children with AIS. Their mean age was 14.4±2.2 years, with males 8.3% and females 91.7%. The mean Cobb angle was 43.2±11.7 degrees. The mean CDI score was 12.83 and 33% (12 patients) had a depressive risk. By using the Logistic Regression Analysis model, none of the variables, including characteristics of the physical examinations, radiographs, treatment, their families and family socioeconomic status, was significantly associated with depression risk.

Conclusions: One-third of the patients with AIS met the clinical cutoff for depression risk. Multidisciplinary scoliosis teams are in an ideal position to offer early identification and optimum treatment for adolescent idiopathic scoliosis.

Keywords: adolescent idiopathic scoliosis, mental health, depression risk, children's depression inventory

Validation of the "aMAP" Score for Predicting Hepatocellular Carcinoma Development in Chronic Hepatitis B Patients in Thailand

Supakorn Chaiwiriyawong, Pimsiri Sripongpun, Naichaya Chamroonkul, Apichat Kaewdech

Gastroenterology and Hepatology Unit, Division of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.

Abstract:

Background: Hepatocellular carcinoma (HCC) is a prevalent cancer worldwide, including in Thailand. Identifying high-risk patients for HCC surveillance is crucial. The aMAP score, introduced in 2020, has demonstrated accurate HCC risk prediction across various etiologies and populations. However, its external validation in Thai chronic hepatitis B patients has not been assessed.

Objectives: To evaluate the aMAP score's efficacy and compare it with other risk scores for predicting HCC development in Thai chronic hepatitis B patients.

Methods: We retrospectively analyzed chronic hepatitis patients from January 1, 2011, to December 31, 2019. Data on demographics, clinical parameters, cirrhotic status, HCC imaging, and AFP surveillance were collected to calculate the aMAP score (0-100) based on age, gender, albumin-bilirubin, and platelets. The aMAP score's predictive accuracy was assessed using time-dependent area under the receiver operating characteristic (AUROC) curve.

Results: The study included 1,060 eligible chronic hepatitis B patients with a mean follow-up time of 8.6 years, and 124 patients (11.7%) developed HCC. The cumulative HCC incidences in the aMAP low-, moderate-, and high-risk groups at 1, 3, 5, and 10 years were significantly different (log-rank P <0.0001). The aMAP score's AUROCs for HCC prediction at 1, 3, 5, and 10 years were 0.696, 0.714, 0.732, and 0.740, respectively. Among the risk scores, CU-HCC had the highest AUROCs (0.800), followed by REACH-B (0.748), aMAP (0.732), PAGE-B (0.722), and mPAGE-B (0.719).

Conclusions: The aMAP score is a valuable tool for predicting HCC risk in Thai chronic hepatitis B patients and can enhance surveillance strategies. Nonetheless, its performance was inferior to CU-HCC, suggesting the need for new predictive tools for HCC surveillance.

Keywords: HCC, aMAP score, chronic hepatitis B, surveillance, Thailand

Factors Associated with The Incidence of Coronavirus Disease of 2019 in Muang Pattani District, Thailand

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Abstract:

Background: COVID-19 distribution varies by demographic, spatial, and temporal factors.

Objective: To investigate the COVID-19 incidence in Muang Pattani district between April 2021 and September 2022.

Methods: The COVID-19 data with 15,807 reported cases was obtained from the Muang Pattani District Health Office. A descriptive analysis was used to describe the characteristics of the COVID-19 cases. A negative binomial model was used to investigate the COVID-19 incidence.

Results: The overall incidence of COVID-19 was around 1,188.9 cases per 100,000 population. Females had a higher incidence rate than males. People aged 20–39 years had significantly higher incidence rates than the average. The highest rate was found in the Barohom sub-district. In 2021, the highest rates were in October, followed by July and August, and in 2022, they were in March.

Conclusion: The findings of the study can be used by public health organizations and others involved in COVID-19 and other infectious disease prevention.

Keywords: COVID-19 incidence, Thailand, demographic, spatial-temporal, negative binomial

Comparison of The Efficacy Between Longitudinal and Transverse Open Skin Incision in De Quervain's Tenosynovitis: A Randomized Controlled Trial

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Abstract:

Background: Surgical release for radial styloid tenosynovitis (De Quervain's tenosynovitis) is the standard treatment for whom is not response to conservative treatment. However, there have some conflict evidences regarding which types of skin incision provide better clinical results.

Objectives: To compare the efficacy and safety of surgical decompression between using the longitudinal and the transverse open skin incision.

Methods: This was a randomized control study. Patients diagnosed with radial styloid tenosynovitis were randomized into two groups: longitudinal vs transverse incision using block of four technique in opaque envelope. All patients were operated by Hand surgeon under local anesthesia. The patients were follow-up at 2, 6, 12 weeks. Primary outcome was the functional outcomes using Thai version Patient-Rated Wrist Evaluation (Thai-PRWE). Secondary outcomes were the Patient and Observer Scar Assessment Scale (POSAS), Verbal Numerical Rating Scale (VNRS), surgery-related complications by independent assessor blinded to the type of incision.

Results: There were 60 patients with 30 patients in each group included in the study. No patients were lost to follow-up. The longitudinal incision group showed a statistically significant better pain improvement (VNRS) and scar satisfaction (POSAS) compared with the transverse incision group only at 2 and 6 weeks postoperative. However, there were no statistically significant in functional outcome and surgical-related complications between both incisions.

Conclusions: The longitudinal incision is recommended for surgical release in radial styloid tenosynovitis because It demonstrated better early surgical results than the transverse incision with comparable functional outcome and surgical-related complications.

Keywords: radial styloid tenosynovitis, surgical-related outcomes, functional outcome, scar evaluation, pain score

Risk Factor of Recurrent Thrombosis in Patients with Venous Thromboembolism Using Warfarin Therapy

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Abstract:

Background: Venous thromboembolism (VTE), including deep vein thrombosis and pulmonary embolism, are the common disease in general practice. Warfarin is the cornerstone treatment of VTE to prevent thrombus propagation or embolization and decrease risk of recurrent VTE. The range of prothrombin time/international ratio (PT/INR) 2.0-3.0 is the therapeutic recommendation of warfarin. The compliance of warfarin with appropriate PT/INR is associated with effective treatment for VTE prevention. However, the risk factors of recurrent VTE are not well understood.

Objective: To evaluate the risk factors of recurrent VTE.

Methods: This retrospective study included patients with age at least 18 years who were diagnosed with VTE and treated with warfarin in Songklanagarind Hospital between 2007 and 2021. Recurrent VTEs were confirmed by the patient's condition and imaging including ultrasonography, computerized tomography or magnetic resonance imaging.

Results: 460 patients with VTE were enrolled in this study. The median age of patients was 63 years with females predominant. Sixty-eight percent of VTEs were deep vein thrombosis and 33.5% of VTEs were unprovoked thrombosis. With a median follow-up 0.53 year (IQR=0.25-1.14), there were sixteen recurrent VTE events in 15 patients. The majority of recurrent VTEs were deep vein thrombosis (62.5%). The median time to VTE recurrence was 26 days (IQR=20.5-276.5). The median of PT/INR at VTE recurrence was 2.20 (IQR=2.00-3.33). 93.3% of patients with recurrent VTE had poor compliance with their warfarin, which was defined as time of therapeutic dose of warfarin (PT/INR in range 2.0-3.0) was less than 70%. In the multivariate analysis of logistic regression, only smoking was associated with a high risk of recurrent VTE. (OR 9.16, 95%CI 1.53-54.92, p=0.015).

Conclusion: Among patients with VTE who were treated with warfarin, more than 70% in time to achieved therapeutic dose of warfarin was necessary to prevent recurrent VTE. Smoking was the strong risk factor for recurrent VTE in patients with warfarin administration.

Keywords: venous thromboembolism, warfarin, PT/INR, compliance

Efficacy between Kinesiotaping versus Elbow Brace in Lateral Epicondylitis Patients: A Randomized Controlled Trial: A Preliminary Study

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Abstract:

Background: Lateral epicondylitis, also known as "Tennis elbow", This the most common pathology diagnosed of the elbow, characterized by pain and tenderness over the lateral epicondyle, pain and weakness in gripping, limitations in daily activities, and deterioration in quality of life. The main treatment principles are exercises and decreasing the load origin of the ECRB. The current treatment guidelines for lateral epicondylitis recommend a non-operative treatment, including physical therapy, electrophysiotherapy, and injections. No conclusive evidence on the most effective management in patient with lateral epicondylitis.

Objectives: To evaluate the efficacy of Kinesiotaping by Kenzo technique and elbow brace in treatment Lateral epicondylitis and there is a lack of proper designed in other studies.

Methods: A randomized controlled trial study was conducted in patients with lateral epicondylitis aged 20-80 years having symptoms duration <12 weeks, tenderness and pain over lateral elbow, and at least one provocative test positive. Patients were divided into 2 groups Kinesiotaping (n=10) or Elbow brace (n=9). The primary outcome was the DASH score (Disabilities of the Arm, Shoulder and Hand) at 4 weeks post treatment. The secondary outcomes were Maximum Grip Strength, Visual analog score (VAS) pain and Pill count of use paracetamol and oral nonsteroidal anti-inflammatory drugs (NSAIDs) for pain relieve at 4 weeks posttreatment.

Results: Mean difference of pretreatment and posttreatment of DASH (Disabilities of the arm, shoulder and sand) Kinesiotaping group DASH scores was -15 (7.4) more than the Elbow brace group -3.4 (16.2) but no significant difference between the two groups of treatment (p=0.056). Mean difference pretreatment and posttreatment Maximum Grip Strength, Visual analog score (VAS) pain, and Pill count of use paracetamol and oral nonsrerioid anti-inflammatory drugs (NSAIDs) for pain relief showed no significant difference in both groups.

Conclusion: Kinesiotaping and Elbow brace showed improvement in DASH score, Grip strength, VAS painb but no significant difference in both group for treatment Lateral epicondylitis.

Keywords: lateral epicondylitis, kinesiotaping, elbow brace

Incidence of Acute Stroke and Associated Factors in Patients Suspected of Stroke Following to Whole Cell COVID-19 Vaccination (CoronaVac) in Southern of Thailand: A Multicenter Study

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Abstract:

Background: Since the beginning of COVID-19 pandemic, a great interest in vaccines has emerged to prevent the disease outbreak. Rare adverse events can be found in mass vaccination. Acute stroke after ChAdOx1 nCov-19 (AstraZeneca-Oxford) is one of the well-known complications. However, there was limit data about acute stroke following CoronaVac (Sinovac Biotech) vaccination.

Objective: To investigate incidence of acute stroke and associated factors in patients suspected of stroke after CoronaVac (Sinovac Biotech) vaccination.

Methods: This is a retrospective study of patients with suspected stroke following CoronaVac (Sinovac Biotech) vaccination. Data were collected from 12 healthcare centers in Southern of Thailand during March-July 2021. A history taking and physical examination were done by neurologists and stroke was diagnosed based on MRI findings.

Results: Of 39 patients suspected of stroke, 4 (10.3%) were diagnosed as stroke and all were ischemic stroke. When compared with non-stroke patients, those with stroke had a higher proportion of male gender, hypertension and a higher median NIHSS score. Age, body mass index, diabetes mellitus, dyslipidemia, onset of neurological symptoms, paresthesia and weakness were not different between patients with and without stroke.

Conclusion: The study reveals the first report of incidence of MRI-confirmed acute stroke following CoronaVac (Sinovac Biotech) vaccination in those with suspected stroke. Factors associated with acute ischemic stroke were male gender, a history of hypertension and a high NIHSS score.

Keywords: post vaccination, neurological adverse events, acute stroke, COVID-19, coronavac

Experience during COVID-19 Pandemic: The Effects on Prehospital Time Intervals of Emergency Medical Services in Thailand

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Abstract:

Background: The coronavirus disease 2019 (COVID-19) affected population health and health service systems globally in early 2020.

Objectives: To determine how the COVID-19 pandemic affected the Emergency Medical Services (EMS) prehospital time intervals in Thailand.

Methods: This retrospective cohort study analyzes the prehospital time intervals of EMS in Thailand from January 1, 2019 to September 30, 2021. The incomplete medical records, the prehospital time intervals were <1 or >300 minutes, and patients who were admitted from January 1 to March 31, 2020 were excluded. Data obtained from the national EMS database were analyzed and compared between groups; Group 1: the pre-COVID-19, Group 2: the first and second-wave COVID-19, and Group 3: the third-wave COVID-19; by Kruskal-Wallis, Wilcoxon Rank-Sum, and Chi-square tests.

Results: A total of 3,863,153 patients were enrolled. The median total prehospital time was significantly longer in Group 2, 25 (17,34) vs 24 (17,33), p<0.001; longer on-scene time, 4 (2,7) VS 3 (2,6), p<0.001; shorter transportation time 10 (6,17) vs 11 (6,18), p<0.001 when compared to Group 1. The median total prehospital time (27 (19,37) vs 25 (17,34), p<0.001), the response time (8 (5,14) vs 7 (4,11), p<0.001), and the transportation time were significantly longer in Group 3 compared to Group 2 (11 (6,18) vs 10 (6,17), p<0.001). The median total prehospital times were significantly longest during the third wave of the COVID-19 pandemic.

Conclusions: The COVID-19 pandemic caused increasing EMS prehospital time intervals in Thailand, in both non-trauma and trauma subgroups. There should be a plan and system monitoring of EMS prehospital care to deal with future emerging pandemics.

Keywords: COVID-19, emergency medical services, pandemic, prehospital times

Epidemiology, Seasonal Variability, and Factors Determining Mortality in Patients with Acute Appendicitis in Thailand: A Study Using Data From the National Health Security Office

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Abstract:

Background: Appendicitis is the most common surgical emergency in all age groups in Thailand and recorded in national database; however, the utilization of these data has not been reported.

Objectives: To evaluate the incidence and outcomes of acute appendicitis in Thailand using reimbursement data from the National Health Security Office from the years 2016–2020.

Methods: The study extracted data from records with ICD–10 (K35) to calculate the incidence of acute appendicitis in the Thai population and explored subgroups according to age and health region. We also examined the mortality rates of acute appendicitis in conjunction with other diseases or conditions that might influence mortality rate, such as diabetes, heart diseases, and extreme age. The study also compared outcomes of treatment between appendicitis patients who underwent an appendectomy and those who received other types of treatment.

Results: The total number of acute appendicitis cases throughout the course of the four–year study was 287,452 (71,863 cases per year). The highest incidence was found in the 10–20–years age group. The overall mortality rate was 2.2% and those aged between 90 and 100 years had the highest mortality rate (35.40%). Out of the 13 health regions in Thailand, Health Area (HA) 1 had the highest incidence while HA 7 had the highest death rate (3.13%). On survival analysis, diabetes, Down syndrome, heart diseases, and non–surgical treatment were associated with higher mortality.

Conclusion: Our analysis of the hospital discharge database found that the mortality from appendicitis in Thailand was comparable with other countries. Higher mortality was found in the elderly and those with underlying diseases.

Keywords: appendicitis, ICD–10, prevalence, mortalities, THIP

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$PM_{2.5}$ and Respiratory Symptoms in Urban and Suburban Schoolchildren in Ho Chi Minh City, Vietnam

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Abstract:

Background: The PM2.5 concentration is commonly used for monitoring air quality that is sensitive to respiratory tract of children.

Objective: To document the pattern of $PM_{2.5}$ concentration in urban and suburban schools in Ho Chi Minh City (HCMC) and to estimate the prevalence of wheezing and rhinitis among schoolchildren and its differences in sociodemographic characteristics and school-related conditions.

Methods: A cross-sectional study was conducted in two suburban and two urban schools in HCMC. $PM_{2.5}$ concentrations were monitored hourly from August to December in 2022. Vietnamese children aged 9-13 years (N=1033) provided data on the occurrence of wheezing and rhinitis symptoms in the previous year. The daily levels of $PM_{2.5}$ were compared between suburban and urban schools. Cross-tabulation was used to compare respiratory symptoms between areas and across school-related conditions.

Results: Geometric means of the daily $PM_{2.5}$ concentration in the suburban and urban areas were 61.2 μg/m^3 and 31.0 μg/m^3, respectively ($p<0.001$). In both areas, $PM_{2.5}$ levels increased in the evening to high levels at night and early morning. The prevalence of respiratory symptoms in the previous 12 months did not differ significantly between the two areas: wheezing 20.6% and 16.9%, and rhinitis 55.7% and 61.5%, respectively. However, school-related conditions in which the prevalence was increased were travelling to school by bus and spending more than 15 minutes/day on the road and attending extra classes outside of normal school hours.

Conclusions: Despite the significantly higher $PM_{2.5}$ levels in suburban schools, the prevalence of wheezing and rhinitis did not reveal significant differences between areas. However, the prevalence of respiratory symptom was higher among those travelling by bus, spending longer time on the road and attending classes out of normal school hours.

Keywords: $PM_{2.5}$, wheezing, rhinitis, schoolchildren, Vietnam

Gender Difference in The Association between Triglycerides-To-High-Density Lipoprotein Cholesterol Ratio and Apolipoprotein B Level

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Abstract:

Background: It is well known that the incidence of coronary heart disease (CHD) is lower in females when compared with age-matched men. Interestingly, this phenomenon is reversed in a situation of existing diabetes. Until now, there has been no good explanation for these discrepancies. Since small low-density lipoprotein (LDL) particle size and high LDL particle number are a major risk of atherosclerosis, a gender difference in LDL particle size and/or LDL particle number might involve in this change. Measurement of LDL particle size and number is not routine in clinical practice. Nonetheless, previous studies demonstrated that a triglycerides-to-high-density lipoprotein cholesterol ratio (TG/HDL-C) was inversely correlated with LDL particle size, and an apolipoprotein B (apoB) level could represent LDL particle number.

Objectives: To explain the heterogeneity of CHD risk between genders, we studied the association between a TG/HDL-C and an apoB level in healthy adult males and females.

