

Highlights from International Conference on Cancer Health Disparities

Murali M. Yallapu^{1,2*}, Jorge Teniente³, Andrew Tsin^{3,4}, and Subhash C. Chauhan^{1,2*}

¹Department of Immunology and Microbiology, School of Medicine, University of Texas Rio Grande Valley, McAllen, TX, USA ²South Texas Center of Excellence in Cancer Research, School of Medicine, University of Texas Rio Grande Valley, McAllen, TX, USA ³Office of Research, School of Medicine, University of Texas Rio Grande Valley, McAllen, TX, USA ⁴Department of Molecular Sciences, School of Medicine, University of Texas Rio Grande Valley, McAllen, TX, USA

*Corresponding author: Murali M. Yallapu, Ph.D., E. mail: murali.yallapu@utrgv.edu.
Subhash. C. Chauhan, Ph.D., E. mail: subhash.chauhan@utrgv.edu

ABSTRACT

The first International Conference on Cancer Health Disparities (ICCHD) was held on August 13-14, 2021, in Harlingen, TX, USA. This two-day ICCHD-2021 was organized by the University of Texas Rio Grande Valley, School of Medicine (UTRGV-SOM). About 200 national and international delegates from 10 countries attended this hybrid meeting in person and through online digital platforms. The event delegates were representatives from National Institutes of Health (NIH), Cancer Prevention and Research Institute of Texas (CPRIT), and the City of Harlingen, in addition to clinicians, faculty, researchers, scientists, bioinformaticians, geneticists, bioethicists, and others. Under the theme of Cancer Health Disparities, this event featured a number of special talks and showcased the work done by researchers from a broad array of disciplines (academia, community, and health care) to identify gaps and/or solutions to multi-faceted health and health disparity issues impacting minority and underserved populations across the country and worldwide. The conference was comprised of six sessions: Session 1: Introduction to the conference and tackling cancer health disparities; Session 2: Elimination of cancer health disparities; Session 3: Cancer cellular and molecular biology; Session 4: Diversity and Inclusion in cancer research; Session 5: Poster and oral presentations, and Early career investigator talks; Session 6: An award ceremony and closing remarks. This conference report summarizes the meeting's content, discussions, and conclusions.

KEYWORDS: Research symposium, cancer health disparities, cancer biology, drug delivery, medical research.

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INTRODUCTION

The University of Texas Rio Grande Valley (UTRGV) is located at the United States (US)-Mexico border, a region predominately Latino/Hispanic. UTRGV is the second largest Hispanic-serving institution in the US and has a special focus on addressing health disparities in the Rio Grande Valley, where approximately 1.4 million people reside. In view of the region's urgent needs, the School of Medicine (SOM) was founded in 2015 to provide improved health care, medical educational, and biomedical research. UTRGV-SOM is strategically positioned to improve the lives and well-being of surrounding communities through innovative research and patient-centered care. UTRGV-SOM attracting and supporting research that will help to address the health disparities of the Rio Grande Valley (RGV) Latino/Hispanic population. As a part of its mission to educate a diverse group of medical students, residents, and future biomedical scientists, in 2017 the SOM began hosting an annual Research Symposium. To date, UTRGV-SOM has successfully held three annual research symposiums on health disparities in the Rio Grande Valley (1-3). These symposiums have provided continued medical education, promoted minority communities to participate in health and health disparities research, and advocated attention to health issues that affect Hispanic and other underserved communities.

Considering the numerous cancer health disparities that exist in the RGV region, UTRGV-SOM sought to focus the 4th Annual UTRGV-SOM Research Symposium on cancer health disparities. The research symposium titled the "International Conference on Cancer Health Disparities (ICCHD-2021)" which was held during August 13-14, 2021. Because the RGV region is a hot spot for several cancer health disparities (liver, gall bladder, stomach and cervical), the National Cancer Institute (NCI) of National Institutes of Health (NIH) graciously

