

Highlights

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ISLSIH 2025 Paris Conference: A New International Chapter in the Convergence of Life Sciences and Holistic Health

Kenji Tanaka*

**Corresponding Author, Email: kenji_tanaka@163.com*

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Abstract: From December 15 to 17, 2025, the ISLSIH 2025 International Symposium was held in Paris, France, focusing on the theme of "Life Sciences and Intelligent Health." Over one hundred experts and scholars from countries including France, Italy, Spain, Oman, and Japan engaged in in-depth discussions across five key areas: genomics, clinical ethics, wearable sensing, rural health monitoring, and robotic surgery training. The event featured the presentation of five original research papers and culminated in the compilation of a comprehensive conference proceedings report. The Pasteur Institute in France introduced a multi-omics deep learning framework that boosted the diagnostic yield for rare diseases from 55% to 82%. The University of Milan in Italy showcased an interpretable and unbiased AI-driven clinical decision-support system. The University of Barcelona in Spain unveiled a wearable device capable of providing a 48-hour early warning for acute exacerbations of Chronic Obstructive Pulmonary Disease (COPD). Sultan Qaboos University in Oman launched a low-cost, edge-AI-based health monitoring system tailored for rural settings, achieving a triage accuracy rate of 91%. Meanwhile, Kyoto University in Japan presented an AI-assisted robotic surgery training system that accelerated the rate of skill acquisition among physicians by 35%. Roundtable discussions focused on critical issues such as data privacy, barriers to clinical implementation, and the global health divide. The symposium issued a call for increased support for health technologies in resource-constrained environments, aiming to ensure that the benefits of advancements in life sciences reach every individual. The next ISLSIH symposium is scheduled to take place in Melbourne, Australia, in 2026. This review article, written for the inaugural issue of Advanced Interdisciplinary Science and Technology (AIST), provides a systematic framework for understanding, evaluating, and practicing genuine interdisciplinarity. It distinguishes multidisciplinary adjacency, cross-disciplinary collaboration, and true interdisciplinary synthesis, then formalizes the core principles of knowledge integration across disparate fields. The review synthesizes insights from philosophy of science, complex systems theory, empirical studies of high-performing convergent teams, and frontier domains such as AI-driven discovery, nano-biotechnology,

and climate-systems modeling. Key contributions include: (1) the concept of translational literacy as a core competency; (2) methodological protocols for cross-domain data fusion under divergent uncertainty conventions; (3) design principles for bio-inspired nanomaterials that unify surface chemistry, protein engineering, and systems biology; and (4) institutional conditions that enable genuine synthesis. The review concludes with a baseline agenda for evaluating progress in interdisciplinary science and a set of irreducible research questions that demand simultaneous engagement across nanoscale fabrication, physiological modeling, and ethical risk assessment.

Keywords: Interdisciplinary synthesis; translational literacy; knowledge integration; convergent research; AI-driven discovery; nano-biotechnology; team science

ISLSIH 2025; Life Sciences and Holistic Health; Paris Conference; Artificial Intelligence and Future Medicine; Five Major Frontier Research Directions; Genomics and Multi-omics Integration; Clinical Ethics and Explainable AI; Wearable Sensing and Chronic Disease Management; Rural Health Monitoring and Edge AI; Robotic Surgery Training; OmniHealthNet (Multi-omics Deep Learning Framework); Explainable Hybrid Models (Knowledge Graphs + Neural Networks); Edge Computing and Real-time Early Warning Systems; Low-cost Offline AI Diagnostics; AI-driven Skill Assessment and Feedback Systems; Data Sharing and Privacy Protection; Algorithmic Fairness and Bias Mitigation; Clinical Implementation and Real-World Validation; Bridging the Global Health Technology Divide; Adaptation for Low-Resource Environments

Paris, December 17, 2025 — From December 15 to 17, 2025, the International Symposium on Life Sciences and Intelligent Health (ISLSIH 2025) was successfully held at the International Conference Center on the banks of the Seine River in Paris, France. Centered on the core theme of "Life Sciences and Intelligent Health," the symposium brought together over one hundred in-person attendees from countries including France, Italy, Spain, Oman, and Japan for three days of in-depth dialogue regarding the profound integration of cutting-edge life science technologies and global holistic health strategies. The conference served as a focal point for presenting original research findings across five key domains: genomics, clinical ethics, wearable sensing, rural health monitoring, and robotic surgery training; five selected papers were officially compiled into the conference proceedings. Participating experts reached a consensus that life science-driven holistic health practices are rapidly accelerating their transition from the laboratory to the real world—moving beyond mere technological breakthroughs toward the realization of human-centric health values.