Methods: Plasma from left-over blood specimens were collected within 24 hours from subjects whose blood was sent for a fasting lipid profile measurement in the health check-up program. The plasma samples were stored at -80°C for less than 2 months before determining apoB levels.

Results: Plasma samples collected from 212 males and 200 females were analyzed. In females, the TG/HDL-C ratio was significantly positively correlated with the apoB level but not with the LDL cholesterol level. In contrast, the TG/HDL-C was significantly negatively correlated with the LDL cholesterol but not with the apoB level in male. At the same level of LDL cholesterol, males had a higher apoB level than females throughout the LDL cholesterol range.

Conclusions: There is a gender difference in the association between a TG/HDL-C (a marker of LDL particle size) and an apoB level (a marker of LDL particle number).

Keywords: apolipoprotein B, gender difference, triglycerides to HDL cholesterol ratio

Development and Functional Characterization of Autologous-Patient Ex Vivo Human Hematopoietic Stem Cell-Derived T Lymphocytes for Off-The-Shelf Cancer Immunotherapy

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Abstract:

Background: CD19 CAR T-cell demonstrated promising results from various clinical trials; however, the poor T-cell function in heavily pretreated patients or inadequate T-cell number collection for therapeutic purposes are crucial concern.

Objectives: To generate and characterize autologous hematopoietic stem cell-(HSC)-derived T-lymphocytes as well as assess the feasibility of off-the-shelf T-cell production for cancer immunotherapy.

Methods: HSCs were obtained from myeloma and lymphoma patients during stem cell transplantation. $CD3^+$ and $CD34^+$ cells were isolated from the HSC products. $CD34^+$ cells were cultured with differentiation and maturation mediums for a total of 52 days. The phenotypes of the $CD3^+$ and HSC-derived T-cells (HSC-T) were analyzed using flow cytometry at indicated time points and the in vitro T-cell functions were assessed. CD19CAR-T cells were also generated and functionally tested for pre-clinical use.

Results: We achieved a 3735-fold expansion of HSC-T by day 52. $CD34^+$ cells differentiated into 63%, 74%, and 90% of progenitor T-cells ($CD5^+CD7^+$) on days 14, 42, and 52, respectively. HSCs dramatically maturated into 41% and 90% of $CD3^+$ cells on days 42 and 52, sequentially. Most generated HSC-Ts were naïve phenotypes with predominant $CD8^+$ cells. HSC-T showed negligible exhaustion phenotypes and higher cytokines secretion, including IL-2, IFN-γ, Granzyme B, and Perforin, compared to conventional T-cells. To preliminarily assess the application, we successfully generated HSC-T-derived CD19CAR-T cells with similar transduction efficacy compared to CD3-derived CAR-T cells. Again, HSC-CAR-T cells exhibited superior cytokine production and specific cytotoxicity against primary mantle cell lymphoma and B-acute lymphoblastic cell lines compared to CD3-CAR-T cells.

Conclusion: The generation of a patient's autologous HSC-T cells is feasible. HSC-T preserves T-cell stemness and functions. The autologous ex vivo human HSC-T cells could be considered for off-the-shelf cancer immunotherapy.

Keywords: hematopoietic stem cell, T lymphocyte, chimeric antigen receptor

Genomic Diversity of Mycobacterium Tuberculosis in Mandalay Region, Myanmar

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Abstract:

Background: Whole genome sequencing (WGS) of Mycobacterium tuberculosis (Mtb) is currently known to be related to tuberculosis transmission, but its sublineages and biodiversity are limited in Mandalay region of Myanmar where the tuberculosis is prevalent.

Objectives: To classify lineages, sublineages, genetic clustering, drug resistance genotypes and biodiversity of Mycobacterium tuberculosis (Mtb) isolates in Mandalay region.

Methods: A cross-sectional sample of 151 isolates were obtained for the 4th Nationwide Anti-Tuberculosis (TB) Drug Resistance Survey in Mandalay region. Whole genome sequencing (WGS) analysis was carried out at Otago University, New Zealand. At Prince of Songkla University and Mahidol University, lineages (L) and sublineages of the isolates were identified. Pairwise genetic distance and Simpson's Diversity Index were computed. A genetic cluster of isolates was defined by at least two having fewer than 20 single nucleotide polymorphism (SNP) difference. Drug resistance genes were identified by TB-profiler software.

Results: The descending order of lineages was L2 (43.0%), L1 (36.4%), L4 (14.6%) and L3 (6.0%). The two most common sublineages were L1.1.3.1 (n=31) and L2.2.AA3.2 (n=17). There were four clusters identified with the number of isolates being 3 (L2), 2 (L4), 2 (L1) and 2 (L2). Simpson's Diversity Index for all sub-lineages was 0.0709, indicating high biodiversity. Among the streptomycin resistant isolates, 73% had an rpsL K43R mutation. Multi-drug resistant tuberculosis (MDR-TB) accounted for 1.6% (2/126) in L1 and L2 among 126 new TB patients.

Conclusions: High genetic diversity suggests that the study area probably had imported Mtb from many geographical sources. Relatively few genetic clusters and MDR-TB may suggest a good opportunity for the success of future control if properly done.

Keywords: genomic diversity, mycobacterium tuberculosis, mandalay region, Myanmar

The Incorporation of A CD40 Co-Stimulatory Molecule Into CD19.28z Car Confers Greater Tumoricidal Activity and T-Cell Persistence by Modulating PD-1 Expression

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Abstract:

Background: CD19CAR-T cell incorporated B-cell signaling, CD79A/CD40, demonstrated greater CAR-T cell proliferation and persistence which enhanced anti-tumor activity (Molecular Therapy, 2021). However, the slow tumor eradication kinetic of CD79A/CD40 compared to CD28 costimulatory domain is still concern as a limitation for therapy.

Objective: To enhance anti-tumor efficacy and CAR-T cell persistence.

Methods: We modified the Ramathibodi's CD19.28z CAR gene backbone by incorporating a B-cell signaling molecule, CD40, into the CD28 T-cell costimulatory domain in order to maximize CD19CAR-T cell functions, including the cytotoxic function and T-cell persistence.

Results: We successfully transferred CAR genes into human CD3 cells using a third-generation lentiviral system with a transduction efficacy of 20%. For T-cell functions, CD19.28.40z CAR-T cells demonstrated robust CAR-T cell proliferation upon exposure to the CD19 antigen compared to CD19.28z CAR-T cells, regardless of cytokine and number of stimulations. The CD19.28z CAR-T cells showed a high central memory T-cell population after antigen stimulation; however, significant upregulation of PD-1 which influences T-cell persistence and cytotoxicity was observed. Moreover, a long-term co-cultured assay confirmed effective and continuous tumor eradication by CD19.28.40z CAR-T cells at an E:T ratio of 1:10. In terms of cytokine secretion, there was no difference among the structures. To further study CAR-T function in vivo, Burkitt lymphoma-inoculated NSG mice were treated with a low CAR-T cell dosage in order to examine the functional differences. The CD19.28.40z CAR-T cells again demonstrated higher tumor suppression which resulted in longer survival compared to CD19.28z CAR-T cells in xenograft model.

Conclusion: Incorporation of the B-cell signaling receptor, CD40, into a CD28 T-cell costimulatory domain optimizes CD19CAR-T cell functions by modulating PD-1 expression.

Keywords: CD40, CD28, CD19CAR, PD-1

Target Antigen Binding of Glycine–Serine Linker Augments CD37CAR–T Performance

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Abstract:

Background: Gene–modified therapy expressing CD19–chimeric antigen receptor (CD19CAR) has shown promising outcomes in B–cell malignancies. However, some patients given this therapy have experienced relapses due to poor CAR–T persistence and antigen escape. To address this issue, a novel third–generation CD37CAR was developed incorporating the dual T– and B–cell costimulatory molecules CD28/CD40, and two different single–chain variable fragments (scFv) linkers to improve CD37CAR–T efficacy against CD37+ malignancies.

Objectives: To investigate the structural behavior and binding characteristics of scFv at the atomistic level.

Methods: We incorporated two different linkers, GSTSGSGKPGSGEGSTKG (18aaL) and GGGGSGGGGSGGGGSGGGGS (GS4L), into the CD37CAR scFv backbone. CAR–T cells were generated using a retroviral system, enriched, and expanded for subsequent experiments.

Results: CD37.GS4L CAR demonstrated higher transduction efficiency than CD37.18aaL CAR. We initially evaluated the influence of linkers on CAR–T proliferation and found that CD37.GS4L robustly expanded regardless of IL–2. Short– and long–term co–culture assays were performed to examine tumoricidal activity against CD37+ malignancies. Surprisingly, CD37.GS4L demonstrated notable tumor eradication against various cancer and primary cell lines without causing fratricide. Moreover, similar levels of cytokine secretion were observed in both CARs. To replicate the effects of prolonged antigen exposure in humans, three consecutive weekly stimulations revealed substantial expansion with significant preservation of central memory T–cells and less exhaustion phenotypes in CD37.GS4L compared to CD37.18aaL. Additionally, an in–silico study displayed greater flexibility and binding affinity in CD37.GS4L.

Conclusion: The considerable flexibility and affinity of CD37.GS4L CAR augments the CAR–T function. The GS linker could facilitate scFv activity and maximize CAR–T effectiveness.

Keywords: CD37CAR, linker modification, malignancies

A Preliminary Study on Gyroscope-Based Gait Characteristics Between Left-Affected Side and Right-Affected Side Stroke Patients

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Abstract:

Background: A gyroscope has been introduced for a motion detection, especially fall detection and gait analysis. Stroke patients usually have abnormal patterns during walking compared to healthy subjects. There is an interesting point to distinguish the similarity and non-similarity of gait characteristics between left-affected side and right-affected side stroke patients.

Objective: To preliminarily test the hypothesis that left-affected side stroke patients have similar gait characteristics as right-affected side stroke patients.

Methods: Stroke patients and healthy subjects were recruited. Two inertial measurement units were attached to a participant's lateral shanks on both sides to assess shank angular velocity during walking. All participants performed two 10-metre walk tests at their preferred speed, repeated three times. The temporal and 3-plane kinematic parameters were computed. For this preliminary study, the data from 10 stroke patients and 5 healthy subjects were analyzed.

Results: The stride time of the stroke patients was longer than that of the healthy subjects, whether they were affected on the left side or the right side. The stroke patients spent shorter stance and longer swing periods on the affected side while stance and swing time were similar on both sides in healthy subjects. The root mean square (RMS) values of angular velocity of the affected and non-affected sides were lower than those of the healthy subjects in three-plane motion. In the sagittal plane, the mean differences of angular velocity of the healthy subjects were 67% and 51% in the stance phase and 66% and 53% in the swing phase of the left-affected and right-affected sides, respectively.

Conclusion: There was a similar tendency in gyroscope-based gait characteristics of left-affected side and right-affected side stroke patients when compared with healthy subjects.

Keywords: gyroscope, stroke, abnormal gait, affected side, kinematic parameters

The Optimal Distal Screw Length in Distal Radius Plate Fixation

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Abstract:

Background: Extensor tendon irritation or ruptures are complications that can be found in patients with distal end radius fractures, treated with volar plate fixation. The main cause is prominent screws from improper screw lengths.

Objective: To evaluate the anterior–posterior diameter of the distal radius according to the anatomic plate screw trajectory

Methods: A cross–sectional study was conducted using 30 wrist computed tomography scans with normal radius were included. The anteroposterior distances of the distal radius as different trajectories of various screw positions were measured and analyzed for mean length to refer to proper screw length in each position.

Results: The mean length of distal radius as distal screw trajectory from radial to ulnar side was 17.4mm., 18.8mm., 19.2mm. and 19.0mm. The mean length of distal radius as proximal row screws trajectory from radial to ulnar side was 18.2mm., 18.8mm., 18.1mm. The shortest screw was at radial side. The mean length at various position of male is greater than female.

Conclusion: We recommended surgeons to use the mean length of screws in each position additional with screw length measurement intraoperatively to choose the proper screw size to avoid extensor tendon irritation. But in male patient other technique is recommended additionally to mean screw length due to higher variation of radial diameter.

Keywords: screw length, distal radius fracture, distal radius fixation, optimal screw length

Which Populations are More Vulnerable to Public Health Measures during a Pandemic? Analysis of Longitudinal Surveillance Data of Tuberculosis Patients from 2017 to 2022 in Wuhan, China

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Abstract:

Background: Public health measures during a pandemic can stress the daily supply and utilization of medical services.
Objectives: To identify changes in health care seeking delay among tuberculosis patients in central China and discover' the most vulnerable populations during a pandemic.
Methods: A total of 33729 pulmonary tuberculosis registered at the Wuhan Tuberculosis Information Management System from January 2017 to December 2022 were included. Care-seeking delay was defined as the time elapsed from the onset of symptoms to the first medical visit. Longer delay was defined as care seeking delay longer than 14 days.
Results: Of all the pulmonary tuberculosis patients, 67.22% were men, and the mean overall age was 48.94±18.98 years. A total of 26360 (40.23%) patients delayed seeking care for more than 14 days. The median delay was 11 days (IQR, 3-27), and the yearly median delay was stable between 8 and 11 days from 2017 to 2021, but increased to 19 days (IQR, 6-40) in 2022. Further analysis showed that patients younger than 15 years old, 65 years old and above, living near downtown, and local populations were the most vulnerable groups.
Conclusion: The care seeking delay among pulmonary TB patients did not change significantly in the first two years of the pandemic compared with the time before, while an intense increase was detected in 2022. There may be a threshold for public health measures during a pandemic to impact the care seeking behaviour of TB patients. Priority should be given to protecting the medical service needs of vulnerable populations such as urban children and the elderly, when strict public health measures are implemented during a pandemic.

Keywords: tuberculosis, care seeking delay, vulnerable population

Digital Image Analysis of Tumor Patterns and a Histological Model for Prognostic Evaluation of Invasive Non-Mucinous Adenocarcinoma of The Lung

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Abstract:

Background: Lung cancer is the leading cause of death among all cancers. The most common type is invasive non-mucinous adenocarcinoma, which has many histological subtypes. The use of digital pathology may increase the accuracy of subtype diagnosis and in turn affect the prognostic prediction.

Objective: To evaluate the prognostic significance of the histological subtypes of invasive non-mucinous adenocarcinoma by using digital pathology for quantitative evaluation.

Methods: This retrospective cohort study included 85 patients with invasive non-mucinous adenocarcinoma of the lung who underwent lung resection at Songklanagarind Hospital between January 2010 and December 2016. Histological evaluation of the tumors was done by using digital glass slide and calculated percentage of tumor pattern in each slide with the QuPath program version 0.3.2. The clinical data, presence of tumor spread through air spaces (STAS), tumor necrosis and tumor-infiltrating lymphocytes (TILs) were collected. The survival analysis was calculated by Cox proportional hazard regression.

Results: The study result in 76 cases showed association between predominant histological subtype and 5-year overall survival (OS) (p-value 0.041); using acinar subtype as a reference, papillary subtype (HR=1.3) (95%CI 0.35–4.91), cribiform subtype (HR=25.3) (95%CI 3.6–177.69), micropapillary subtype (HR=3.04) (95%CI 0.84–11.07), complex glandular subtype (HR=2.11) (95%CI 0.59–7.48) and solid subtype (HR=2.89) (95%CI 0.69–12.11). Tumor necrosis, STAS, and TILs were not associated with 5-year OS, HR=1.49 (95% CI 0.79–2.79), 1.36 (95% CI 0.71–2.61) and 0.9984 (95% CI 0.98–1.01), respectively. The best histological model for predicting prognosis was a combination of stage and high-grade pattern with 82% cut-off (AUC=0.8056). The model was validated by bootstrap and revealed AUC 0.7085.

Conclusion: The predominant histological subtypes were associated with prognosis in this study. The best histological model for predicting prognosis was combining stage and high-grade pattern with 82% cut-off.

Keywords: digital pathology, lung cancer, invasive lung adenocarcinoma, pattern, histological models

Serum Sodium Level is Predictive for Kidney Injury or Hyponatremia after Modest-Volume Paracentesis (<5L) to Release Ascites in Asian Cirrhotic Patients

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Abstract:

Background: Acute kidney injury (AKI) and/or hyponatremia are well-known complications in decompensated cirrhosis underwent large-volume paracentesis (LVP; release >5L) according to international guidelines. Due to the smaller body size of Asians, we hypothesized that removal of <5L ascites (modest-volume paracentesis; MVP) may also lead to those outcomes.

Objectives: To investigate whether MVP could lead to such outcomes in Thai cirrhotic patients and determine associated factor (s).

Methods: We conducted a retrospective study of cirrhotic patients who underwent paracentesis at GI unit, Songklanagarind Hospital, Thailand. All therapeutic paracenteses performed between 2020-2021 were included. Exclusion criteria were LVP and those without available pre- and post-MVP creatinine (Cr) data. AKI was defined as the International Ascites Club criteria 2015, and hyponatremia was defined as serum Na level <130 post-paracentesis or a drop of >5 if baseline Na was <130 mEq/L.

Results: There were 301 paracenteses during the study period. Of those, 39 distinct patients underwent 73 MVPs. The 1st MVP data in each individual were collected. Eight patients (20.5%) developed AKI or hyponatremia within 7-28 days after MVP. There was no significant difference between the patients who developed the complications and who did not in terms of demographic, amount of ascites released, albumin infusion, baseline Cr, K, liver test, and blood pressure before and after paracentesis. Baseline hyponatremia Na was significantly lower in patients who developed complications compared to who did not (131.0±5.9 vs 135.6±3.0 mEq/L, p=0.004). The Na cutoff of 132 mEq/L showed a specificity of 0.9, and a sensitivity of 0.63 for predicting the development of such complications (AUC 0.81).

Conclusions: AKI or hyponatremia did occur after MVP in Thai cirrhotic patients. Baseline Na <132 mEq/L is independently associated with the development of such complications. These results might aid the decision of albumin replacement in Asian cirrhotic patients undergoing MVPs.