sponsored this conference (1R13CA254453-01; Principal Investigators: Subhash C. Chauhan and Andrew Tsin) along with the UTRGV-SOM. Our scientific agenda showcased collaborative and community-engaged research in which researchers, practitioners, and communities (e.g., biomedical, clinical and translational science) discussed global cancer health disparities in a single forum. The ICCHD-2021 emphasized how the scientific and medical research community can interact with community health organizations/workers to discuss the common goal of addressing global minority health and health disparities. The research studies include many projects focused on health disparities among Hispanic, African American, and American Asian/Indian populations. ICCHD-2021 included presentations including, but not limited to, the US, Canada, Mexico, Latin American, and Asian, African, and European countries. Many UTRGV-SOM teams conduct research and work with Hispanic, African American, American Indian, and American Asian populations in the U.S. The ICCHD-2021 closely aligns with the mission of the NCI and National Institute on Minority Health and Health Disparities (NIMHD), that is, to support global cancer research and cancer health disparity research to advance scientific knowledge and help all people live longer/maintain a quality lifestyle after cancer diagnosis/treatment.

Cancer health disparities impact millions of people across the US and around the globe (4-6). Disparities in cancer burden/prevalence, incidence, and health outcomes are evident by race/ethnicity, geography, genetics, gender, culture, and sexual orientation. Cancer health disparities are primarily due to not only to poor access to health care, co-morbidities, chronic stress, and ancestry, but also correspond to cultural, socio-economic, biological, and environmental factors. Thus, there is a critical need for research on global health disparities impacting disadvantaged populations. We are

keenly aware of the need for a diverse scientific workforce to foster scientific innovation, global health, and community service. ICCHD-2021 was aimed to promote a robust learning environment, to improve the quality of research, and to advance participation of global health disparity populations who benefit from health research. The community outreach program during the ICCHD-2021 promoted information dissemination and enhanced public trust essential for the success of intervention programs to reduce and eliminate US-Mexico border and global cancer health disparities.

The prime objectives of ICCHD-2021 were **1)** To provide a unique platform for open scientific discussions between basic, clinical, and translational cancer researchers from institutions on both sides of the US-Mexico border and from other international institutions, **2)** To introduce health disparities concepts and educate new investigators in global cancer health disparity research and organize community-based participatory research and outreach, and **3)** To enable interprofessional and transdisciplinary partnerships to bring awareness and help eliminate minority health disparities in the U.S. and other countries.

The ICCHD-2021 reports recent advances in understanding of the causes of cancer health disparities in rural populations and among various ethnicities. The ICCHD-2021 also focused on the roles of financial hardship and the tumor immune profile in causing outcome disparities and discuss evidence-based strategies to reduce these disparities. The ICCHD-2021 was comprised of six sessions and reported on various health disparities-related topics, discussions, interaction, engagement, and collaboration among participants, administrators, state and federal officials, and stakeholders. Despite the ongoing COVID-19 pandemic, a total of 200 participants from more than 10 countries attended the ICCHD-

2021 either in-person or through digital online platforms. Among these participants were several renowned faculty, researchers, scientists, and students from reputed institutions, centers, hospitals, and universities. Overall, the majority of participants were from academic and research institutions.

Summary of the conference

The ICCHD-2021 not only aligns with the mission of the NCI Global Health Center, but it is novel to the region and is one of the few health disparity research conferences in the US with an emphasis on cancer research in minority health and health disparities. The ICCHD-2021 opened a platform to transform the biomedical and health disparity research culture in the Rio Grande Valley and beyond. Access was broadened at the ICCHD-2021 through novel health disparity content and approaches, work with community health organizations and health workers, and simultaneous Spanish interpretation of sessions.

The ICCHD-2021 was comprised of six sessions: Session 1: Introduction to the conference and tackling cancer health disparities; Session 2: Elimination of cancer health disparities; Session 3: Cancer cellular and molecular biology; Session 4: Diversity and inclusion in cancer research; Session 5: Poster and oral presentations, and Early career investigator talks; and Session 6: An award ceremony and closing remarks.