Following the conference opening, Dr. Élise Moreau from the Pasteur Institute in France delivered the inaugural keynote speech titled "Genomic Data Integration and Health Intelligence." She pointed out that, despite the considerable maturity of whole-exome sequencing technology, more than half of rare disease patients worldwide still lack a definitive diagnosis. The root of this issue, she argued, lies not in the sequencing process itself, but in the severe lag in the capacity to integrate multi-omics life science data. The vast volumes of information derived from genomics, transcriptomics, epigenomics, and other fields often exist in isolation, resulting in the burial of numerous potential diagnostic clues. The "OmniHealthNet" multi-omics deep learning framework, developed by Dr. Moreau's team, employs multi-modal variational autoencoders and attention mechanisms to map disparate omics datasets into a unified space for integrated analysis. Validated through a multi-center cohort study in France, this framework successfully raised the diagnostic yield for rare diseases from 55% to 82%, while simultaneously achieving a significant reduction in unnecessary ancillary diagnostic tests. Dr. Moreau emphasized that this system is not intended to replace clinicians, but rather to serve as an intelligent assistant for interpreting biological data—empowering physicians to rapidly pinpoint critical targets for health interventions amidst complex biological information. Dr. Luca Bianchi from the University of Milan, Italy, focused on the ethical challenges inherent in clinical decision-making, presenting a report on the application of explainable artificial intelligence (XAI) within the life sciences and healthcare sectors. He noted that while many AI diagnostic models boast high accuracy, they often lack interpretability—a deficiency that is unacceptable in clinical decisions involving patient safety. Dr. Bianchi's team proposed a hybrid model that combines reasoning based on life science knowledge graphs with lightweight neural networks. This model generates natural-language explanations alongside its predictive outputs, explicitly identifying which biological features played a pivotal role, the strength of their association with a specific disease, and the corresponding confidence intervals. Furthermore, the team developed an ethical evaluation framework encompassing four key dimensions: fairness, traceability, privacy protection, and algorithmic bias. In a pilot study conducted across three Italian hospitals, the system provided decision support for 1,200 patients without exhibiting any detectable algorithmic bias; predictive accuracy rates varied by less

than 2% across patients of different genders, ages, and socioeconomic backgrounds. Dr. Bianchi concluded that the convergence of life sciences and comprehensive healthcare must be firmly grounded in the principles of trust and fairness.