Keywords: ascites, kidney injury, modest-volume paracentesis, post-paracentesis circulatory dysfunction, decompensated cirrhosis

Discriminative Ability on Endurance Impairment Relating to Hyperkyphosis Using The Block Method

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Abstract:

Background: Hyperkyphosis can affect functional and pulmonary endurance in the elderly. Degree of spinal curvature measured by block method can be related to the endurance.

Objective: To compare functional and pulmonary endurance in older adults with different degrees of hyperkyphosis as determined by the block method.

Methods: This was a cross-sectional study conducted in 43 participants, both male and female, aged 60 years and older. The participants were classified into 2 groups of hyperkyphosis using the number of blocks, including mild hyperkyphosis (<4 blocks) and severe hyperkyphosis (≥4 blocks). Then, their functional endurance was assessed using the 6-minute walk test (6MWT) and pulmonary endurance was assessed using spirometry, based on slow vital capacity (SVC) and percentage predictive of SVC.

Results: There were 17 and 26 persons in mild and severe hyperkyphosis groups, respectively. The study found statistically significantly less percentages predictive of SVC in people with severe hyperkyphosis compared to those with mild hyperkyphosis (89.53% vs 76.69%, p-value<0.013, respectively). However, there were no significant differences of functional endurance in the 6MWT and SVC tests.

Conclusion: The block method was an appropriate method for early detection of pulmonary endurance impairment, in terms of percentage predictive of SVC. The primary health professional could apply this simple method in people with hyperkyphosis who live in the community. Then, they could plan an appropriate prevention and intervention to reduce risk of severe complications and hospitalization rates.

Keywords: block method, hyperkyphosis, functional endurance, pulmonary endurance

The Correlation and Accuracy of Serum Interferon Gamma Inducible Protein 10 (IP-10) with Interferon Gamma Release Assays (IGRAs) in Diagnosis of Latent Tuberculosis in Health Care Workers

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Abstract:

Background: At present, IGRA is the gold standard for diagnosis of latent tuberculosis infection (LTBI). However, the cost is high and the laboratory procedure is sophisticated. Interferon gamma inducible protein 10 (IP-10) is another cytokine which is found at higher levels in active tuberculosis but its application in LTBI is still unknown.

Objective: To study the correlation and accuracy of IP-10 levels with IGRAs in the diagnosis of latent tuberculosis.

Methods: This study was a cross-sectional study conducted in healthy health care workers at Songklanagarind Hospital who had no underling diseases during June 2011-October 2022. Blood samples were obtained from all participants and IP-10 levels measured from initial serum and stimulated plasma (with specific TB antigens) via CD4 and CD8 responses, respectively.

Results: Sixty-six participants were enrolled, of whom 64 were eligible for analysis. Nine of the participants (14%) had an LTBI infection according to the IGRA positive criteria. The r value for correlations between the stimulated plasma IP-10 with TB1 detection method and the IGRA by CD4 response detection method (TB1) was 0.719. The r value for correlations between the stimulated plasma IP-10 with CD4 and CD8 response detection method (TB2) and the IGRA by CD4 detection method was 0.768. The margins plot derived from logistic regression showed that the stimulated plasma IP-10 TB1 yielded >2980 pg/mL. This cut-off point showed 96% specificity with a sensitivity of 100% and the stimulated plasma IP-10 TB2 yielded >3108 pg/mL. This cut-off point showed 95% specificity with a sensitivity of 100%. The IP-10 level from the plasma, which was stimulated by TB antigens, had good correlation and high accuracy when compared with IGRA status for diagnosis of LTBI.

Conclusion: It suggests that the IP-10 assay could be an alternative biomarker for diagnosis of LTBI, especially in low-income countries.

Keywords: IP-10, IGRA, latent tuberculosis infection, health care worker

Predicting the Need for Intensive Care Unit in Non-St-Segment Elevation Acute Coronary Syndrome Patients: External Validation of the Action ICU Score

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Abstract:

Background: Nowadays, the decision of admitting patient who had stable non-ST-segment elevation myocardial infarction (NSTEMI) is varying depends on several factors which different in each hospital and does not associate with the severity of the disease. Therefore, The Acute Coronary Treatment and Intervention Outcomes Network (ACTION) ICU score was developed to predict complications requiring ICU care post-NSTEMI.

Objectives: To evaluate the ability of ACTION ICU score to predict whether NSTEMI patients should be admitted to intensive care unit. We also aimed to retrospectively identify NSTEMI patients who might not have needed to be admitted to the ICU based on the ACTION ICU risk score.

Methods: We defined complications requiring ICU care post-NSTEMI as cardiac arrest, cardiogenic shock, stroke, re-infarction, death, heart block requiring pacemaker placement, respiratory failure, and sepsis. The data was gathered from Songklanagarind hospital's database from January 1, 2008 to December 31 2019. The ACTION ICU risk score was calculated for each patient using variables from the case record form. We evaluated models' discrimination using the area under the receiver operating characteristic curve (AUROC). We applied the calibration plot to evaluate the agreement between predictions and observations in different percentiles calibration.

Results: Of 270 patients with NSTEMI, mean age was 71 years and 39.4% were female. The primary outcome was present in 45 patients (17%), and 33 (72%) were admitted to ICU. The most common event was shock (57%), followed by Respiratory failure (28%). The C-statistics for the ACTION risk score to predict complications was 0.70 (95% confidence interval 0.61-0.78).

Keywords: non-ST-segment elevation myocardial infarction (NSTEMI), ICU care post-NSTEMI

The Public's Irrational Use of Antibiotics for Upper Respiratory Tract Infections: A Cross-Section Study Based on Health Belief Model

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Abstract:

Background: Overuse of antibiotics, especially in the context of upper respiratory tract infections, contributes to the development of drug resistance. It is crucial to identify the primary factors associated with irrational antibiotic use, utilizing the Health Belief Model.

Objective: To understand the reasons why the public irrational use antibiotics based on health belief model (HBM).

Methods: A questionnaire survey was conducted based on a cluster random sampling in Chongqing, China. The public's antibiotic use behaviors, knowledge, perceived threat of diseases (both short-term upper respiratory tract infections, URTIs, and long-term antibiotic resistance, AR), perceived value of antibiotic use (benefits and harm), self-efficacy, antibiotic availability and social influences were measured. Structural equation modelling (SEM) was applied to test the fitness of survey data with the theoretical framework based on HBM.

Results: A total of 815 respondents were enrolled and irrational use of antibiotics was still prevalent among the public (mean: 2.95, S.D.=2.11). The public had limited knowledge about antibiotic use (average 29.17% correct answers to 8 questions), perceived high threat of AR (mean=2.46, S.D.=0.64) and moderate threat of URTIs (mean=2.13, S.D.=1.04). They also perceived high benefits (mean=2.57, S.D.=0.68) and moderate harm (mean=2.16, S.D.=0.83) of antibiotic use. In addition, respondents had easy access to antibiotics (mean=2.38, S.D.=0.80), perceived high prevalent use of antibiotics from relatives (mean=2.40, S.D.=0.65) and had a moderate level of self-efficacy in using antibiotics (mean=1.97, S.D.=0.75). The SEM results showed that higher levels of the perceived threat of URTIs, perceived benefits of antibiotic use, self-efficacy, antibiotic availability and social influence were associated with more antibiotic irrational use behavior (p-value<0.005). Moreover, Higher knowledge indirectly led to irrational use of antibiotics by promoting self-efficacy (p-value<0.001) and perceived threat of URTIs (p-value<0.005).

Conclusion: To curb irrational use of antibiotics, improving knowledge itself is not enough. The lack of health beliefs of the public to change needs to be addressed through a systematic approach.

Keywords: antibiotics, irrational use; health belief model, the public, structural equation modelling

Can a Traction–Internal Rotation Radiograph Increase Agreement and Accuracy in Detection of an Unstable Pattern in an Intertrochanteric Fracture?

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Abstract:

Background: Intertrochanteric fractures are common in elderly patients. The physical findings are shortening and external rotation of the extremity. The routine radiographs are standard pelvis anteroposterior (AP) view and lateral cross-table films. Sometimes the standard AP radiograph can lead an inexperience physician to misclassify the intertrochanteric fracture type.

Objectives: To assess the clinical utility of a traction-internal rotation radiograph for detecting an unstable pattern of intertrochanteric fractures.

Methods: This was a retrospective study which included 50 intertrochanteric fracture patients who had preoperative standard radiographs, traction-internal rotation radiographs, and CT scans of the affected hip. Two residents (1 senior, 1 junior), blinded to clinical information, classified each standard AP view and traction view. The reference standard was the CT scan of the hip as interpreted by a musculoskeletal radiologist who defined each fracture as stable or unstable. Accuracy and agreement were analyzed by Chi-square test and kappa statistics, respectively.

Results: Using the traction-internal rotation radiographs increased the accuracy from 74% to 84% for the senior resident (p-value=0.326) and 68% to 76% for the junior resident (p-value=0.505). With traction-internal rotation radiographs, the kappa statistic for agreement of detecting an unstable pattern increased from 0.593 to 0.705 for both readers, agreement according to the AO classification increased from 0.418 to 0.467 for both readers, and agreement in choice of treatment increased from 0.517 to 0.639 for both readers (p-value<0.001)

Conclusion: The use of traction-internal rotation radiographs increased the accuracy in detecting an unstable pattern but without statistical significance and increased the agreement in detection of an unstable pattern and choice of treatment in both readers.

Keywords: hip fracture, intertrochanteric fracture, traction-internal rotation radiograph, unstable intertrochanteric fracture

Epidemiology and Final Outcomes of Patients with Reported Inconclusive HIV Antibody Test in Songklanagarind Hospital: A 9-year Retrospective Study

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Abstract:

Background: Using a set of HIV antibody tests aim optimizing test performance, hence, disagreement of each test interpreted as "inconclusive" can be found more resulting consequences including diversion of planned treatment or psychological impact.

Objectives: To describe the incidence, patient's characteristics, and the final HIV-Ab serologic conclusion in patients who had "inconclusive" HIV antibody report from a routine 3 HIV-Ab tests set in Songklanagarind Hospital.

Methods: All patients with age over 15-year-old who had "inconclusive" HIV-Ab report during 2013-2021 were included, their EMR were reviewed for patients' characteristics, indications for HIV-Ab test, the actions and investigations to get final HIV-Ab result conclusion and the factors responsible for disagreement of those 3 HIV-Ab tests.

Results: The incidence of inconclusive HIV-Ab result was accounting for 1.3% (138 patients) of HIV-Ab tests in 9 years period. Most common indication for obtaining HIV-Ab test was routine screening regardless HIV disease associated illnesses 73.2% (101/138) (pre-operative/procedural screening 63.7%, health check 9.4%, and pregnancy 6.5%). Of those, only 100 of 138 patients (72.5%) had undergone proper investigations, only 4 patients (2.9%) were confirmed having HIV infection (3 of 4 were MSM), 75 patients (54.3%) were concluded no HIV infection and 21 patients (15.3%) were failed to conclude as incomplete investigations. The factors possible responsible to the false-positivity of some HIV-Ab tests were including solid and hematologic cancers, background autoimmune diseases, chronic liver or kidney diseases and pregnancy.

Conclusion: The inconclusive HIV-Ab test are not very uncommon, screening regardless of clinical presentations of HIV-associated illness is likely to be false positive test. The patient with HIV risk especially MSM has higher chance to become true HIV infection. Approving the conclusive result of "inconclusive" HIV-Ab by proper investigations is needed to be promoted.

Keywords: HIV-Ab test, inconclusive

Do the Different Arm Positions Affect the Exposure in a Minimally Invasive Posterior Scapular Approach?: A Cadaveric Study

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Abstract:

Background: In the past 2 decades, many authors have proposed several modified techniques with less muscular dissection and smaller skin incision. However, to date, there have been no studies examining the association between intra-operative arm positioning and the exposed area of the scapula.

Objectives: To assess changes in scapular exposed area for fixation in various arm positions using the posterior minimally invasive approach to the scapula, defined as the changes in location and quantity of surface area of the exposure.

Methods: We performed a posterior minimally invasive approach on 6 adult fresh cadavers (total 12 scapulae). The location of the exposure area and the quantity of surface area were measured using a radial coordinate system in 3 different degrees of shoulder abduction (45, 90 and 135 degrees). The results were demonstrated as a topographic map that allowed for the creation of a logical matrix with true values over a standardized scapula.

Results: The study demonstrated an association between that the degree of shoulder abduction and the locations of the exposed areas. As the degrees of shoulder abduction increased, the exposed area moved toward the lower part of the scapula. For the amounts of exposed area between each degree of shoulder abduction, a statistically signifiacnt difference was found between the 45-90 degrees group (p-value=0.0128) and the 45-135 degrees group (p-value<0.01).

Conclusion: In a minimally invasive posterior scapular approach, we found an association between the degrees of shoulder abduction and the locations of the exposed area. As the degrees of shoulder abduction increased, the exposure area tended to moved towards the lower part of the scapula.

Keywords: posterior minimally invasive scapular approach, arm position, shoulder abduction, exposure area

Outcomes of Routine Screening for SARS-CoV-2 by RT-PCR in Asymptomatic Patients before Elective Operations/Interventions

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Abstract:

Background: Pre-operative/interventional SARS-CoV-2 nasopharyngeal (NP) swab was a screening method that was routinely applied worldwide for disease spreading control. However, the unexpected impact of screening in patients without any risk factors for SARS-CoV-2 infection may cause a delay of definitive non-COVID-19 treatment, leading to an increase in morbidity or mortality.

Objective: To describe the incidence and COVID-19 disease activity in asymptomatic patients who had SARS-CoV-2 testing by RT-PCR before undergoing elective operations or procedures in Songklanagarind Hospital.

Methods: The data of asymptomatic adult patients who had SARS-CoV-2 testing by RT-PCR before undergoing elective operations or procedures between June 2021 and March 2022 were collected in this retrospective observational study. The incidence of SARS-CoV-2 infection and demographic data were collected from the Hospital Information System (HIS). The number of vulnerable patients were also reported.

Results: 33,450 NP swab RT PCRs for SARS-CoV-2 were done during the period of data collection. Among these, 15,148 (45.29%) specimens were done for pre-operative/interventional screening purposes. Only 566 (3.7%) specimens were reported as detected/inconclusive results.

Conclusion: There are only a small number of COVID cases compared to the total screening volume. However, some of these patients have to lose the opportunity to receive treatment in a timely manner which may change the prognosis of the disease in the future.

Keywords: COVID-19, pre-interventional screening, pre-operative screening, Thailand, SARS-CoV-2

The Role of Thai Local Herbs and Ingredients in Promoting Post-Pandemic Wellness and Medical Tourism for Sustainable Development Goal 3: A Critical Literature Review

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Abstract:

Background: Thai local herbs and ingredients have been used for wellness in Thailand; however, their uses may be affected during the COVID-19 pandemic.

Objective: To investigate the therapeutic properties of local Thai herbs and ingredients, assess scientific evidence on Thai traditional medicine, explore cultural significance and traditional knowledge, analyze the potential of Thai herbs in post-pandemic wellness, and examine the role of Thai traditional medicine in medical tourism and its contribution to Sustainable Development Goal 3 (SDG 3).

Methods: This article presents a comprehensive and rigorous critical literature review conducted systematically, including thorough data extraction, systematic search, and analysis of relevant studies. The review ensures the inclusion of the most current and reliable information, providing a complete overview of the topic under investigation.

Results: The literature review explores the results of various studies conducted on the efficacy and safety of local Thai herbs and ingredients and the potential impacts of medical tourism on sustainability. The review reveals that Thai traditional medicine, incorporating practices such as Thai massage and herbal remedies, demonstrates promising therapeutic benefits for conditions such as inflammation, pain, and respiratory infections. However, challenges exist in terms of standardization and regulation, necessitating further research to establish safety and efficacy. While medical tourism benefits Thailand economically, concerns arise regarding social inequalities and environmental impacts. Integrating traditional medicine into medical tourism and adopting sustainable practices can mitigate adverse effects. These findings highlight the importance of investment in research, education, technology, and sustainable tourism practices to promote traditional medicine, enhance patient care, and position Thailand as a leader in post-pandemic wellness and sustainable development.

Conclusion: The discussion emphasizes the need for continued research, education, and regulation to promote the integration of traditional medicine into the healthcare system, enhance the safety and efficacy of practices, and position Thailand as a leader in medical tourism and post-pandemic wellness. By embracing these future directions, Thailand can unlock the full potential of traditional medicine, improve healthcare outcomes, and contribute to sustainable development.

Keywords: Thai local herbs, sustainable development, post-pandemic wellness, medical tourism

Neuroprognostication after Out-of-Hospital Cardiac Arrest Using an Increase in Mean Platelet Volume

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Abstract:

Background: Determining the prognosis of patients after cardiac arrest is crucial. The mean platelet volume (MPV), which is available from a complete blood count, is a novel biomarker that has been used in the prognosis of various inflammatory-related diseases.

Objective: To investigate whether MPV could serve as a prognostic marker for in-hospital mortality and neurological outcomes in out-of-hospital cardiac arrest (OHCA) patients.

Methods: A retrospective study was carried out at a tertiary care center in southern Thailand on all adult OHCA patients admitted to the medical intensive care unit from 2016 to 2022. We collected data on the patients' characteristics and MPV measured at least twice during the first four days of admission. The primary outcomes were in-hospital mortality and poor neurological outcomes, defined as a cerebral performance category score of 3–5. We used a multivariable logistic-regression model with a generalized estimating equation approach to examine the association between covariates and primary outcomes.

Results: The study included 134 patients, of whom 97 (72.4%) had a poor neurological outcome and 69 (51.5%) died. The MPV on the first four days of admission were significantly different between the survivors and non-survivors (p-value=0.017). Increased in-hospital mortality among the OHCA patients was associated with MPV (adjusted odds ratio 1.26, 95% confidence interval 1.02–1.55, p-value=0.032). There were no significant differences in MPV between patients with good or poor neurological outcomes.

