Organ regeneration and fibrosis sub-forum advances global solutions for fibrotic diseases

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GLOBAL CHALLENGE MEETS INNOVATIVE SOLUTIONS

The global burden of organ fibrosis—including that of the lung, liver, kidney, heart, pancreas, and skin—continues to rise and remains a leading cause of chronic organ failure, outpacing therapeutic progress (Figure 1). Fibrotic diseases contributed to approximately 35% of global deaths in 2019, highlighting their significant impact on mortality.[1] Impaired mechanisms of organ regeneration and repair are key drivers in the pathogenesis of injury-induced fibrosis. Enhancing regenerative capacity in fibrotic organs may therefore offer promising avenues for therapeutic intervention. Against this backdrop, the Organ Regeneration and Fibrosis Sub-Forum, held as part of The Innovation Conference in Changsha, China, July 13, 2025, convened global experts to explore cutting-edge strategies for reversing fibrosis and advancing organ

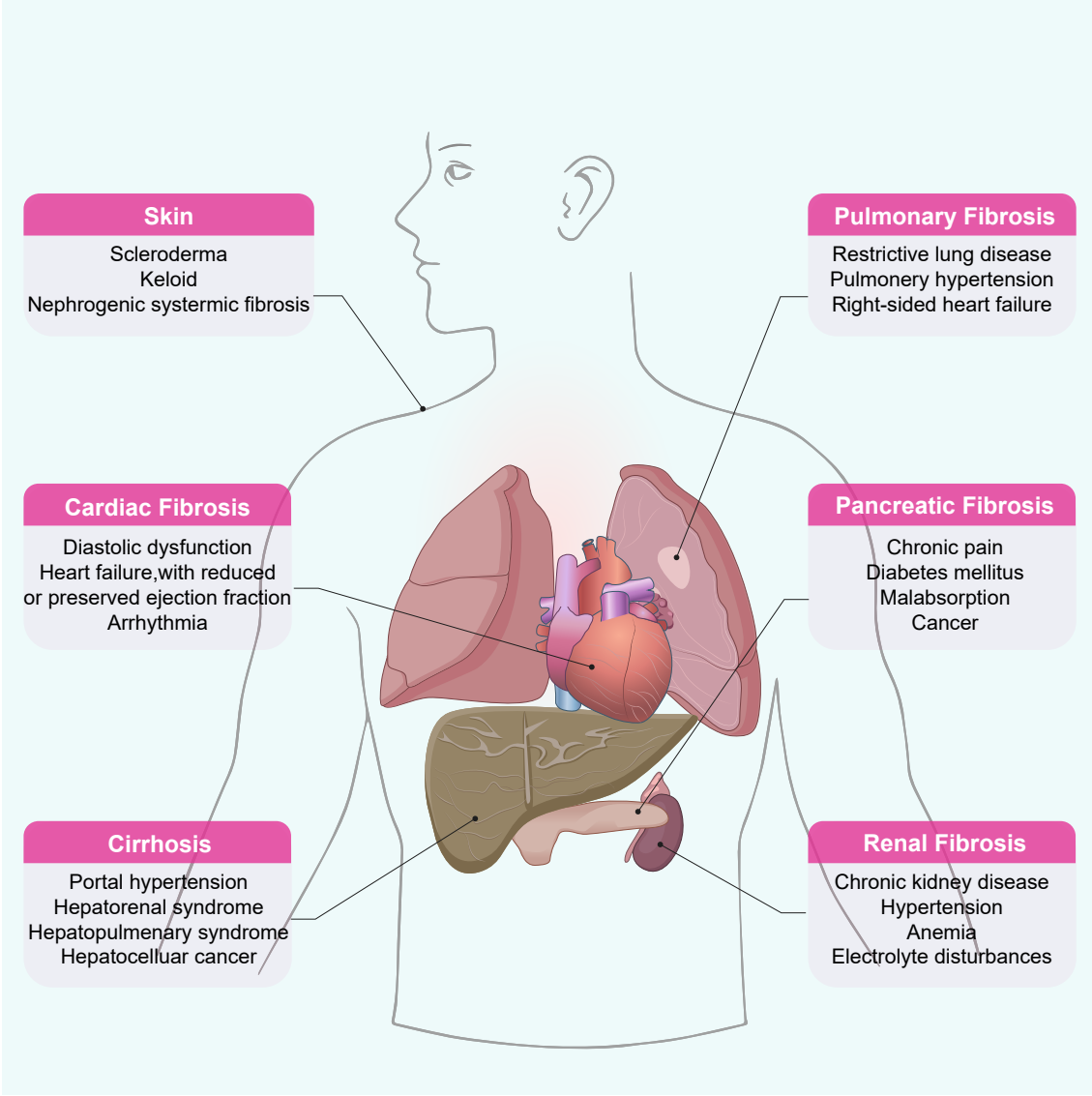

Figure 1. Schematic representation of fibrogenesis across major organ systems Fibrosis represents a pathological hallmark shared by nearly all organs, leading to diverse and frequently fatal outcomes, and contributing substantially to global morbidity and mortality. Representative organs and their associated fibrotic disorders are illustrated.

regeneration. Co-chaired by Professor Chunheng Mo (West China Second University Hospital) and Professor Chaxiang Guan (Central South University), the forum featured pioneering discussions on molecular mechanisms, stem cell therapies, and translational challenges, with participation from leading scientists including Professors Aiyuan Zhou, Zijie Wang, Suyu He, and Wei Zhao.