Dr. Subhash C. Chauhan, Professor and Chairman of the Department of Immunology and Microbiology and the Director of South Texas Center of Excellence in Cancer Research, School of Medicine, UTRGV, opened the conference by warmly welcoming and greeting to participants. He introduced Dr. Michael B. Hocker, Dean, School of Medicine, UTRGV; Honorable Christopher Boswell, Mayor, City of Harlingen; and Dr. Parwinder Grewal,

Executive Vice President, Research, Graduate Studies, and New Program Development, UTRGV. They briefly shared the roles and engagement of the Cancer Center, School of Medicine, City of Harlingen, and university research and graduate programs addressing cancer and cancer health disparities in the RGV region, Texas, the US, and around the globe.

Day 1 opened with two plenary presentations and two keynote talks by world renowned speakers. This session was moderated by Dr. Chauhan. Dr. Rina Das, Program Officer, Division of Integrative Biological and Behavioral Sciences, NIMHD, presented on the topic "NIMHD Mission and Programs in Health Disparities," which delineated programs that exist for investigators, researchers, and students. Next, Dr. Jose A. Torres Ruiz, Chancellor at Ponce Health Sciences University (PHSU) in Ponce, Puerto Rico, focused on "Eliminating Cancer Health Disparities through the PHSU Specialized Center in Health Disparities." He described the implementation of cancer health disparity research at the PHSU. After this, Dr. Renu Wadhwa, Professor of the School of Integrative and Global Majors, University of Tsukuba, Japan, presented on "Experimental evidence to the bioactivities of propolis constituents, Caffeic Acid Phenethyl Ester and Artepillin C presentation" which reports the feasibility of implementing natural agents for cancer prevention. As a concluding talk, Dr. Jamboor K. Viswanatha, Regents Professor and Vice President, and Director of Texas Center for Health Disparities, University of North Texas Health Science Center, presented on "MIEN1 in regulation of migration and invasion in prostate and breast cancers" correlating how use of MIEN1 can be extended in tackling cancer health disparities.

Of equally high standards as the first session, Day 2 started with a morning session on elimination of cancer health disparities moderated by Dr. Bilal

Hafeez, Assistant Professor, School of Medicine, UTRGV. Dr. Sunil Saini, Director of Cancer Research Institute, Himalayan Institute Hospital Trust, Swami Rama Himalayan University, India, presented his team work on "Multitude of Disparities in Cancer Care in India". This work primarily relates to India where approximately 70% of the rural population have very limited access to cancer care and facilities. Additionally, India needs specifically tailored cancer control strategies, taking into account the time, current trends, and resources available to patients. The next presentation was delivered by Dr. Junichi Fujii, Professor of Biochemistry & Molecular Biology, Yamagata University, Japan. His presentation focused on "Genetically modified mice that undergo both oxidative stress and endoplasmic reticulum stress spontaneously develop hepatocellular carcinoma" which confirmed the development of a suitable animal model that transitions from non-alcoholic steatohepatitis (NASH) to Hepatocellular carcinoma (HCC) progression. This DKO model undergoes oxidative/ER stress that would clarify the pathogenesis of HCC development initiated by non-alcoholic fatty liver disease (NAFLD). During the morning, a presentation was made by nationally renowned physician scientist, Dr. Daniel Petereit, Member of Monument Health Cancer Care Institute, Monument Health, on a topic "The Walking Forward Cancer Disparity Program: A Model for Community Cancer Control". Dr. Petereit is a prominent researcher looking at cancer health disparities in the Native American population of the Northern Plains. He presented his work of two decades on the cancer disparity program that was implemented in South Dakota in collaboration with local ethnic groups. The final talk of this session was presented by Dr. Dulal Panda, Chair Professor, Department of Biosciences & Bioengineering, IIT Bombay, from India. His presentation on "Inhibition of Wnt/ β -Catenin signaling is a prominent

antitumor activity of microtubule-targeting anticancer drugs" provided more understanding of the mechanism of anticancer action of microtubule targeted drugs towards development of antimetabolic agents.