Conclusion: An increased MPV was independently associated with in-hospital mortality in OHCA patients, indicating its potential as a prognostic marker.

Keywords: mean platelet volume, outcome, out-of-hospital cardiac arrest

The Development of Nursing Guidelines and Monitoring Tools for Symmetrical Peripheral Gangrene Prevention in Patients Using Vasopressors at MICU

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Abstract:

Background: Symmetrical peripheral gangrene (SPG)is a rare syndrome characterized by symmetrical gangrene in the acral regions and the absence of large-vessel occlusion. Several factors affect the result of SPG, but vasopressor-induced SPG is the most commonly reported. From 2018 to 2020, 21 patients had severe SPG as a result of vasopressors used during medical intensive care unit (MICU) admission, including two patients who had all of their distal extremities amputated. There is no obvious treatment for SPG, but close monitoring and early detection by nurses are required.

Objective: To develop a nursing guideline to early detect, monitor, and decrease the severity of SPG in high-risk patients. Methods: The PSU model, which stands for person-centeredness, standard, and unity of purpose, was used as the study's framework. The plan-do-check-act cycle was used as the study's method.

Results: The MICU Nursing Guideline on SPG Prevention, which was developed, covers five main concepts: 1) rapid reduction and discontinuation of vasopressor use, 2) identification and awareness of SPG risk factors, 3) effective limb care, 4) close monitoring and appropriate management, and 5) informative communication for effective long-term care. In addition, four innovations were developed to assist nurses in following the guidelines including; 1) the 7Ps Coding Illustration, 2) Vasopressor Dose Conversion Table 3) SPG Recording Form, and 4) SPG Alert System by Line Application. For three years, 878 patients received nursing care in accordance with this guideline. The results showed that SPG early detection increased from 30% to 97%, and 100% of at-risk patients were monitored and followed up. In addition, the rate of recovery increased from 46% to 88%, the rate of worsening lesions decreased from 30% to 4.6%, and no patients became disabled as a result of SPG.

Keywords: monitoring tool, nursing guidelines, patients using vasopressors, symmetrical peripheral gangrene

Risk Factors of Bleeding during an Amyloidosis Biopsy

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Abstract:

Background: Amyloidosis is a rare disease in which amyloid fibrils become deposited in tissues and organs. It is associated with potentially life-threatening hemorrhage. Among doctors there are concerns about post-biopsy bleeding in patients biopsied to confirm a diagnosis of amyloidosis.

Objectives: To compare the incidence of post-biopsy bleeding between patients with amyloidosis and without amyloidosis and to identify factors related to post-biopsy bleeding in patients with amyloidosis.

Methods: This study was a retrospective case-control study of patients aged 15 or over who underwent a tissue biopsy for definite diagnosis at Songklanagarind Hospital between 1 January 2006 and 31 December 2021.We randomly recruited patients with pathology-confirmed amyloidosis and non-amyloidosis in a ratio of 1:4 by matching biopsy site, gender, year of procedure and the experience of the doctor who performed the biopsy.

Results: A total of 360 patients were recruited. The incidences of post-biopsy bleeding were not significantly different between the two groups (OR 1.31, 95% CI: 0.10-17.48, p-value=0.837), including major bleeding complications (1.4% in the amyloidosis group and 1.0% in the non-amyloidosis group, p-value=1.00) and minor bleeding complications (4.2% in the amyloidosis group and 3.5% in the control group, p-value=0.729). Factors related to post-biopsy bleeding were hemoglobin level (OR 1.03, 95% CI: 1.01-1.05, p-value=0.021) and diastolic blood pressure (OR 0.87, 95% CI: 0.78-0.97, p-value=0.005) had significant influence on the complications

Conclusion: For patients suspected to have amyloidosis, the incidences of post-biopsy bleeding to confirm the diagnosis were not significantly different between amyloidosis and non-amyloidosis patients. A specific intervention before the tissue biopsy was not required for any of these patients. However, patients who had low hemoglobin level and/or high diastolic blood pressure had significantly more post-biopsy bleeding complications.

Keywords: Amyloidosis, post-biopsy, bleeding, risk factors

The Public's Antibiotic Use Behavioral Patterns and Their Determinants for Upper Respiratory Tract Infections: A Latent Class Analysis Based on Consumer Behavior Model in China

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Abstract:

Background: The irrational use of antibiotics among the public is a major contributor to antibiotic resistance, which is a serious global threat.

Objective: To identify the public's behavioral patterns of antibiotic use for upper respiratory tract infections (URTIs) and their influencing factors.

Methods: A cross-sectional questionnaire survey was conducted among the public in Chongqing, China. A Consumer Behavior Model was used to assess the public's antibiotic use behaviors through six stages, from need recognition to post-use evaluation. The underlying behavioral patterns were identified by a latent class analysis and further linked with individual's capacity, opportunity, and motivation factors based on a multinomial logistic regression.

Results: The public's inappropriate use of antibiotics was prevalent (n=815), including antibiotic self-medication (39.63%), non-prescription antibiotic purchasing (59.02%), and early stopping of an antibiotic prescription (76.56%). Four behavioral patterns were identified and significantly associated with individuals' self-efficacy, belief in effectiveness, awareness of side effects, perceived availability, social influence, and demographics factors (age, gender, and education).

Conclusion: This study calls for targeted and multifaceted interventions with audience segmentation to reduce inappropriate antibiotic use among the public, including educating the public about antibiotics and the management of URTIs, reinforcing regulation of the over-the-counter antibiotic sale, and improving physicians' appropriate antibiotic prescriptions.

Keywords: antibiotics, consumer behavior model, capacity-opportunity-motivation

The Cost of Breast Cancer in Indonesia 2023

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Abstract:

Background: According to Globocan in 2020, the number of new cases of breast cancer in Indonesia reached 68,858 cases (16.6%) of a total of 396,914 new cases of cancer, with the number of deaths reaching more than 22.000 people. Health care for breast cancer is evolving rapidly, and the cost and value of new treatments is often debated. Current evidence on the total cost of cancer is needed to inform policy decisions.

Objective: To estimates the cost of breast cancer in Indonesia in 2023.

Methods: This research was conducted using quantitative methods, prediction studies and quantitative descriptive analysis with the aim of getting an overview of the total costs of treating breast cancer in Indonesia in 2023. Data on cancer costs were obtained from Dharmais Cancer Hospital. The study populations were breast cancer patients at Dharmais Cancer Hospital.

Results: Based on the results of graphic interpretation, the estimated total direct medical costs required for breast cancer treatment is 2023 is not over yet, so you have to say will be IDR 66,112,950, and the estimated total indirect costs required for breast cancer treatment will be IDR 60,225,202, so we get the total cost of breast cancer in Indonesia in 2023 of IDR 126,338,152.

Conclusion: The total cost of breast cancer treatment is determined by direct costs and indirect costs where each patient has different characteristics such as age, severity, length of stay, services required, and the class of treatment taken. The total cost of breast cancer in Indonesia in 2023 at Dharmais Cancer Hospital is projected to be IDR 126,338,152.

Keywords: breast cancer, direct cost, indirect cost, total cost.

Analysis of Spatial and Temporal Patterns of COVID-19 Incidence in Thailand

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Abstract:

Background: The variation in the COVID-19 incidence rate between locations and timeframes is indicative of the situation and the severity of the problem.

Objective: This study aimed to investigate spatial and temporal patterns of COVID-19 incidence rates and identify the factors associated with the COVID-19 incidence rates in Thailand.

Material and Methods: The data on daily COVID-19 infected cases were downloaded from the Department of Disease Control website at the Ministry of Public Health (MoPH) of Thailand from January 2020 to April 2022. COVID-19-infected cases were pooled daily to form monthly cases. A log-linear model was used to predict the COVID-19 infection rate in Thailand.

Results: The results showed that 3,344,191 subjects were infected by COVID-19. The median COVID-19 incidence rate was 1.05 cases per 1,000 population per month (min=0; max=105.33), while the average was 3.32 cases per 1,000 population per month. Males aged 20–39 years and females aged 20–29 and 80 and older exhibited significantly higher incidence rates than the average. The COVID-19 pandemic experienced three peaks. The first peak occurred between June and November 2020. The second peak came in August 2021, followed by a third peak in March and April 2022, both of which were higher than the overall average. Thailand's central and southern regions had considerably higher COVID-19 incidence rates than the average.

Conclusion: The incidence of COVID-19 is mostly determined by characteristics of people's behavior, as well as time and geographical characteristics. The long-term consequences on health should be emphasized in future research.

Keywords: COVID-19 incidence rate, spatial-temporal, log-linear model, Thailand

FULL PAPER

The 2nd Annual Health Research International Conference (AHR-iCON 2023)

Global Health & Medical Sciences: **Research & Innovation**

Towards Post-COVID Health Equity

Comparative Protein Profiling of Urinary Extracellular Vesicles in Stage-Specific Breast Cancer Patients: Pilot Study

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Abstract:

Objective: Urinary EVs have recently emerged as promising non-invasive biomarkers for various urological and non-urological malignancies. Nevertheless, there is a lack of widespread reporting on the proteomic profiling of urinary EVs in BC patients, especially in different stages. Thus, we aimed to examine the proteomic profile of uEVs among stages (I-III) of BC patients compared with healthy women.

Material and Methods: The mid-stream urine samples were collected from newly diagnosed BC patients (n=34; stage I: n=12, stage II: n=19, stage III: n=3) and health women (CT: n=29). The uEVs were isolated and characterized by differential ultracentrifugation, and western blotting and TEM, respectively. The protein profiling was performed using LC-MS/MS, and significantly differential expressed proteins (DEPs) were further validated using UALCAN database.

Results: uEV presenting CD9 EV protein markers were isolated and displayed a spherical morphology. For proteomic analysis, the uEV proteomes revealed thousand DEPs among BC patients and CT. We used unsupervised hierarchical clustering to describe overall changes in gene expression among BC stages and CT. We found numerous uEV proteins related to cancer development which were significant stage-specific DEPs.

Conclusion: Our finding showed uEV proteins related to BC progression and provided additional evidence to support further extensive research and BC biomarkers discovery. However, the functional analysis of stage-specific uEVs should be addressed in further study.

Keywords: breast cancer, stages, proteomes, urinary extracellular vesicles

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Introduction

The most common malignancy among women is breast cancer (BC). According to GLOBOCAN 2020, there are now 19.3 million new cases of BC and 2.3 million mortality cases in women globally[1]. Thus, early detection is critical to timely treatment leads to reduce the amount of mortality due to BC[2]. The American Joints Committee on Cancer updates to utilize new strategies for BC staging based on TNM classification (TNM; tumor size (T), nodal status (N), and metastases (M)) coupled with biological factors to consider the treatment choices. The biological factors including estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2), grade, and multigene assays are commonly used to diagnosis BC. Pathology evaluations can identify these biomarkers, which can subsequently be applied in combination with TNM status after tumor resection[3]. Unfortunately, this procedure still requires an invasive biopsy and time consuming.

Extracellular vesicles (EVs) are recently utilized for screening, diagnosis, prognosis and prediction of treatment outcomes in cancer patients. EVs are membrane vesicles produced by numerous cell types and functions in cell-to-cell communication by delivering their signaling molecules (such as proteins, mRNA, miRNA, DNA, lipids, and transcriptional factors) and subsequently impact on biological processes in the recipient cells. Cancer-derived EVs may include particular molecules related to the development and invasion of cancer, promoting intercellular cargo transfer across the tumor microenvironment. Furthermore, the contents of EV cargoes could potentially mirror the altered characteristics of the primary tumors[4].

Urinary EVs (uEVs) have recently emerged as promising non-invasive biomarkers for various urological malignancies (including kidney, bladder, and prostate cancer) (5), non-urological cancers (including lung cancer)[6], Parkinson disease[7,8], and Alzheimer disease[9]. Nevertheless, there is a lack of widespread reporting on the proteomic profiling of urinary EVs in BC patients, especially in different stages that reflect to BC progression.

Hence, we investigate the proteomic profiling of uEVs in BC patients with different stages of diseases, and compare with CT using LC-MS/MS.

Material and Methods

Sample collection and preparation

This pilot study aimed to analyze the proteomic profile of uEVs in BC patients compared to healthy women. The workflow of this study was shown in Figure 1. The mid-stream urine samples were collected from newly diagnosed BC patients enrolled at the Songklanagarind Hospital (n =34; stage I: n=12, stage II: n=19, stage III: n=3). Patients aged 18 years or older. For the healthy women (CT) group, urine samples were obtained from 29 healthy women without a history of cancer who were age-matched to the BC patients (Table 1). All volunteers provided informed and written consent. Participants who were pregnant, was unable to communicate in Thai, or suffered from mental illnesses were excluded from this study. The study was approved by the Human Research Ethics Committee of the Faculty of Medicine, Prince of Songkla University, Thailand (REC. 59-233-18-1). The urine preparation protocol was adapted from the experiment by Gheinani et al.[10]. The samples were centrifuged at 2,500 g, for 20 min, at 4°C to remove cells, cell debris, and bacteria. Subsequently, the supernatants were collected and kept at -80 °C until use.

uEV isolation by differential ultracentrifugation

The uEV isolation method was adapted from the previous studies of Sequeiros et al.[11] and Barros et al.[12]. Briefly, the prepared urine samples (9 mL) were thawed and centrifuged at 2,500 g for 15 minutes at 4 °C. After discarding the pellets, the supernatants were collected and centrifuged at 20,000 g for 20 minutes at 4 °C to remove large particles. For the depletion of the contaminant urine protein including Tamm-Horsfall protein (THP), the 20,000-

g pellets resuspended with isolation solution (containing 10 mM triethanolamine and 250 mM sucrose) were vortexed for 30 sec, and then added 200 mg/mL DTT and incubated at 37 °C, for 10 min. Subsequently, the mixture was centrifuged at 20,000 g, for 20 min, at 4 °C. The supernatant was collected and centrifuged at 120,000 g, for 70 min, at 4 °C (Beckman Coulter, Optima MAX-XP Ultracentrifuge). The pellets were cleaned with phosphate buffer saline (PBS) and re-centrifuged for 70 minutes at 4 °C at 120,000 g. The uEV pellets were then resuspended in 150 µL of PBS and kept at -80 °C until use.

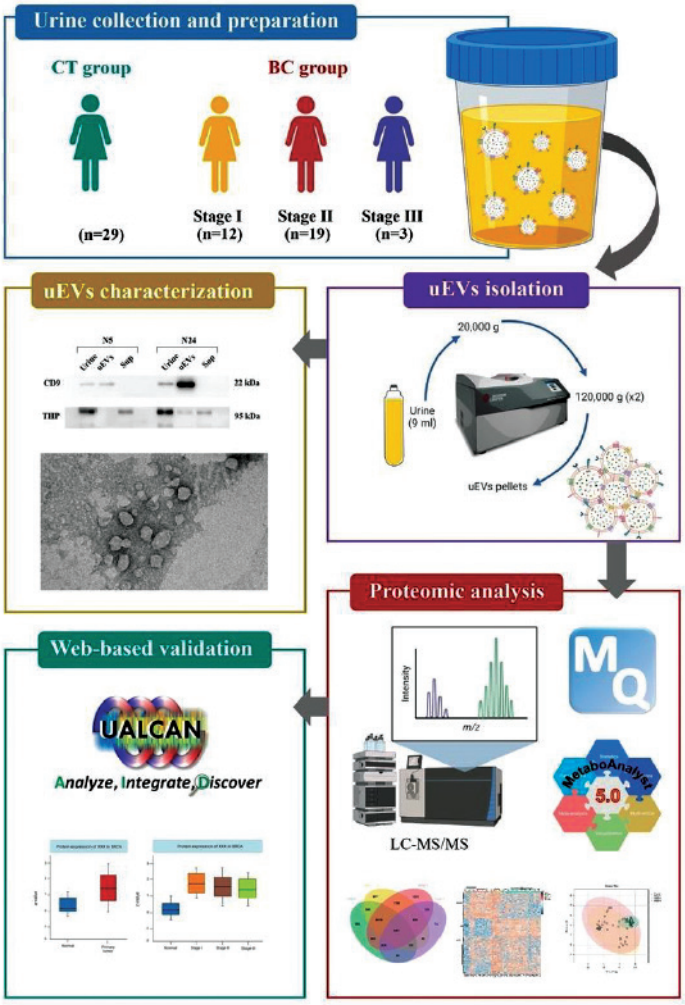

Figure 1 Workflow for this study

Table 1 Clinical characteristics of healthy controls and breast cancer patients

Characteristics	Healthy control (CT)	Breast cancer (BC) patients		
		Stage I	Stage II	Stage III
Number	29	12	19	3
Age				
Mean±S.D.	52.97±3.76	53.08±2.95	53.89±2.52	60.00±5.57
<50	7 (24.14%)	4 (33.33%)	6 (31.58%)	0 (0.00%)
≥50	22 (75.86%)	8 (66.67%)	13 (68.42%)	3 (100.00%)
Subtypes				
Luminal A	–	5 (41.67%)	11 (57.89%)	3 (100.00%)
Luminal B	–	2 (16.67%)	4 (21.05%)	0 (0.00%)
HER2-enriched	–	4 (33.33%)	2 (10.53%)	0 (0.00%)
TNBC	–	1 (8.33%)	2 (10.53%)	0 (0.00%)
Tumor size (cm)				
<2	–	6 (50.00%)	2 (10.53%)	1 (33.33%)
2-5	–	6 (50.00%)	17 (89.47%)	1 (33.33%)
>5	–	0 (0.00%)	0 (0.00%)	1 (33.33%)
Lymph nodes involvement				
0	–	12 (100.00%)	9 (47.37%)	0 (0.00%)
1-3	–	0 (0.00%)	10 (52.63%)	1 (33.33%)
4-9	–	0 (0.00%)	0 (0.00%)	1 (33.33%)
≥10	–	0 (0.00%)	0 (0.00%)	1 (33.33%)
Side of breast tumors				
Left breast	–	5 (41.67%)	11 (57.89%)	1 (33.33%)
Right breast	–	6 (50.00%)	6 (31.58%)	2 (66.67%)
Both sides	–	1 (8.33%)	2 (10.53%)	0 (0.00%)

Western blot analysis

Urine protein and uEV samples (10 µL of each) were mixed with non-reducing dye, boiled at 100°C for 5 min, and then incubated on ice for 5 min. The proteins were separated through a SDS-PAGE gel by using the 12% TGX Stain-Free™ FastCast™ Acrylamide Kit (cat#161-0185) and then transferred to polyvinylidene difluoride membranes (PVDF). The membranes were blocked with 5% non-fat milk in Tris-buffered saline containing 0.1% Tween 20 (TBS-T) for 1 h, at room temperature. The membranes were then washed three times with TBS-T, for 10 min and incubated with primary antibodies (1:1,000 dilution) against CD9, TSG101, THP, and cytochrome c for overnight, at 4°C. After the incubation, the membranes were washed three times with TBS-T for 10 mins, and further incubated for 2 h with horse radish peroxide-conjugated secondary antibodies (1:2,000) at room temperature. After washing the membranes, the protein bands were detected using the SuperSignal™ West Dura Extended Duration Substrate (cat#34075; Thermo Fisher Scientific) and visualized through a chemiluminescence imager (Alliance Q9 Advanced, UVITEC).