Dr. Sofia Ramirez from the University of Barcelona, Spain, used Chronic Obstructive Pulmonary Disease (COPD) as a case study to demonstrate a multimodal wearable sensing system designed for chronic disease management. COPD ranks among the leading causes of death globally, with acute exacerbations serving as the primary driver of hospitalizations and fatalities. Dr. Ramirez's team integrated four sensors—measuring heart rate, blood oxygen levels, acceleration, and skin conductance—into a lightweight wristband. The device runs lightweight deep learning models locally to process data in real time, sending alerts to physicians only when abnormal patterns are detected. This edge computing architecture serves the dual purpose of safeguarding patient privacy while simultaneously reducing the data transmission load. In a six-month clinical trial involving 120 COPD patients wearing the device, the system successfully issued early warnings an average of 48 hours prior to the onset of acute exacerbations, achieving an F1 score of 0.89. One 67-year-old male patient, having received timely oral corticosteroid treatment following a system alert, successfully avoided hospitalization. Dr. Ramirez emphasized that the true value of life sciences lies not merely in deciphering disease mechanisms, but—through the application of intelligent sensing technologies—in facilitating a transformative shift within the healthcare paradigm: moving from a focus on "treatment" to one on "prevention." Dr. Amina Al-Farsi from Sultan Qaboos University in Oman has turned her attention to the billions of people worldwide living in regions with scarce medical resources, presenting a smart health monitoring system designed for rural communities. These regions often lack stable electricity and high-speed internet connectivity, rendering traditional telemedicine solutions unworkable. Dr. Al-Farsi's team designed a low-cost, low-power edge AI health system centered around a modified, inexpensive smartphone and a portable multi-parameter sensor capable of measuring blood pressure, heart rate, body temperature, and blood oxygen levels. All AI models run locally on the smartphone, requiring no internet connection. After undergoing simple training, community health workers can collect vital signs data from villagers; the system then provides real-time triage recommendations—suggesting whether the patient should remain at the village health post for observation, be referred to a township health center, or be urgently transported to a county-level hospital. During field deployments in rural Oman, the system achieved a preliminary triage accuracy rate of 91% for common infectious diseases and chronic conditions (such as hypertension, diabetes, and respiratory infections), with a cost of less than \$0.50 per use. In one instance, an elderly woman—who had not had her blood pressure checked for three years due to transportation difficulties—was found to have a dangerously high blood pressure reading of 190 mmHg; the system issued an urgent referral recommendation, successfully averting a potential stroke. Dr. Al-Farsi states that the core principle of "Big Health" is "leaving no one behind," and that the greatest application of artificial intelligence lies not in merely adding "icing to the cake" in top-tier hospitals, but rather in providing critical assistance where it is needed most.

Dr. Kenji Tanaka from Kyoto University in Japan focuses on surgical training—a critical component of life science practice. He notes that while robot-assisted surgery is becoming increasingly prevalent, training remains heavily reliant on one-on-one guidance from experienced mentors—a process that is inefficient, costly, and difficult to standardize. Dr. Tanaka's team has developed an AI-driven evaluation system for robotic surgical training. This system automatically analyzes operational logs from surgical robots—including tool trajectories, force feedback data, and task completion times—alongside synchronized video footage. By doing so, it identifies the trainee's technical proficiency and common error patterns, providing personalized, real-time feedback. The system deconstructs an expert surgeon's performance into a series of quantifiable action units, then compares them frame-by-frame against the novice's performance to pinpoint precisely where errors occurred. In a randomized controlled trial involving 40 surgical residents, the group receiving AI-assisted training demonstrated a 35% faster rate of skill improvement compared to the control group, which received traditional mentor-guided instruction; notably, there was no significant difference in procedural quality between the two groups during the final assessment. Tanaka envisioned a future in which every surgical resident would have access to a 24/7 online AI tutor—a development poised to fundamentally transform the talent cultivation model within the life sciences sector.

During the subsequent roundtable discussion, participating experts engaged in an in-depth dialogue centered on "The Next Decade of Convergence between Life Sciences and Intelligent Health." Three core themes recurred throughout the discussion: balancing data sharing with biological privacy, overcoming barriers to translating research findings into practical healthcare systems, and bridging the global health divide. Dr. Moreau pointed out that the success of multi-omics integration frameworks hinges on large-scale, high-quality datasets; however, the security of patients' biological data constitutes an inviolable red line, making federated learning and differential privacy potential pathways for resolution. Dr. Ramirez candidly acknowledged that while wearable devices have performed well in clinical trials, their transition into real-world settings faces significant hurdles—specifically regarding patient compliance, device durability, and data quality—which can substantially impact overall system performance. Dr. Tanaka likewise conceded that migrating AI-driven surgical training systems from research environments to actual teaching hospitals requires overcoming a multitude of challenges, including hospital information system integration, data standardization, and physician acceptance. Dr. Al-Farsi's remarks resonated most deeply with the audience: she noted that current AI health research remains heavily concentrated in North America, Europe, and a handful of developed nations in East Asia, while the low-income countries that stand to benefit most from such technology are effectively excluded from this wave of innovation. She called upon international academic organizations and funding agencies to establish dedicated programs supporting life science applications tailored to resource-constrained environments, rather than allowing all research efforts to chase only the most expensive and cutting-edge scenarios. This impassioned appeal was met with enthusiastic applause from the entire assembly.