The third session of the symposium was on cellular and molecular biology and determinants of cancer health disparities. This was the first breakout session, held during the morning of the second day. In Hall A's breakout session, Dr. Manish Tripathi Assistant Professor, School of Medicine, UTRGV and Dr. Sheema Khan, Assistant Professor, School of Medicine, UTRGV, were session moderators. First, Dr. Keshav Singh, Professor, Department of Genetics, UAB School of Medicine, presented a keynote talk on "Mitochondrial Determinants of Cancer Health Disparities." His work documents a number of findings that demonstrate how mitochondria contributes to determining cancer health disparities. Dr. Mehdi Shakibaei, Professor - Institute of Anatomy, Ludwig Maximilian University, Munich, from Germany delivered a presentation on "Calebin A decreases tumor microenvironment inducing EMT in CRC cells via modulation of NF- κ B/Slug axis." His team's study indicates that the tumor microenvironment has a pivotal impact on tumor progression, and epithelial-mesenchymal transition is an extremely crucial initial event in the metastatic process in various cancers which can be prevented by employing a naturally occurring molecule, Calebin A (an ingredient in Curcuma longa). In the next presentation, Dr. Upender Manne, Director/ Professor, Anatomic Pathology, University of Alabama at Birmingham School of Medicine, presented recent outcomes of his study on "Interplay of Molecular Factors and Comorbid Conditions in Cancer Disparities." This work shows how distinct molecular alterations contribute to cancer health disparities, and he continues investigating various molecular factors and comorbid condition analyses through a grant from

the Center to Reduce Cancer Health Disparities branch of the National Cancer Institute (U54CA118948). In the concluding presentation, a breakout session was presented by Dr. Nadeem Zafar, Director, Pathology and Laboratory Medicine Service, VA-Washington, from Seattle on the topic "Promoting Healthcare as A Career for Minority Students To Fight Cancer Health Disparity," which referred to a number of points on cancer disparities in terms of differences in cancer measures which can be minimized by education, frequent/annual medical visits/test, minority community awareness, and the welfare pipeline. Dr. Zafar's work also emphasizes how awareness of healthcare careers for American minority populations can be enhanced by medical schools' educational programs/components.

In the morning breakout session in Hall B, Dr. Subash Gupta, Assistant Professor, Institute of Science, Banaras Hindu University, and Dr. Ajaikumar Kunnumakkara, Professor, Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati, from India were session moderators. Dr. Subash Gupta delivered the keynote presentation on the special topic "Unraveling the long non-coding RNA signatures for gall bladder cancer". His team findings identified a distinct role of long non-coding RNA for initiation, progression, and metastasis of cancer cells in vitro/in vivo models which needs to be further verified and investigated in human samples. Dr. Alok Bharti, Professor, Department of Zoology, University of Delhi, India, delivered the next presentation on "Plant-derived homeopathic preparations with anti-cervical cancer and anti-Human papillomavirus activity as alternative to mitigate cancer health disparity". His data supports the use of homeopathic preparations as a promising cost effective and safe alternative for cancer therapeutics against cervical cancer in low-resource settings. Dr. Anshika Arora, Assistant

Professor, Swami Rama Himalayan University, India, described their team work on "Association of Nutritional Status with Failure to Complete Planned Treatment in patients with HNSCC- a prospective cohort study in a Tertiary cancer center in Northern India". This study confirms that various nutritional parameters (weight, BMI, MUAC, weight loss, and SGA score) are highly associated with failure to complete treatment. Thus, it advises that disparities in the nutritional status of patients undergoing treatment for Head and neck squamous cell carcinomas need to be acknowledged. Another distinct talk on "Disparities in Occurrence of Cancer Due to Different Treatment Modalities in Rheumatoid Arthritis Patients" was delivered by Dr. Varsha Gupta, Assistant Professor, Department of Biotechnology, Institute of Biosciences and Biotechnology, Chhatrapati Shahu Ji Maharaj University, India. Her study addresses disparities in the occurrence of various cancers with respect to different treatment modalities in rheumatoid arthritis patients. Mr. Erik Steinfeld, Director, Biobanking Market Development, Thermo Fisher Scientific, presented on "Biobanking in Cancer Related Research" and described how Thermo Fisher Scientific can be part of cancer health disparity research. The last presentation on "Health Disparities in Oral Cancer" was given by Dr. Ajaikumar Kunnumakara, Professor, Indian Institute of Technology Guwahati, India. He addressed the association of risk factors such as tobacco smoking, alcohol intake, areca nut, human papillomavirus (HPV), and poor oral hygiene on oral cancer etiology in eastern India.