Transmission Electron Microscopy (TEM)

The uEV pellets were fixed with 2.5% glutaraldehyde for 30 mins at room temperature. Subsequently, each sample were dropped on carbon/formvar-coated grids and incubated for 10 min. The grids were then washed two times with PBS for 3 min, and ten times with distilled water for 2 min. Each uEV sample was negatively stained with 2.5% of uranyl-acetate for 10 min, and left to dry overnight at room temperature. The uEVs were visualized

by a transmission electron microscope (JEOL JEM 2010) with 50,000× magnification at the Scientific Equipment Center of the Prince of Songkla University.

Proteomic analysis

Total protein of individual urine and uEV samples were measured with Lowry assay using the bovine serum albumin as the standard[13]. Five microgram of protein samples were reduced with 5 mM dithiothreitol and alkylated in 15 mM Iodoacetamide. The protein samples were then digested with sequencing grade porcine trypsin for 16 h at 37 °C. The tryptic peptides were dried and resuspended in 0.1% formic acid for LC–MS/MS analysis.

LC–MS was used to examine the tryptic peptide samples using an Ultimate3000 Nano/Capillary LC System (Thermo Scientific, UK) linked to a Hybrid quadrupole Q–TOF impact IITM (Bruker Daltonics) equipped with a Nano–captive spray ion source. The peptide digests were enriched on a µ–Precolumn C18 Pepmap 100 (Thermo Scientific, UK) and separated on an Acclaim PepMap RSLC C18, nanoViper (Thermo Scientific, UK). The CaptiveSpray was used for electrospray ionization at 1.6 kV. In the positive–ion mode, mass spectra (MS) and MS/MS spectra (m/z) 150–2200 were obtained at 2 Hz. As a function of the m/z value, the collision energy was modified to 10 eV. Each sample was analyzed using LC–MS in triplicate.

MaxQuant 2.1.0.0 was used to quantify the proteins in each samples by correlating MS/MS spectra to the Uniprot Homo sapiens database through the Andromeda search engine[14]. In order to perform label–free quantitation, MaxQuant's standard settings were used: main search mass tolerance of 0.6 dalton, 38 trypsin as the enzyme for digestion, a limit of two miss cleavages, carbamidomethylation of cystein as a fixed modification, and oxidation of methionine and acetylation of the protein N–terminus as variable modifications. For protein identification, only peptides with a minimum of 7 amino acids and at least one unique peptide were required. Protein FDR was set at 1%. The maximum number of modifications per peptide was set at five.

The Venn diagram was constructed by jvenn and showed the identified proteins among the sample groups[15]. The differentially expressed proteins (DEPs), the heat map visualizing the protein expression, and the principal component analysis (PCA) were generated by Metabo Analyst 5.0[16]. DEPs were validated using online clinical proteomic tumor analysis consortium (CPTAC) samples across cervical tumors and normal samples using the University of Alabama at Birmingham Cancer (UALCAN) database analysis portal.

Statistical analysis

For proteomic analysis, the features having missing values in more than 50% of the samples were removed, and the remaining missing value was estimated by LoDs. Data filtering based on the median intensity value. Data were normalized by quantile normalization and auto scaling in Metaboanalyst 5.0. The data were taken for unpaired Two–sample t–tests to identify the DEPs. The fold change cut–off of ≥ or ≤2 and adjusted p–value<0.05 were considered as a significant upregulated expressed protein. After that, the significantly up– and down–regulated proteins were then selected as candidates for each pair (Stage vs. CT) to further analyze protein expression as constructed by the heatmap.

Results

Characterization of uEVs

After uEVs isolation, we observed the expression of CD9, which served as EV marker, expressed in uEVs of both CT samples (N5 and N24). Moreover, we could reduce the level of THP, a contaminant protein in uEV samples. To confirm, we have successed to isolate uEV, we collected the supernant after centrifugation and determined wheather uEVs existing in the supernatant. We found that no protein was observed in the supernatant of the samples (Sup) as shown in Figure 2A. TEM was utilized to examine the size

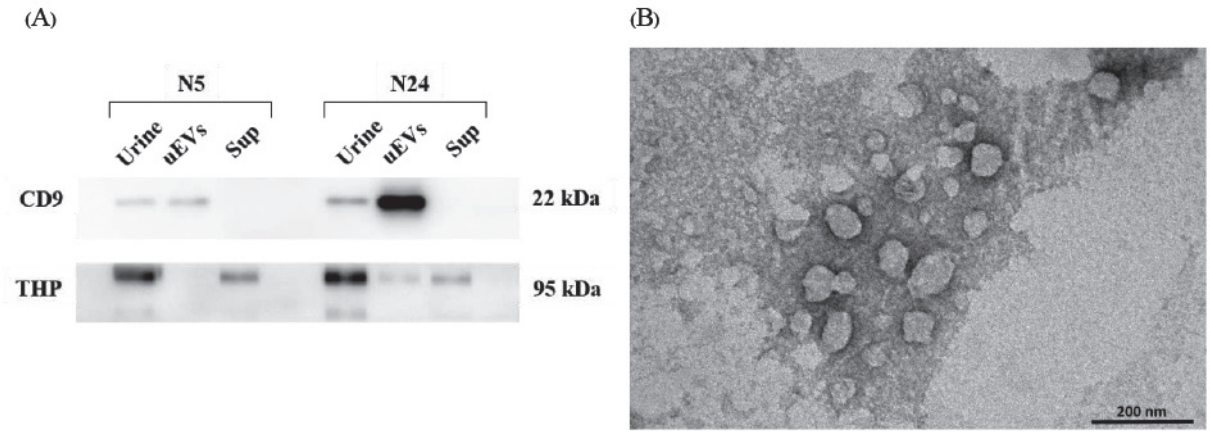

Figure 2 Characterization of uEVs. (A) Representative western blot of CD 9 exosome marker and THP in urine protein, uEVs, and supernatant (Sup) from CT samples (N5 and N24). (B) TEM showed size and morphology of the uEV pellets (magnification: 50,000×).

less than 200 nm in diameter and spherical in shape of the uEV pellets (Figure 2B).

Protein profiles among BC patients and healthy women

We found 11,278 uEV proteins in CT group which were 558 unique proteins. While a total of 15,374 proteins were discovered in the uEVs of the BC patients, which common shared between in CT group and in different stage BC groups. The unique proteins in stage I, stage II and stage III were 857, 1,202, and 74 proteins, respectively (Figure 3A). PCA showed that group of individual CT samples were closely clustered together, while BC group appeared dispersion of the protein profile derived from different stages (Figure 3B). Unsupervised hierarchical clustering analysis of protein expression among CT group and BC group including stage I, stage II, and stage III BC were further analyzed. The heatmap showed the expression of total proteins across individual samples (Figure 3C). The protein expression of BC samples revealed distinctive pattern apart from CT group whereas the similarity patterns were performed within mostly samples in each stage. The clustering was determined the overall protein expression changes based on closely relationship of uEV proteomic data among individuals. We found that protein in CT were quite separated from BC group, but within the stage, the protein data of each stage was not completely separated from each other. This result is concordance with the PCA data that the clustering could separate BC from CT rather than staging.

Differentially expressed protein in different stages of BC versus CT and Web-based validation

In comparison of stage I vs CT, eight uEV proteins were categorized in significantly down-regulated proteins in stage I compared to CT group (Table S1). The Heatmap represented heterogeneity of patients in stage I that more than half of the patients resembled CT (Figure 4). Two of the eight proteins were Utrophin (UTRN) and Ankyrin-3 (ANK3), which were able to search in the CPTAC dataset and showed the same trend of protein expression. Their expression significantly decreased in primary tumors compared to normal (Figure 5A and 5C), and have a trend in decreased in stage I BC (Figure 5B and 5D).

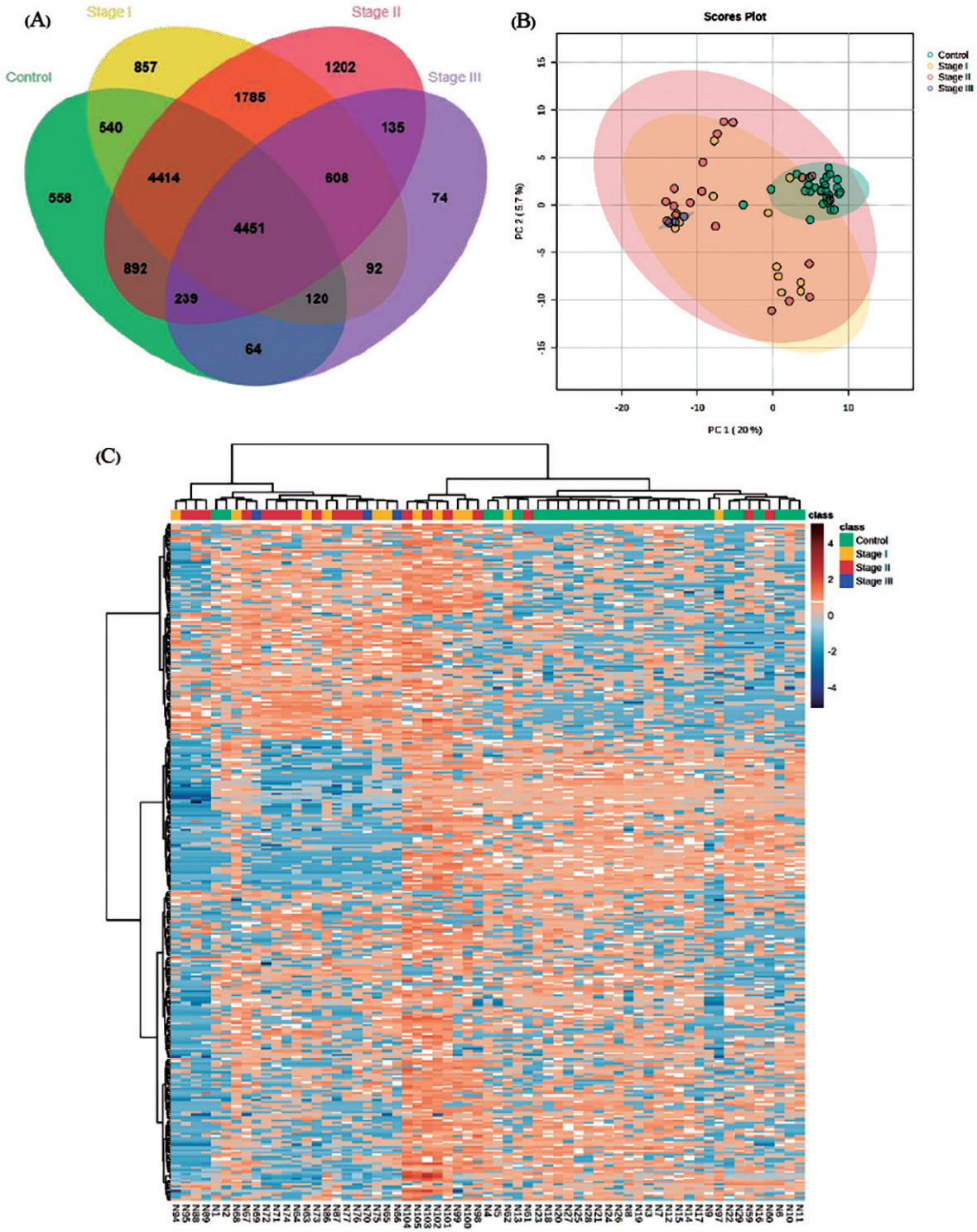

Figure 3 (A) Venn diagram of total proteins identified in the uEVs samples, as compared in different stages of BC and healthy women (CT). (B) PCA of uEV proteins obtained from BC and CT. (C) Heat map analysis of the uEV proteomic profile in individual samples.

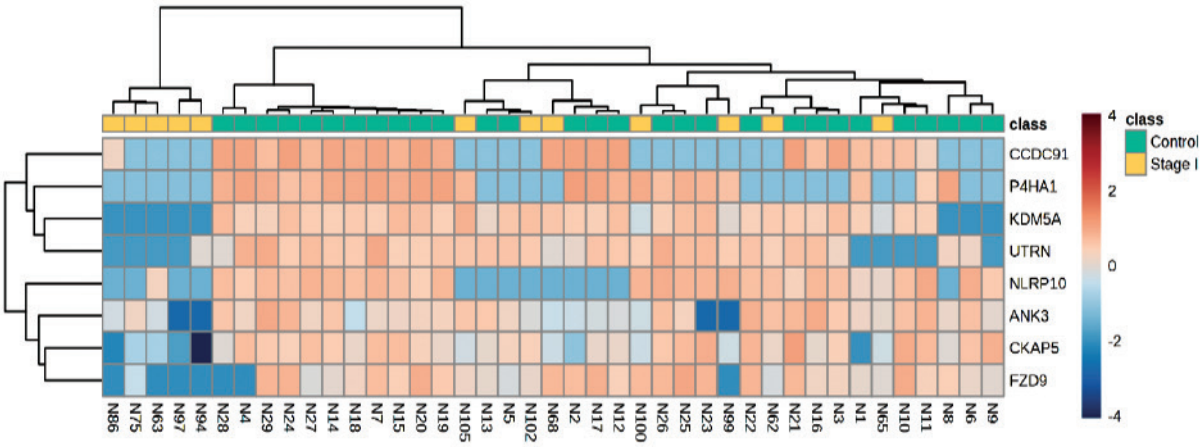

Figure 4 Heat map analysis of the uEV proteomic profile in stage I BC patients (n=12) compared to CT (n=29).

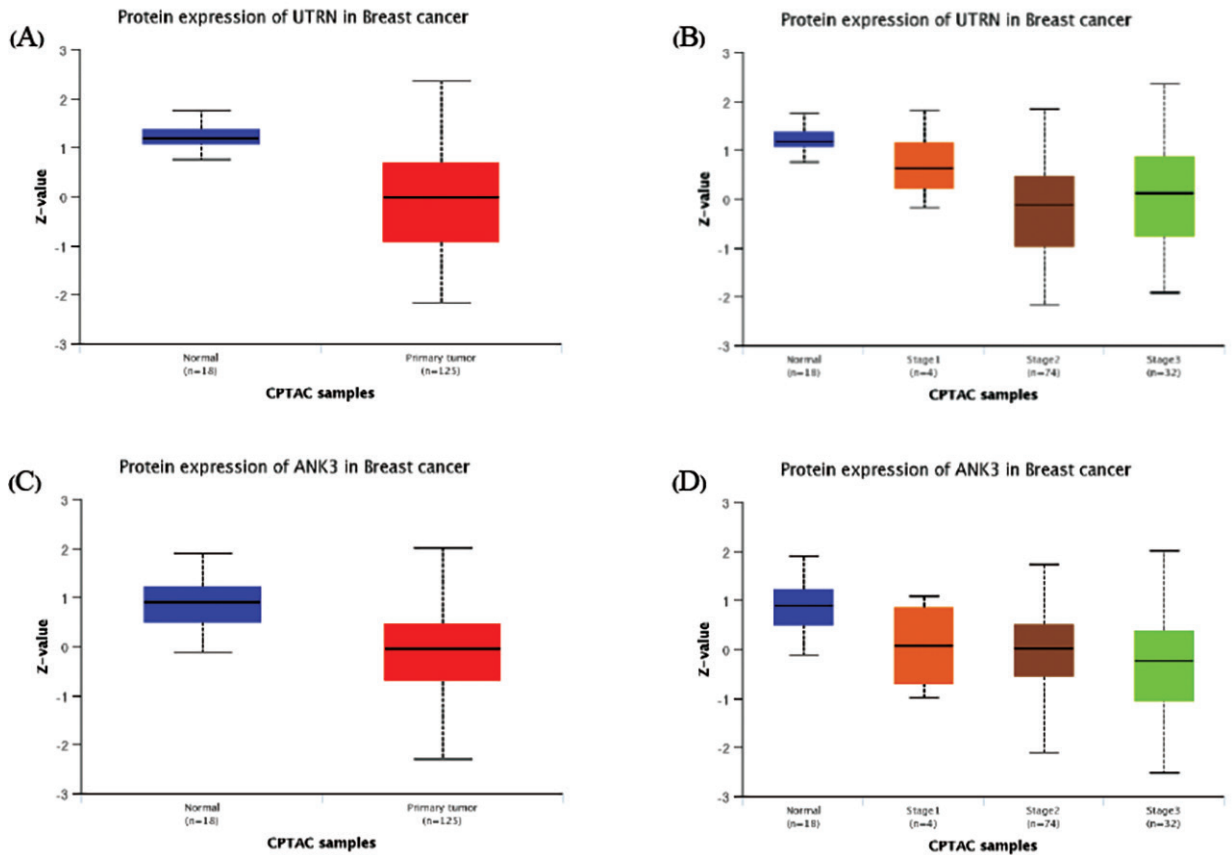

Figure 5 Web-based validation of protein expression between sample types and across individual cancer stages from CPTAC database. (A–B) Expression level of UTRN, (C–D) Expression level of ANK3.