KEYNOTE INSIGHTS: FIBROSIS AS A POST-TRANSPLANTATION BARRIER

Professor Mo opened the forum by highlighting fibrosis as a critical hurdle in long-term organ transplant survival.[2] Professor Zijie Wang (Nanjing Medical University) underscored this challenge, noting that while liver and kidney transplant outcomes in Chinese centers have improved, progressive fibrosis limits graft functionality. He emphasized the need to decode the dynamic interplay between regeneration and fibrosis in transplanted organs. Professor Guan then posed a pivotal question: How is physiological "growth arrest" achieved during post-transplant liver regeneration? This sparked cross-disciplinary dialogue on balancing regenerative potential with fibrotic risks.

THERAPEUTIC FRONTIERS: FROM DRUG DEVELOPMENT TO STEM CELL INNOVATION

Professor Aiyuan Zhou (Xiangya Hospital) reviewed progress in antifibrotic therapies, noting that while FDA-approved drugs like pirfenidone and nintedanib offer limited benefits for pulmonary fibrosis, whereas next-generation agents such as Nerandomilast show promise.[3] Professor Suyu He (Suining Central Hospital) highlighted the paradox of organ transplantation—a life-saving yet supply-limited intervention—through a compelling case where a single donor's organs saved five recipients. She stressed the urgent need for pharmacologic solutions, particularly for infection-driven liver fibrosis. Meanwhile, Professor Wei Zhao (Chengdu Medical College) presented advances in mesenchymal stem cell (MSC) therapy, acknowledging translational hurdles while affirming the potential of stem cells to reverse fibrosis through targeted homing and microenvironment modulation.[4]

MULTIDISCIPLINARY SYNERGY: AI, BIOMECHANICS, AND BEYOND

The forum's latter half focused on systemic approaches to fibrosis. Dr. Ke Chen, co-founder of The Innovation, advocated for breaking disciplinary silos by integrating mathematical modeling, AI, and biomechanics with biomedical research. For example, AI-driven imaging analysis has been applied to improve the early diagnosis and progression monitoring of pulmonary fibrosis, enabling more precise patient stratification.[5] Similarly, mathematical modeling of fibrotic lung tissue has provided insights into extracellular matrix remodeling and mechanical stress distribution, offering predictive frameworks for therapy response. These cases illustrate how multidisciplinary approaches can accelerate translational innovation and inform the development of next-generation antifibrotic strategies. Attendees also discussed the role of cellular senescence in fibrosis, highlighting strategies that combine selective elimination of activated fibroblasts with microenvironmental reprogramming. They emphasized key translational challenges, including fibroblast subpopulation heterogeneity, the specificity of senescence markers, and the potential disruption of homeostatic extracellular matrix functions. These considerations point to the necessity of precise targeting and rigorous preclinical validation to ensure both efficacy and safety in next-generation antifibrotic therapies.

CONSENSUS AND FUTURE DIRECTIONS

This Organ Regeneration and Fibrosis Sub-Forum not only focused on addressing urgent clinical challenges but also looked ahead to future directions rooted in scientific frontiers and multidisciplinary convergence. Experts agreed that overcoming fibrosis demands deeper mechanistic insights and precision microenvironment engineering. At the same time, they highlighted key translational bottlenecks, including reproducibility challenges in preclinical models, interspecies differences, and obstacles in scaling stem cell and pharmacologic therapies for clinical application. With regenerative technologies and AI advancing rapidly, cross-disciplinary collaboration—spanning biology, engineering, and data science—is poised to drive breakthroughs in organ regeneration.

To facilitate translation, a prioritized roadmap was proposed: first, establish standardized experimental protocols and shared datasets to ensure model reproducibility; second, validate AI and computational models across multiple datasets to enhance predictive accuracy; and third, coordinate preclinical and early clinical studies to iteratively refine therapeutic strategies. Experts also emphasized the importance of ethical and regulatory frameworks, including rigorous ethical review, compliance with regulatory standards, and adherence to good clinical practice, particularly for stem cell therapies and AI-driven interventions. As Professor Mo concluded, "Bridging the gap between lab and clinic will transform fibrosis from a terminal diagnosis into a reversible condition," highlighting that scientific, translational, and ethical rigor must progress in parallel to realize next-generation antifibrotic therapies.

REFERENCES

1. Mutsaers H.A.M., Merrild C., Nørregaard R., et al. (2023). The impact of fibrotic diseases on global mortality from 1990 to 2019. *J. Transl. Med.* **21**:818. DOI:10.1186/s12967-023-04690-7
2. Hysi E., Baek J., Koven A., et al. (2025). A first-in-human study of quantitative ultrasound to assess transplant kidney fibrosis. *Nat. Med.* **31**:970–978. DOI:10.1038/s41591-024-03417-5
3. Zhou A., Lang Q., Zhao C., et al. (2025). Nerandomilast shatters decade-long stalemate in fibrotic lung diseases: FDA fast track insights. *Innov. Med.* **3**:100151. DOI:10.59717/j.xinn-med.2025.100151
4. Han M.M., He X.Y., Tang L., et al. (2023). Nanoengineered mesenchymal stem cell therapy for pulmonary fibrosis in young and aged mice. *Sci. Adv.* **9**:eadg5358. DOI:10.1126/sciadv.adg5358
5. Gompelmann D., Gysan M.R., Desbordes P., et al. (2025). AI-powered evaluation of lung function for diagnosis of interstitial lung disease. *Thorax* **80**:445–450. DOI:10.1136/thorax-2024-221537

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AUTHOR CONTRIBUTIONS

All authors conceived the original idea, wrote and reviewed the manuscript.

DECLARATION OF INTERESTS

The authors declare no competing interests.