The conference officially released the **Proceedings of the International Symposium on Life Sciences and Intelligent Health**. This volume compiles original papers that have undergone rigorous peer review and subsequent revision based on the discussions held during the symposium. Collectively, these papers outline a future vision for the convergence of life sciences and holistic health—a future characterized by high precision without being a "black box," personalization without elitism, and intelligence without dehumanization. In the preface to the proceedings, the volume's editor-in-chief stated that, collectively, these papers address the most pressing question facing the field today: how to translate breakthroughs in the life sciences into tangible health and well-being accessible to every individual. The electronic edition of the proceedings will be made available via open access on the official ISLSIH website starting December 25, 2025, allowing researchers and clinicians worldwide to download and utilize the content free of charge.

During the closing ceremony, the Chair of the ISLSIH 2025 Organizing Committee delivered the concluding remarks. He noted that while the progress of artificial intelligence in the life sciences and healthcare sectors over the past few years has been exhilarating, it has also been accompanied by issues of excessive hype and inflated expectations. The greatest value of this conference, he observed, lay in the fact that none of the presenters shied away from the real challenges confronting AI in healthcare—specifically, interpretability, equity, privacy protection, clinical implementation, and global health disparities. These challenges are not mere technical details; rather, they represent the core propositions that will determine whether the life sciences can truly benefit the health of all humanity. He extended special thanks to all participants hailing from diverse nations and disciplinary backgrounds, emphasizing that it was precisely this cross-disciplinary intellectual exchange that generated a collective wisdom transcending the scope of any single paper. He announced that the next ISLSIH symposium is scheduled to take place in Melbourne, Australia, in 2026. The theme will focus on "Collaborative Decision-Making in Life Sciences and Comprehensive Health," and the event will invite increased participation from researchers in low-income countries to ensure that voices from both the Global South and the Global North are heard.

That evening, the conference drew to a close with a banquet held along the banks of the Seine. Researchers from around the world raised their glasses in celebration, exchanging insights gained over the past three days and discussing plans for future collaborations. Dr. Moreau and Dr. Al-Farsi agreed to explore the feasibility of adapting a genomic data integration framework for use in resource-constrained environments; Dr. Bianchi and Dr. Tanaka planned to launch a joint cross-cultural comparative study on the ethical dimensions of AI-assisted clinical decision-making and surgical training; meanwhile, Dr. Ramirez had already begun conceptualizing how to integrate the edge computing architecture from her COPD early-warning model with Dr. Al-Farsi's rural health monitoring system. These spontaneously formed collaborative intentions may well constitute the conference's most enduring legacy—not merely a collection of isolated papers, but a growing network of collaboration in the life sciences and comprehensive health, spanning both national borders and academic disciplines. Reflecting on the entire conference, a clear trend has emerged: the

convergence of life sciences and holistic health is undergoing a paradigm shift—moving from a "technology-centric" approach to one centered on "human health value." The focus is no longer solely on pursuing higher precision or lower error rates, but rather on asking: Can this technology be understood and trusted by physicians? Will it exacerbate existing healthcare disparities? Can it function effectively in rural areas with limited power and connectivity? Can it ensure that patients feel respected rather than merely defined by algorithms? These questions defy simple technical answers; yet, every presenter at ISLSIH 2025 offered a sincere response through the lens of their own research.

As Dr. Al-Farsi remarked at the conclusion of the roundtable discussion: "The pinnacle of technology is not to inspire awe, but to become invisible—allowing people to forget its very existence and simply experience the restoration of their health." This, perhaps, constitutes the ultimate objective of the convergence between life sciences and holistic health: not merely that a rural elder can finally measure their blood pressure right at their doorstep; that a child with a rare disease finally receives a definitive diagnosis; or that a patient with COPD is finally spared the late-night rush to the emergency room via ambulance. Setting out from Paris, these research findings will reach a wider global audience through open-access platforms and transnational collaborative networks, enabling more researchers, clinicians, and policymakers to engage with these cutting-edge ideas and practical experiences. As we look toward Melbourne in 2026, we have every reason to anticipate even more surprises. Yet, regardless of how technology continues to evolve, ISLSIH 2025 has already left an indelible mark: on the journey toward integrating life sciences and holistic health, scientific rigor and human warmth need never be mutually exclusive—they can, and indeed should, go hand in hand.