In comparison of stage II vs CT, 21 significantly up-regulated DEPs and 5 down-regulated DEPs were found in stage II (Table S1). These DEPs were able to classify as a group of stage II BC, even though some patients were clusterd in CT group (Figure 6). We found that E3 ubiquitin-protein ligase RNF213 (RNF213), Dynein axonemal heavy chain 5 (DNAH5), and Plectin (PLEC) were significantly up-regulated proteins in primary tumors in the CPTAC dataset (Figure 7A, 7C and 7E). Moreover, RNF213 and DNAH5 were significantly overexpressed in stage II primary breast tumors compared to normal samples (Figure 7B and 7D). However, PLEC was not significantly higher in stage II than CT (Figure 7G), but it showed a significantly increased in luminal type which was the most common subtype samples in stage II of our study.

In comparison of stage III vs CT, the majority of DEPs in stage III compared to the CT group were 59 down-regulated proteins and 7 significantly up-regulated proteins, as showed in Table S1. A small number of up-regulated proteins were not specifically expressed in stage III considering via heatmap (Figure 8). Particularly, Scaffold attachment factor B2 (SAFB2) showed strongly expressed in our finding which concordence with its expression in the CPTAC dataset. SAFB2 was not only significantly higher in primary breast tumors but also in stage III BC compared to normal (Figure 9).

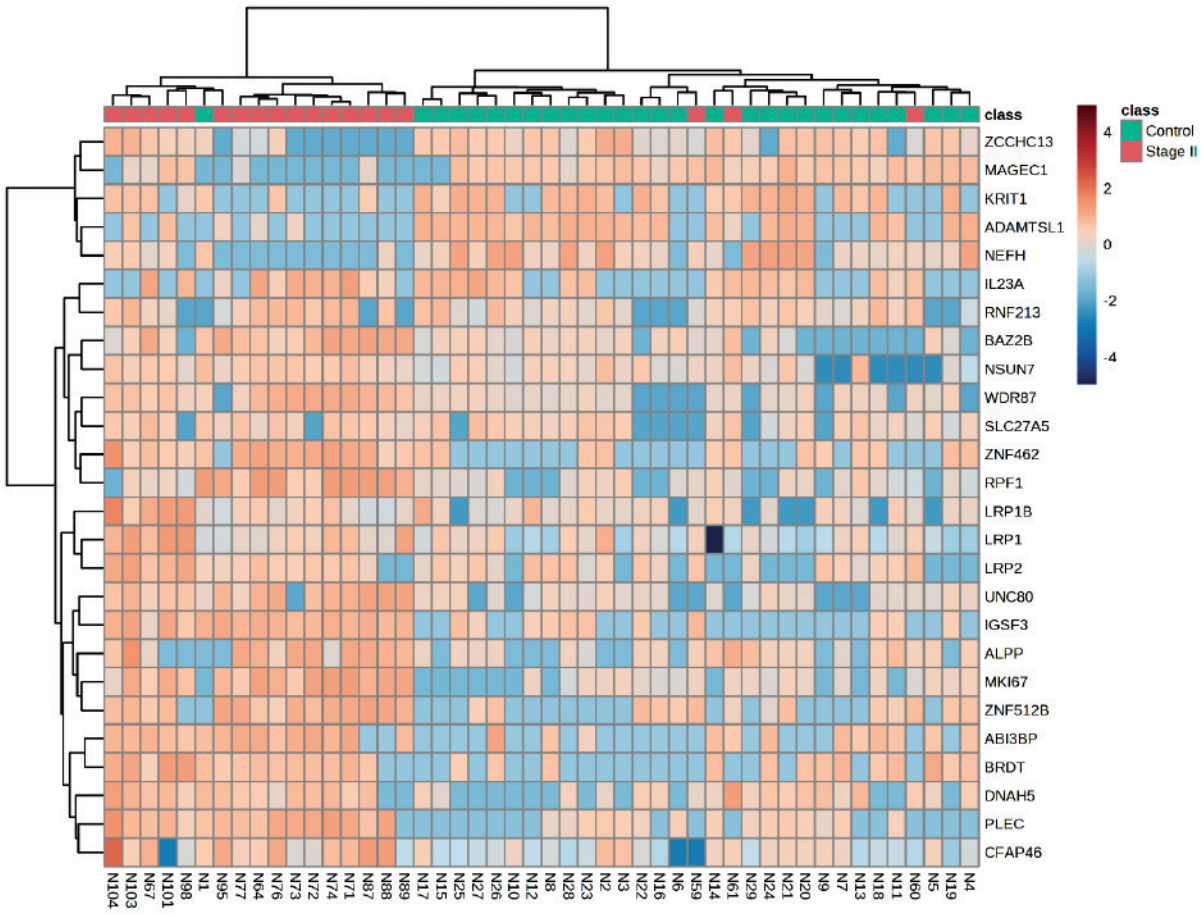

Figure 6 Heat map analysis of the uEV proteomic profile in stage II BC patients (n=19) compared to CT (n=29).

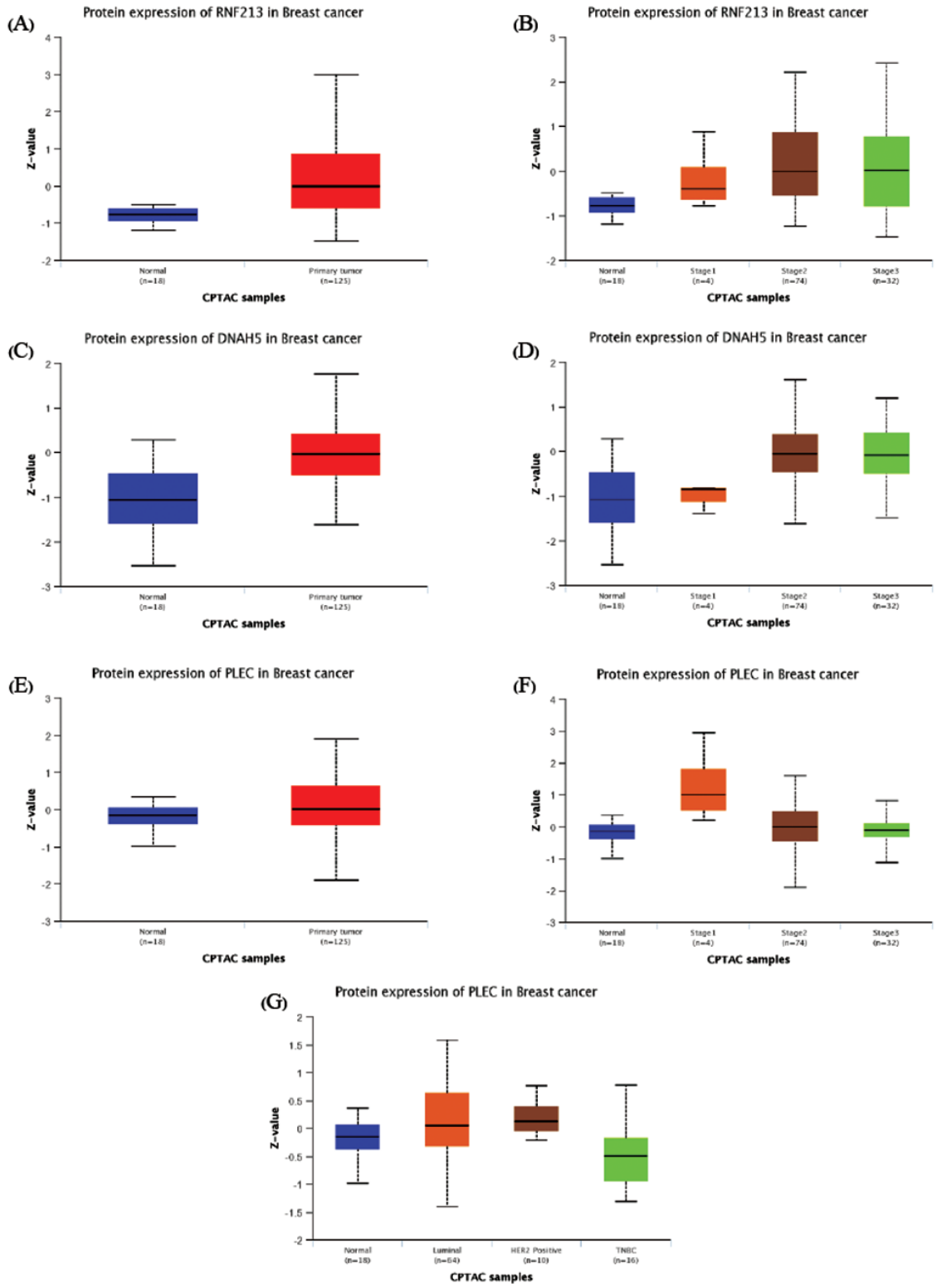

Figure 7 Web-based validation of protein expression between sample types and across individual cancer stages from CPTAC database. (A-B) Expression level of RNF213, (C-D) Expression level of DNAH5, (E-F) Expression level of PLEC, (G) Expression level of PLEC based on major subclass.

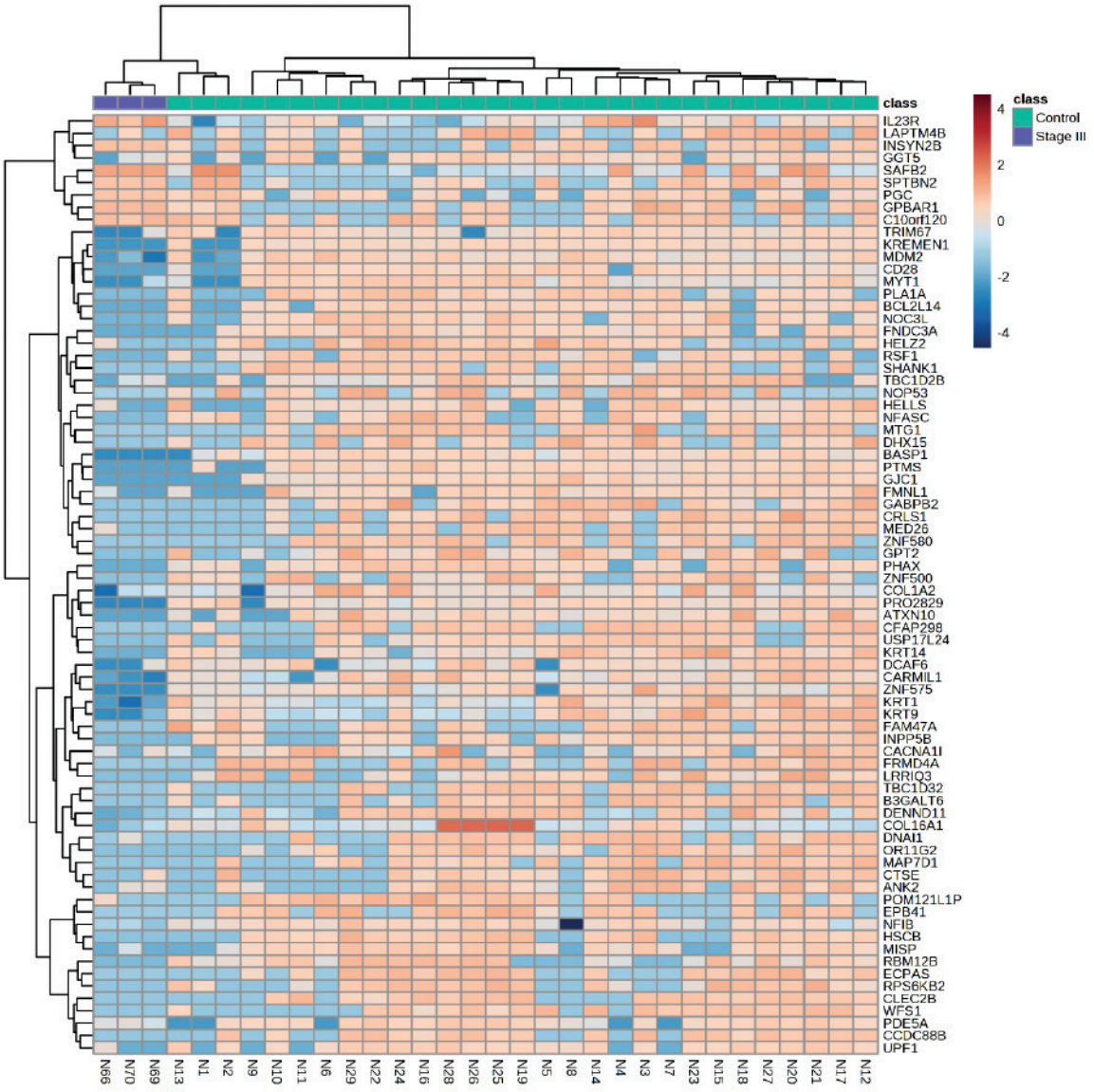

Figure 8 Heat map analysis of the uEV proteomic profile in stage III BC patients (n=3) compared to CT (n=29).

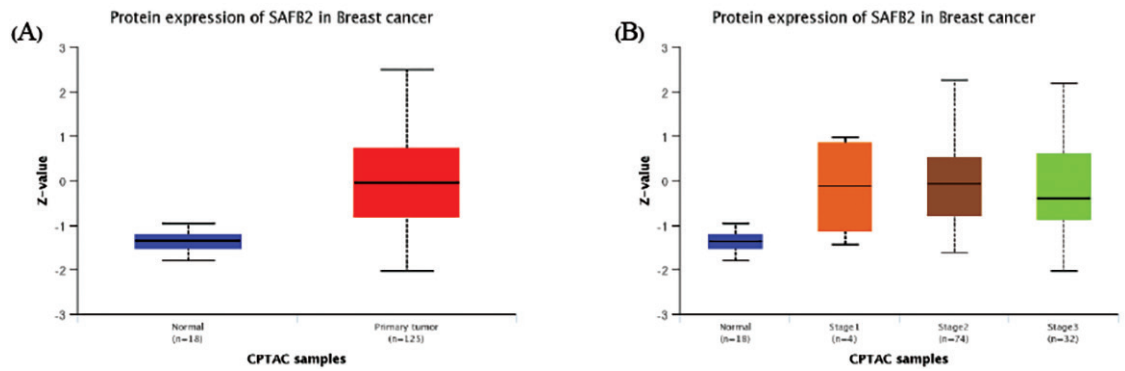

Figure 9 Web-based validation of protein expression of SAFB2 between sample types and across individual cancer stages from CPTAC database.

Discussion

Understanding the pathological changes that occur from the early to late stages of BC can provide valuable insights for diagnosis and prognosis, particularly in the absence of noticeable symptoms. Thus, numerous circulating biomarkers have been extensively studied in the field, including carbohydrate antigen 15-3 (CA 15-3), cancer antigen 27-29 (CA 27-29), serum HER2 (sHER2), carcinoembryonic antigen (CEA), tissue polypeptide antigen (TPA), and tissue polypeptide specific antigen (TPS). Among these biomarkers, CA15-3 and CEA are the most commonly used in BC and have significantly higher levels in metastatic BC patients[17]. They are practically applied in the early detection of recurrent disease. However, their utilization for screening or early diagnosis is not recommended due to low sensitivity, which is influenced by the stage of cancer[18,19]. A panel of trefoil factor proteins (TFF1, TFF2, and TFF3) has been proposed as a promising set of biomarkers for BC screening. Notably, the serum levels of TFF1 and TFF3 were found to be significantly elevated in BC patients compared to healthy individuals, while TFF2 levels exhibited lower levels observed in BC. Surprisingly, when these proteins were combined in BC detection, there was a potential enhancement in sensitivity and specificity (AUC=0.96) compared to the detection of individual proteins[20]. Furthermore, promising methods for detecting early BC have been reported in plasma exosomal proteins. For example, Del-1[21,22] and fibronectin[23] have shown potential as markers for patients with early-stage BC. Additionally, FAK, fibronectin and MEK1were reported as the three most prominent protein signatures for stage I and IIA BC[24]. Conversely, the elevated levels of PAI-1, ADAM12, and β-catenin were detected in advanced stage BC[25].

For more comprehensively, our study was the first report in the urinary EV proteome of BC using non-invasive approach. Although a great number of uEV proteomes were analyzed in BC and control samples, we still have the limitation of the insufficient the sample size in each stage. As our pilot study, the lowest number of uEV proteins were derived from only 3 patients of stage III BC. Unsurprisingly, it showed more significantly down-regulated proteins than other groups compared to the healthy women samples. From this limitation, we could not indeed confirm that these proteins were truly up- or down-regulated in each stage of BC. Since some proteins also showed opposite results annotated by CPTAC database or had no previous evidence correlated with cancers. Therefore, we mainly emphasized the examination of the significantly up-regulated proteins that we could investigate using the CPTAC dataset to find specific proteins for the BC stage, as we expected.