The fourth session in the afternoon on Day 2 focused on cancer health disparities in the RGV and around the globe. In Hall A, Dr. Subhash C. Chauhan moderated the session. In this breakout session, Dr. Patty Moore, Director of Academic Research, Cancer Prevention and Research Institute of Texas (CPRIT), presented a "CPRIT-overview"

which broadened the horizons for investigators at Texas institutions seeking to apply for and conduct cancer prevention and community outreach research. The second talk was by Dr. Vijian Dhevan, General Surgeon, UT Health RGV, who presented on "Cancer Disparities in the Lower Rio Grande Valley". This work discussed disparities among various types of cancers in the RGV region comparing them to the broader area of south Texas, the state as a whole, and nationally. Later, Dr. Rakesh Kumar, Distinguished Professor, National Chair in Cancer Research, Rajiv Gandhi Centre for Biotechnology, India, portrayed his life-time experience through the presentation "Science and Medicine: A Priceless Journey" which summarized the contribution of his laboratory over the past few decades to fundamental molecular events to cancer progression and metastasis. He also shared his thoughts on how these findings may offer new opportunities in health disparity cancer research.

The other breakout session in Hall B was moderated by Dr. Subash Gupta and Dr. Ajaikumar Kunnumakara. Dr. Rajesh Singh, Associate Professor, Microbiology, Biochemistry & Immunology, Morehouse School of Medicine, presented a keynote talk titled "CCR5/CCL5 axis plays an essential role in Liver Cancer Racial Disparity". This work explained the involvement of chemokines in various cancers and their stimulation of the chemokine receptors expressed in cancer cells. He proposed that blockage of the CCR5/CCL5 interaction could induce apoptosis, confirming that the CCR5/CCL5 interaction might be an interesting target for managing and treating HCC in humans and HCC associated disparities. The next work was presented by Dr. Eduardo C. Lazcano-Ponce, Dean, El Instituto Nacional de Salud Pública, Mexico, on the special topic "The Epidemiologic Panorama of Cancer in Mexico" which describes several key insights into cancer disparities across the country. Later, Dr. Catherine Kaschula, Senior Lecturer,

Stellenbosch University, South Africa, from South Africa delivered her presentation on “Investigations into the cytotoxic mechanism of the garlic compound ajoene in cancer cells”. This study has identified and validated a number of targets, many of which contain reactive cysteines involved in the maintenance of cancer homeostasis. The concluding presentation of this session was delivered by Dr. Shailesh Singh, Professor, Microbiology, Biochemistry & Immunology, Morehouse School of Medicine. His presentation focused on “Associate of CC chemokines with Breast Cancer Disparity”. His team concluded that there is a significant association of CC-chemokines in breast cancer progression and disparate disease outcome in African American (AA) compared to European American (EA) patients.

The fifth session of the symposium included poster and oral presentations, and early career investigator talks focused on diversity and inclusion in cancer and health disparities research. There were about 127 poster and 61 oral presentations, out of which 1 high school, 11 undergraduate, 20 medical students, 36 graduate students, 15 residents, 8 fellows, 5 faculty, and 5 staff (poster presentations) and 16 flash talks and 30 oral videos (oral presentations). The early career investigator flash talks session was moderated by Dr. Murali Yallapu, Associate Professor, School of Medicine, UTRGV. The flash talk topics included: Gene-by-Environment Expression and Calculation of the Frailty Index (Dr. Eron Grant Manusov); Mind, Body and Race: A Look Into How Implicit Biases Influence the Perception of Emotion (Faiza Ahmad, UTRGV Medical Student); Multiple RSV strains infecting HEp-2 and A549 cells reveal cell line-dependent differences in resistance to RSV infection (Dr. Felipe-Andres Piedra); Human iPSC derived cardiomyocyte model reveals the transcriptomic bases of COVID-19 associated myocardial injury (Miss. Kashish Kumar, High School Student); Production of codon optimized