Interestingly, the uEV proteome of early-stage (stage I and II) breast cancer (BC) patients revealed pathological changes during BC progression, reflecting tumor suppression and prognostic proteins. For instance, the uEV proteomics of stage I BC patients showed eight down-regulated proteins compared to healthy women, among which UTRN and ANK3 have been proposed as prognostic markers. Li et al. suggested that UTRN is a tumor suppressor gene candidate. The function of UTRN might involve in maintaining cell membrane integrity and normal cytoskeletal structure. UTRN expression was reduced in several primary cancers as compared to matched normal tissues. In BC cell line, UTRN was overexpressed and their function was decrease a tumor cell development *in vitro*, as well as reducing tumor potential in nude mice (26). In addition, Zhou et al. concluded their finding that the reduction of UTRN was linked to a poor prognosis and suppressed melanoma development via the p38 and JNK1/c-Jun pathways. As a result, UTRN may act as a tumor suppressor as well as a potential prognostic biomarker in melanoma patients (27). Hence, the decreased expression of UTRN may present in the uEV in early-stage BC to reflect cancer development. Ankyrin 3 (ANK3) is Membrane-cytoskeleton linker related to androgen-receptor (AR) stability. In breast cancer, AR and AR signaling pathways were related to treatment responses and outcomes. Therefore, low ANK3 protein expression was a poor prognostic indicator in BC patients with high AR expression[28]. In a meta-analysis of gene expression signatures, ANK3 was reported as downregulated in EMT during cancer progression[29]. Moreover, Wang et al. reported that ANK3 knockdown in the avian embryo model was significantly increases of cell invasion through an AR-dependent mechanism and also enhanced cancer cell invasion and extravasation[30].

In stage II of BC patients, the uEV proteome showed RNF213, DNAH5, and PLEC which were significantly up-regulated compared to CT group and potentially involved in cancer progression. RNF213 encodes the E3 ubiquitin-protein ligase RNF213 protein, which exhibits ATPase and ubiquitin ligase activities and is involved in various processes, such as lipid metabolism, angiogenesis, and cell-autonomous immunity. One potential role of RNF213 in cancer is involvement in angiogenesis. During hypoxia conditions, RNF213 is a novel PTP1B substrate in the PTP1B/RNF213/α-KGDD pathway that regulates oxygen consumption and promotes tumor survival of HER2+ BC cells[31]. The expression of RNF213 was significantly greater in the primary tumors of BC patients compared to normal breast tissues[32]. DNAH5 encodes dynein axonemal heavy chain 5, which is part of a microtubule-associated motor protein complex for making the heavy chain 5. DNAH5 is frequent mutated gene that occurs in TNBC (33) and associated with a poor prognosis in esophageal squamous cell carcinoma patients[34,35]. DNAH5 are involved in the development of colorectal cancer and beneficial for diagnosis, prognosis prediction, and treatment (36). In addition, TRA2B-DNAH5 fusion was reported as a novel oncogenic gene that significantly upregulates MMP1 expression that induced lung squamous cell carcinoma progression *in vivo*[37]. Plectin (PLEC) is a filamentous cytoskeleton linker protein for binding and stabilizing membrane, and cytoskeletal proteins. Perez et al. concluded that the role of plectin is involved in a variety of functions in cellular structure and signal transduction depended on cell type. Plectin acts as a pro-tumorigenic regulator and can regulate several cellular processes, including cell proliferation, survival, migration, and invasion in cancer cells[38] such as prostate cancer[39], head and neck squamous cell carcinoma (HNSCC) which is a novel prognostic marker for HNSCC[40]. In silico study by Rao et al. inferred that plectin as a putative novel biomarker for breast cancer. Furthermore, other studies examined the efficacy of plectin-targeted peptide conjugated to nanoparticles for the treatment of ovarian cancer *in vitro* and *in vivo*[41], and imaging diagnosis allows for the differentiation of pancreatic cancer cells from normal cells in mice models[42].

The stage III of BC patients, we found that SAFB2 was significantly higher in uEVs of stage III compared to CT which was correlated to high expression in the CPTAC dataset. Unfortunately, our results showed the opposite information from previous studies. SAFB2 encodes scaffold attachment factor B2 which can function as an estrogen receptor corepressor in breast cancer cells, inhibit cell proliferation and play a role in tumor suppressor[43,44]. More aggressive tumors expressed with low SAFB2 associated with worse overall survival for non-treated BC patients[45]. According to the most recent study by Zhen et al. overexpression of SAFB2 in the BC cell line inhibited cell proliferation, migration, and invasion, inactivated Wnt/-catenin signaling, and induced apoptosis, suggesting that SAFB2 may be a potential prognostic marker and therapeutic target in breast cancer[46].

In summary, we conducted preliminary verification of notable proteins that were not discussed in this article, as more comprehensive analysis and improved validation methods are required beyond web-based validation. It is important to note that this study served as a pilot study with a limited number of samples. Consequently, the comparison of proteomic data may result in false positives or negatives. In further studies, it is crucial to increase the number of samples in each group sufficiently to define the cut-off value. Additionally, potential protein markers should be verified using different methods such as ELISA, western blotting, and targeted proteomics. Furthermore, considering the potential improvement in sensitivity, the combination of a protein panel should be addressed.

Conclusion

Our study has identified uEV proteins that were differentially expressed in BC patients across stages I, II, and III compared to healthy donors. We summarized the protein, probably specific to the BC stages versus CT, which was implicated in cancer progression and provided the supporting information to guide further extensive clinical research and to develop breast cancer biomarkers.

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Conflict of interest

There are no potential conflicts of interest to declare.

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Table S1 The significant DEPs are unique to the stage of BC compared with CT

Comparison	Gene name	Fold change (FC)	Log2 (FC)	p.ajusted
Stage I vs. CT	CKAP5	0.48175	−1.0537	0.012026
	NLRP10	0.39016	−1.3579	0.046685
	KDM5A	0.3665	−1.4481	0.010084
	ANK3	0.34779	−1.5237	0.038405
	UTRN	0.34581	−1.5319	0.026828
	P4HA1	0.3219	−1.6353	0.008814
	CCDC91	0.26246	−1.9298	0.024983
	FZD9	0.23054	−2.1169	0.025826
Stage II vs. CT	MKI67	121.78	6.9282	0.028387
	UNC80	39.453	5.3021	0.018871
	BAZ2B	33.491	5.0657	0.018025
	PLEC	27.718	4.7928	0.017647
	ALPP	26.732	4.7405	0.017647
	WDR87	26.278	4.7158	0.021843
	ZNF512B	25.123	4.651	0.015412
	ZNF462	18.781	4.2312	0.018871
	RPF1	16.426	4.0379	0.02937
	IGSF3	15.79	3.981	0.018871
	CFAP46	14.38	3.8459	0.04059
	ABI3BP	9.902	3.3077	0.028387
	IL23A	6.3121	2.6581	0.047295
	LRP1	5.9565	2.5745	0.037559
	DNAH5	5.7022	2.5115	0.039008
	RNF213	5.1542	2.3658	0.027895
	LRP2	4.026	2.0094	0.0089783
	LRP1B	3.8198	1.9335	0.018871
	NSUN7	3.7528	1.908	0.009205
	BRDT	3.323	1.7325	0.021097
	SLC27A5	2.9978	1.5839	0.029237
	ZCCHC13	0.32555	−1.6191	0.028387
	MAGEC1	0.31392	−1.6715	0.0086175
	ADAMTSL1	0.25506	−1.9711	0.015948
	KRIT1	0.21609	−2.2103	0.002566
	NEFH	0.061176	−4.0309	0.012018
Stage III vs. CT	GPBAR1	8.74	3.1276	0.021598
	INSYN2B	6.9908	2.8055	0.006481
	PGC	6.6485	2.733	0.00455
	IL23R	4.7962	2.2619	0.00023
	C10orf120	4.4765	2.1624	0.031872
	SAFB2	3.5559	1.8302	0.012255
	SPTBN2	3.4685	1.7943	3.83E−05
	BCL2L14	0.4842	−1.0463	0.000461
	PTMS	0.46223	−1.1133	0.00116
	CCDC88B	0.42902	−1.2209	0.00109
	TRIM67	0.41984	−1.2521	0.004654
	HSCB	0.34288	−1.5442	0.002659
	TBC1D32	0.3275	−1.6104	0.001061
	NOC3L	0.32721	−1.6117	0.01474
	GGT5	0.31265	−1.6774	0.019444
	MTG1	0.30832	−1.6975	0.027137
	GJC1	0.30442	−1.7159	0.000205
	CTSE	0.3032	−1.7216	0.026713
	DENND11	0.29041	−1.7838	0.0004
	HELLS	0.28544	−1.8087	0.022457
	KREMEN1	0.28489	−1.8115	1.06E−05
	ANK2	0.28092	−1.8317	0.039892
	PDE5A	0.27231	−1.8767	0.019491
	FNDC3A	0.26756	−1.9021	0.000121

Table S1 (continued)

Comparison	Gene name	Fold change (FC)	Log2 (FC)	p.ajusted
	CFAP298	0.26738	−1.903	0.00016
	MDM2	0.24488	−2.0298	0.021598
	MAP7D1	0.23782	−2.0721	0.00136
	CARMIL1	0.21882	−2.1922	4.35E−07
	ECPAS	0.21879	−2.1924	0.000457
	KRT1	0.2164	−2.2082	1.65E−05
	CLEC2B	0.21483	−2.2188	0.000788
	PLA1A	0.21178	−2.2394	0.000721
	POM121L1P	0.20719	−2.271	0.033282
	LAPTM4B	0.20183	−2.3088	0.02515
	NFIB	0.19385	−2.367	1.13E−05
	FAM47A	0.19348	−2.3698	0.034857
	COL16A1	0.19104	−2.388	0.045419
	PHAX	0.18162	−2.461	7.05E−05
	CD28	0.17672	−2.5005	3.40E−05
	HELZ2	0.15948	−2.6485	0.044109
	PRO2829	0.15725	−2.6688	4.50E−06
	UPF1	0.15311	−2.7073	0.000415
	B3GALT6	0.15281	−2.7102	0.000225
	FMNL1	0.13647	−2.8734	0.025979
	DCAF6	0.13376	−2.9023	0.000567
	TBC1D2B	0.12697	−2.9774	0.00271
	KRT9	0.11369	−3.1368	3.44E−05
	DHX15	0.10089	−3.3092	0.019444
	BASP1	0.10041	−3.3161	2.76E−05
	CRLS1	0.09423	−3.4077	0.002135
	FRMD4A	0.089341	−3.4845	0.000567
	ATXN10	0.088334	−3.5009	0.03845
	GABPB2	0.087885	−3.5082	0.02262
	MED26	0.085193	−3.5531	0.000207
	RSF1	0.071147	−3.8131	1.06E−05
	WFS1	0.06838	−3.8703	0.00194
	NOP53	0.065975	−3.9219	0.001543
	COL1A2	0.064473	−3.9552	0.017375
	ZNF580	0.061573	−4.0216	0.000121
	MISP	0.06055	−4.0457	2.70E−05
	DNAI1	0.059388	−4.0737	0.00016
	ZNF500	0.054574	−4.1957	0.002135
	NFASC	0.043188	−4.5332	0.00071
	USP17L24	0.040036	−4.6426	3.64E−05
	ZNF575	0.036706	−4.7678	0.014599
	MYT1	0.035058	−4.8341	0.000139
	CACNA1I	0.031477	−4.9895	0.039892
	EPB41	0.030608	−5.0299	0.001154
	INPP5B	0.028452	−5.1353	1.67E−05
	OR11G2	0.022245	−5.4903	7.05E−05
	RBM12B	0.021138	−5.564	0.000765
	KRT14	0.01491	−6.0676	0.020555
	RPS6KB2	0.014354	−6.1224	0.000394
	SHANK1	0.010795	−6.5334	0.000158
	LRRIQ3	0.004778	−7.7095	0.010078
	GPT2	0.00256	−8.6099	0.00248

Adherence with Sputum Collection and Quality of Sputum in Tuberculosis Screening during Pregnancy in Yogyakarta, Indonesia: A Cross-Sectional Study in Pregnant Women and Healthcare Workers

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Abstract:

Background: Sputum collection and quality of sputum are important to the diagnostic performance of tests used. However, there were few studies revealing the adherence of sputum collection for screening tuberculosis in pregnancy.

Objective: To assess adherence of tuberculosis screening using sputum perceived by pregnant women and healthcare workers in Indonesia and explore actual adherence with sputum collection and quality of sputum for tuberculosis screening in pregnant women and its associated factors.

Material and Methods: A cross-sectional study was conducted in Yogyakarta, Indonesia among 366 participants, consisting of 240 pregnant women and 126 healthcare workers. The pregnant women watched a video about the methods of sputum collection before 'perceived adherence' and 'actual adherence' were measured, and then the sputum specimens were assessed for sputum quality by trained personnel. Perceived adherence of the women and healthcare workers and the quality of the sputum samples was analyzed descriptively. Actual adherence and the associated factors were analyzed using univariate and multivariate analyses.

Results: The majority of the women who provided sputum agreed that the sputum was valuable and important for diagnosis but more than half of both the women and healthcare workers said that the procedure was difficult to obtain good quality sputum. Actual adherence with sputum collection among the study women was 11.2%. Presence of any

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underlying disease was associated with actual adherence with an odds ratio of 4.05 (95% CI 1.68–9.76). None of the women provided good quality sputum.

Conclusion: Low sputum collection adherence and poor sputum quality from pregnant women indicated the difficulty of the procedure, which was supported by the opinions from both the women and healthcare workers. Tuberculosis screening using sputum specimens from pregnant women requires more efforts to identify better methods.

Keywords: pregnant women, healthcare workers, adherence, sputum collection, tuberculosis screening

Introduction

Tuberculosis (TB), one of the oldest known human diseases, is caused by *Mycobacterium tuberculosis*[1]. One of the high-risk population groups for TB infection and transmission is pregnant women, due to the immunological changes which occur during pregnancy[2]. The World Health Organization (WHO) recommends systematic screening for active TB in pregnant women in antenatal care (ANC) if the prevalence in the general population is higher than 100/100,000 cases[3]. Indonesia is among high TB Burden countries with the 2nd rank after India, with 354 estimated incident cases per 100,000 population in 2021[4]. Despite the WHO recommendations, there are still many countries which did not do appropriate TB screening in pregnant women, including Malawi, Pakistan, and Indonesia[5–7].

The recommended TB screening method in general populations can be chest radiography and/or sign and symptom screening followed with sputum tests if sign and symptom is positive. Chest radiography has higher sensitivity than symptom screening but its use is limited among pregnant women due to fear of radiation hazards.[8] Therefore, among those with TB signs and symptoms, sputum examinations will be performed without chest radiography. However, getting sputum with good quality is important for accurate diagnosis for TB screening test among those with or without TB symptoms[9–11]. Examining the sputum collection methods used and the perceptions of pregnant women and healthcare workers concerning sputum collection will help to improve the achievement rate of TB screening programs and ending TB and other communicable diseases as the Sustainable Development Goal Target 3.3[12].

Although a pregnant woman believes that she would produce a sputum sample for screening for TB as perceived adherence of sputum collection, but sometimes she would not be able practically to do so. To date, there have been no studies examining the magnitude of perceived and actual adherence to sputum collection and the quality of sputum samples used for TB screening during pregnancy. This study aimed to (i) assess adherence of tuberculosis screening using sputum perceived by pregnant women and healthcare workers in Indonesia, and (ii) explore actual adherence with sputum collection and quality of sputum for tuberculosis screening in pregnant women and their associated factors.

Material and Methods

Study design, setting, and participants

This cross-sectional survey study was conducted in Yogyakarta Municipality, Indonesia from September 2022 to January 2023. Six primary healthcare centers or *Pusat Kesehatan Masyarakat* (PHC/*puskesmas*) with a high prevalence of tuberculosis in the area were purposively selected for the study. The study participants were divided into two groups: pregnant women and healthcare workers. We invited pregnant women aged at least 18 years at any gestational age who came for an antenatal care visit at the study *puskesmas*. For healthcare workers, we included all *puskesmas* staff who provided the service to pregnant

women and/or were involved in a tuberculosis prevention and control program.

The required sample size of pregnant women was calculated using the precision formula for proportion of perceived adherence for sputum collection or tuberculosis screening using sputum. As there have been no previous studies examining this question, we used an estimated outcome of perceived adherence of 50%. Given a type I error of 5%, margin of error of 10%, a design effect of 2, and a 10% non-response rate, at least 216 pregnant women were required. All eligible healthcare workers from the 6 PHCs were selected, thus a sample size calculation was not required for this group.

Variables and definitions

The main outcome of this study was adherence of sputum collection perceived by pregnant women and healthcare workers. Actual adherence with sputum collection and sputum quality results from pregnant women were also measured. Perceived adherence was defined whether the pregnant women agreed or disagreed on TB screening using sputum during pregnancy measured by a 5-point Likert scale ranges from "*strongly disagreed*" to "*strongly agreed*" using a structured questionnaire comprising four statements. A pregnant woman who agreed to provide the sputum was classified to be actual adherence. The sputum was then assessed by trained personnel for sputum quality using macroscopic appearance and sputum volume. Good sputum quality was indicated by a mucoid or purulent appearance and at least 3-5 ml of volume.

Independent variables recorded for the study women included socio-demographic characteristics (age, sex, marital status, religion, ethnicity, education level, and monthly household income in USD), obstetric information (gestational age, gravida, any underlying diseases noted in the medical records, history of problems in previous and current pregnancies, and known tuberculosis in one or more family members). Independent variables recorded for the healthcare workers were socio-demographic characteristics, employment status and working period. The reasons and opinions about sputum collection were recorded using closed- and open-ended questions.

Data collection

The research team informed the pregnant women who came for antenatal care at the selected *puskesmas* about the objectives of the study and invited them to participate in the study. We briefly explained about tuberculosis and the screening methods, the procedure of the research, and showed them a video about how to provides a good sputum sample. This video was produced by Interactive Research & Development (IRD), Pakistan worked with Inovasi Sehat Indonesia (ISI), Jakarta in Indonesian language that are in accordance with the Ministry of Health Indonesia guideline. After they signed an informed consent form, they all were interviewed but only the pregnant women who agreed to provide the sputum gave their sputum to the research team. The sputum samples received from the pregnant women were then examined by a trained research team for the quality of the sputum. Likewise, we informed and invited the healthcare workers who provided the service to pregnant women and/or were involved in a tuberculosis prevention and control program at study PHCs to participate in the study. After signing the informed consent form, they were interviewed using a structured questionnaire.

Statistical analysis

The study data were collected and managed using the REDCap electronic data capture tools hosted at the Clinical Epidemiology and Biostatistics Unit, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Indonesia. Analysis was performed with R software version 4.2.2 (R Foundation for Statistical Computing 2022, Vienna, Austria). Independent variables were analyzed

descriptively and presented as median and interquartile ranges or percentages, as appropriate. The factors associated with actual adherence with sputum collection in pregnant women were analyzed using univariate and multivariate analyses. We selected the variables which had p-value<0.2 in univariate analysis as inputs for multivariate analysis using backward-stepwise logistic regression. Odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated. Perceptions on tuberculosis screening using sputum from pregnant women and the adherence with sputum collection perceived by pregnant women and healthcare workers were analyzed using Chi-squared or Fisher's exact test. A p-value less than 0.05 was considered as significant.

Ethical considerations

The study was approved by the Human Research Ethics Committee, Faculty of Medicine, Prince of Songkla University, Thailand (REC. 65-311-18-1) and the Medical and Health Research Ethics Committee, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Indonesia (Ref. No.: KE/FK/1435/EC/2022).

Results

A total of 366 study participants including 240 pregnant women and 126 healthcare workers participated in the study. Table 1 shows the socio-demographic characteristics and pregnancy status of the pregnant women. Their median age was 29 years, and almost all of them were married, Javanese, and Muslim. About two-thirds of them had a secondary school or lower education and a household income less than 160 USD per month. One-third were primigravida, and most of them had no underlying diseases (84.6%). Approximately 5% reported having one or more family members previously diagnosed with tuberculosis.

Table 1 Socio-demographic characteristics and pregnancy status of the study women

Characteristic	Total (n=240) n (%)
Age group (years)	
18-25	52 (21.7)
26-30	95 (39.6)
31-35	62 (25.8)
>35	31 (12.9)
Marital status	
Married	239 (99.6)
Single	1 (0.4)
Religion	
Islam	223 (92.9)
Other	17 (7.1)
Ethnicity	
Javanese	221 (92.1)
Other	19 (7.9)
Education level	
Secondary school or lower	155 (64.6)
Bachelor's degree or above	85 (35.4)
Monthly household income in USD	
≤160	147 (61.3)
160-320	65 (27.1)
>320	14 (5.8)
No data	14 (5.8)
Gestational age (weeks)	
median (IQR)	22.5 (12, 32)
Gravida	
1	91 (37.9)
2	79 (32.9)
≥3	70 (29.2)
Underlying diseases	
Yes	37 (15.4)
No	203 (84.6)
Problems with current pregnancy	
Yes	8 (3.3)
No	232 (96.7)
Problems with previous pregnancies	
Yes	39 (16.2)
No	201 (83.8)
Family member ever diagnosed with tuberculosis	
Yes	11 (4.6)
No	229 (95.4)

Of the 126 healthcare workers, the majority were female, Javanese, Muslim, and had a bachelor's degree or higher education. Approximately half had been working for >5 years (Table 2).

Table 2 Socio-demographic status of study healthcare workers

Characteristic	Total (n=126) n (%)
Sex	
Male	11 (8.7)
Female	115 (91.3)
Age (years)	
median (IQR)	32.5 (28.2, 40)
Religion	
Islam	117 (92.9)
Other	9 (7.1)
Ethnicity	
Javanese	117 (92.9)
Other	9 (7.1)
Education level	
Secondary school or lower	3 (2.4)
Bachelor's degree or above	123 (97.6)
Monthly household income in USD	
≤160	15 (11.9)
160–320	53 (42.1)
>320	53 (42.1)
No data	5 (3.9)
Employment status	
Government employee	108 (85.7)
Non-government employee	18 (14.3)
Working period	
≤1 year	18 (14.3)
1–5 years	41 (32.5)
5–10 years	14 (11.1)
>10 years	53 (42.1)

Only 27 pregnant women (11.2%) actually adhered with the request to provide a sputum specimen. Of the 27 sputum specimens collected, 25 were saliva, one (3.7%) was mucoid sputum <3 ml, and the other (3.7%) was blood-stained sputum <3 ml. The factors associated with actually adhering with the request to provide a sputum sample in the women are presented in Table 3. No significant differences were found in the study variables between the adherence and non-adherence groups, except for underlying disease. Pregnant women in adherence group had significantly higher rate of having underlying disease (37.0%) than those in non-adherence group (12.7%) with OR of 4.05, 95% CI 1.68–9.76.

Perceived adherences of TB screening using sputum in pregnant women who actually adhered and did not adhere with request for sputum collection are shown in Table 4. All women who provided a sputum sample showed high agreement with the statement "tuberculosis should be screened for in all pregnant women". Comparisons of perceived adherence with sputum collection in tuberculosis screening for pregnant women, as indicated by all the study women and healthcare workers, are shown in Table 5. The majority of the pregnant women high agreement about the usefulness of tuberculosis screening. The perceptions on the easiness of the sputum collection procedure between pregnant women and healthcare workers were significantly different, of which 66.7% of women and 28.6% of healthcare workers disagreed with this statement.

From the 27 pregnant women who provided sputum, the majority (88.9%) said the reasons for performing sputum collection were "it is valuable and important for pregnant women", followed by "this sputum collection can prevent transmission of infection" (51.9%), "the procedure is easy" (40.7%), and "healthcare workers said that it is important" (33.3%), as shown in Figure 1.

The reasons of the 213 pregnant women who did not provide sputum and opinions of all healthcare workers on sputum collection in screening tuberculosis in pregnancy are presented in Figure 2. More than half of both the pregnant women in non-adherence group and healthcare workers said that getting a good sputum sample was difficult. Only 13.6% and 13.5% of the women and healthcare workers, respectively, felt that the instructions for providing a sputum sample were difficult. 9 women (4.2%) expressed that this procedure was not beneficial for pregnant women and 2 women (0.9%) felt this procedure was dangerous to pregnant women.

Table 3 Factors associated with actual adherence of collecting sputum in pregnant women

Characteristic	Actual adherence n (%)		p-value
	Yes n=27	No n=213	
Age (years)			0.448
mean (SD)	30.2 (4.8)	29.4 (5.2)	
Marital status			1
Married	27 (100)	212 (99.5)	
Single	0 (0)	1 (0.5)	
Religion			0.418
Islam	24 (88.9)	199 (93.4)	
Other	3 (11.1)	14 (6.6)	
Ethnicity			0.457
Javanese	24 (88.9)	197 (92.5)	
Other	3 (11.1)	16 (7.5)	
Education level			0.689
Secondary school or lower	16 (59.3)	139 (65.3)	
Bachelor's degree or above	11 (40.7)	74 (34.7)	
Monthly household income in USD			0.349
≤160	21 (77.8)	126 (59.2)	
160–320	4 (14.8)	61 (28.6)	
>320	1 (3.7)	13 (6.1)	
No data	1 (3.7)	13 (6.1)	
Gestational age (weeks)			0.839
median (IQR)	21 (15,31)	23 (12,32)	
Gravida			0.584
1	10 (37.0)	81 (38.0)	
2	11 (40.7)	68 (31.9)	
≥3	6 (22.2)	64 (30.0)	
Underlying diseases			0.003
Yes	10 (37.0)	27 (12.7)	
No	17 (63.0)	186 (87.3)	
Problems with current pregnancy			1
Yes	1 (3.7)	7 (3.3)	
No	26 (96.3)	206 (96.7)	
Problems with previous pregnancies			0.782
Yes	5 (18.5)	34 (16)	
No	22 (81.5)	179 (84)	
Family member ever diagnosed with tuberculosis			0.357
Yes	2 (7.4)	9 (4.2)	
No	25 (92.6)	204 (95.8)	

Table 4 Perceived adherence of TB screening using sputum in pregnant women who actually adhered and did not adhere with request for sputum collection

Statements	Actual adherence n (%)		p-value
	Yes n=27	No n=213	
All pregnant women should be willing to be screened for tuberculosis			0.139
Disagree	2 (7.4)	46 (21.6)	
Agree	25 (92.6)	167 (78.4)	
Tuberculosis should be screened in all pregnant women			0.032
Disagree	0 (0)	33 (15.5)	
Agree	27 (100)	180 (84.5)	
The sputum collection procedure for pregnant women is easy			0.516
Disagree	16 (59.3)	144 (67.6)	
Agree	11 (40.7)	69 (32.4)	
I prefer tuberculosis screening with sputum collection rather than by signs and symptoms			
Disagree	4 (14.8)	63 (29.6)	0.167
Agree	23 (85.2)	150 (70.4)	

Table 5 Perceived adherence of TB screening using sputum in pregnant women, responses of all study women and healthcare workers

Statement	Respondents		p-value
	Pregnant women (n=240) n (%)	Healthcare workers (n=126) n (%)	
All pregnant women should be willing to be screened for tuberculosis			0.655
Disagree	48 (20)	22 (17.5)	
Agree	192 (80)	104 (82.5)	
Tuberculosis should be screened in all pregnant women			1
Disagree	33 (13.8)	17 (13.5)	
Agree	207 (86.2)	109 (86.5)	
The sputum collection procedure for pregnant women is easy			<0.001
Disagree	160 (66.7)	36 (28.6)	
Agree	80 (33.3)	90 (71.4)	

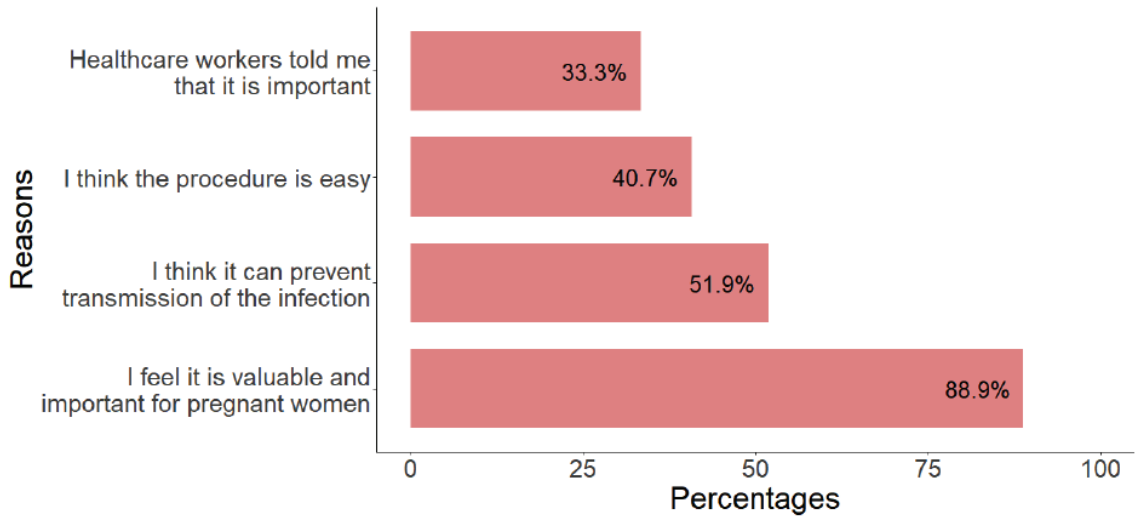

Figure 1 Reasons for agreeing to adhere with the request for sputum collection of the pregnant women in adherence group (n=27)

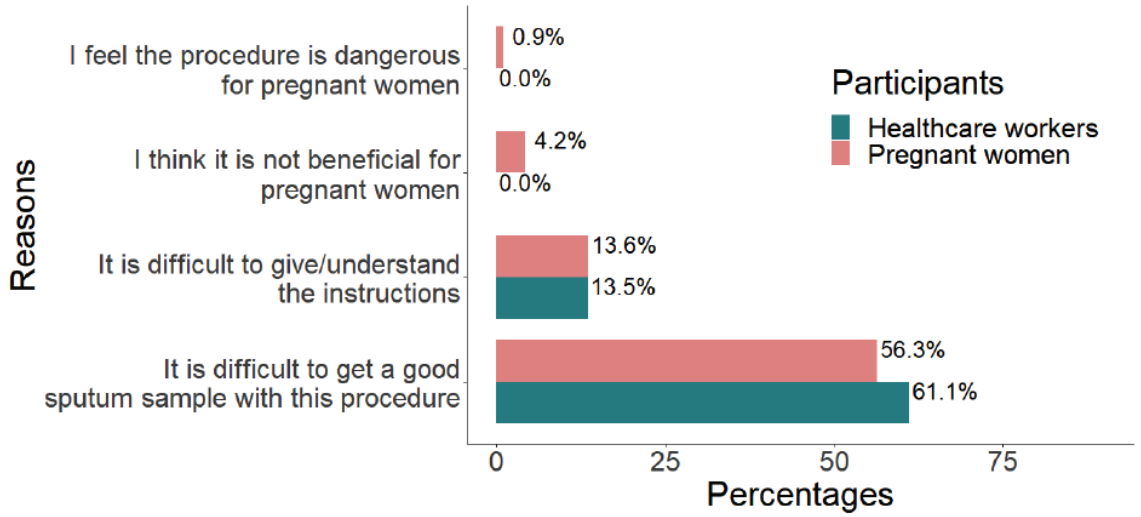

Figure 2 Reasons of pregnant women in non-adherence group (n=213) and opinions of all participated healthcare workers (n=126) on sputum collection in screening for tuberculosis in pregnancy

Discussion

Only one of ten pregnant women in the study actually adhered with the request to provide a sputum sample for tuberculosis screening. Actual adherence with sputum collection was 4-fold more likely in women with an underlying disease. None of the 27 sputum specimens collected were of good quality. All women providing sputum felt a universal tuberculosis test for pregnant women was valuable. Approximately two-thirds of the women and one-third of the healthcare workers thought that it is not easy to get a sputum sample. The majority of the pregnant women who provided sputum considered sputum collection to be of value and importance. More than half of both groups felt that it is difficult to obtain good quality of sputum, using the definition of a mucoid or purulent sputum at least 3 ml of volume.

The rates of actual adherence with sputum collection programs from pregnant women in Africa for testing for tuberculosis reported in previous studies have varied. In our study, the agreement rate was 11.2%, which was higher than the finding from a study in Burkina Faso, West Africa[13] but lower than in studies from South Africa (49.2%), Eswatini, Southern Africa (78%), and Zambia, Southern Africa (25.3%)[14–16]. Different prevalences of these previous studies can be explained by the different characteristics of the study participants either presenting with or without symptoms or high proportions of HIV-seropositivity, and different antenatal care systems requesting the sputum for screening. High actual adherence with sputum collection in those with symptoms or HIV in above studies also supported our finding that pregnant women in adherence group had higher rate of underlying disease than those in non-adherence group.

The pregnant women in our study could not provide a good quality sputum sample according to the definition of mucous or purulent sputum of at least 3 ml although all women received information and watched an instruction video explaining and describing the procedure. There are few studies which have assessed the quality and quantity of sputum samples in pregnant women. A study from India reported that only 16% of pregnant women who had positive TB screening signs and symptoms could produce sputum and 41.6% of the samples had poor quality and were of insufficient quantity[17]. Likewise, studies from Indonesia and Kenya reported that 67% and 30%, respectively, of sputum samples from the general populations were of poor quality[18,19]. We could not find a definitive explanation for these findings, but perhaps the failure to produce adequate sputum 'on demand' is related to being in a pathological stage of disease which stimulates the production of the sputum.

The pregnant women in our study who actually adhered with sputum collection had significantly higher positive perception for universal screening for tuberculosis in pregnant women than those who did not adhere. In our literature review, we could not find any publications assessing the adherence of sputum collection for tuberculosis screening in pregnancy. We found only two qualitative studies, both of which reported the belief that routine tuberculosis screening during antenatal care was acceptable to both pregnant women and healthcare workers[6,20], as we found in our study. However, our study also found that both the pregnant women in non-adherence group and healthcare workers were concerned about the difficulty of the sputum collection procedure in pregnant women, with the concern significantly greater in the pregnant women. This indicates that there is a need to identify a new method or technology to screen for tuberculosis in pregnant women.

To date, there have been no studies investigating either perception of use of TB screening using sputum tests in pregnancy or the quality of sputum collecting in Indonesia where the estimate of tuberculosis is high in the general population and for which screening in pregnancy is recommended. We conducted the study in six PHCs with a high prevalence of tuberculosis in the areas, to represent

the real conditions of the need for tuberculosis screening. There were some limitations to this study. First, we calculated the required sample size for the study women using the proportion of perceived adherence for sputum collection or tuberculosis screening using sputum, not actual adherence or its associated factors. However, the number of these samples was sufficient with a statistical power of 81% for assessing actual adherence based on a 6% acceptable error. We aimed to explore the associated factors; thus, we did not calculate the sample size to reflect that objective. Second, our study did not aim to test for tuberculosis from the sputum collected due to confidentiality of results of routine TB testing and a lack of facilities having the GeneXpert for TB screening. Finally, this study was conducted in Indonesia, and thus may not be generalizable for other country contexts.

This study found a positive adherence with sputum collection and the need for tuberculosis screening using sputum perceived by pregnant women and healthcare workers. Risk recognition for tuberculosis is helpful to enhance tuberculosis screening using sputum tests in pregnant women, but it cannot guarantee the quality of the sputum collected. New technologies or innovations are required to be studied to increase adherence with tuberculosis screening programs in pregnant women.

Conclusion

Adherence with sputum collections and good sputum quality for routine tuberculosis screening among pregnant women during antenatal care was challenged, although both pregnant women and healthcare workers believed that TB screening in pregnant women is useful. Pregnant women with underlying diseases were more likely to actually adhere with a request for a sputum sample. The difficulty of the procedure for sputum collection and obtaining good quality sputum were the main challenges.

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Author contributions

All authors participated in the study conceptualization and design. DSR, DSN, JAT and S involved in data collection and validation. DSR and TL contributed to data cleaning, analysis, interpretation and drafting the manuscript. TL supervised all the procedure steps. All authors approved the final version of the manuscript and agreed on the order in which their names are listed in the manuscript.

Conflict of interest

All authors declare no conflicts of interest.

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