Polyomavirus (Dr. Luis M. Rodriguez Martinez); Center for Diabetes and Metabolism, a collaborative dream comes true (Claudia Munguia, MPH); Smoking and Drinking Activates NF- κ B /IL-6 Axis to Promote Inflammation During Cervical Carcinogenesis (Dr. Vivek K. Kashyap); Development and validation of a simple clinical construct for prediction of new type 2 diabetes mellitus (Xavier Rios, Undergraduate Student); Cross-linked nanocomplexes for drug delivery applications (Sumeet S. Chauhan, Undergraduate Student); Potential Involvement of a Glycoprotein MUC13 Mucin in Colorectal Cancer Health Disparity (Dr. Manish K. Tripathi); Targeting tumor associated macrophages to improve the immunotherapy of pancreatic cancer (Dr. Bilal Hafeez); Therapeutic intervention using autologous exosomes for treatment of early-stage pancreatic cancer (Dr. Sheema Khan); Exploration of potential natural inhibitors against KRAS-G12D in PanCan: Protein centered pharmacophore HTVS approach (Dr. Anupam Dhasmana); Mucin MUC13 and YAP1 correlate with poor survival in colorectal cancer (Dr. Sudhir Kotnala); Tuberculosis in elderly Hispanics: BCG vaccination at birth is protective and diabetes is not a risk factor (Dr. Blanca I. Restrepo); Case report: Chronic diabetes and COVID-19: A perfect storm for reactivation tuberculosis (TB)? (Dr. Blanca I. Restrepo); and Addressing PKD1 in Prostate Cancer Disparity: Implication for Drug Repurposing (Dr. Mohammed Sikander).

In all sessions, there is a window of two to five minutes discussion on all topics. During this question-and-answer session a topic relevant content was discussed. It was noticed that a highly engaged discussions among various participants and presenters. Notable incidents are regarding CPRIT opportunities and development of new programs, cancer health disparity community engagement research queries, and delineating cancer biology in health disparity research, etc.

The final session of the program included an Award ceremony and closing remarks. Dr. Subhash C. Chauhan and Dr. Murali Yallapu described the various award category honors and selection criteria. A dedicated committee and chair oversaw the selection process and only works with technical excellence were recommended for an award. Award categories included honors for significant technical expertise in both oral and poster presenters from undergraduate students (4), graduate students (7), medical students (3), resident fellows (5), postdoctoral fellows/staff scientists (5), and young investigators/ faculty (4). To encourage international participants, there was a separate category allotted for international participants (11). All work of technical excellence in posters and oral talks received a distinctive engraved award plaque and certificate signed by the conference chairman. At the final stage of the program, a vote of thanks to all participants and organizers was extended by Dr. Subhash C. Chauhan (Chairman of the Scientific Committee ICCHD-2021). He also provided a brief overview of the meeting, feedback received, and future plans. At the end of the meeting, Dr. Chauhan also announced the continuation of the "International Conference on Cancer Health Disparities" conference on an annual basis.

Conclusions

The first two-day annual International Conference on Cancer Health Disparities (ICCHD) was conducted by the UTRGV-SOM as the 4th Annual Research Symposium. The ICCHD-2021 was held on August 13-14, 2021, at the Harlingen Convention Center, Harlingen, TX, USA, as hybrid event (both physical and virtual live programs). The conference was comprised of six sessions: introduction and tackling cancer health disparities; elimination of cancer health disparities; cancer cellular and molecular biology; diversity and inclusion in cancer research, poster, and oral presentations; early

career investigator talks; followed by an award ceremony and closing remarks. A network of colleagues from academia, the community, and health care joined to promoted various themes of cancer health disparities via special talks, showcasing research work, and continuing professional development programs. The success of this program can be seen in the participation of ~200 delegates from more than 10 countries. This accomplishment resulted from the commitment and participation of volunteers, UTRGV leadership, NIH, CPRIT, as well as city officials, clinicians, faculty members, researchers, scientists, bioinformaticians, geneticists, bioethics, and other members.

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Conflicts of interest

The authors have no conflicts of interest to report.

Authors' contributions

M.M.Y. drafted the manuscript. S.C.C., J.T, A.T., and MMY participated in review and edition of the manuscript.

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