3rd Seminar on Mechanical Science and Bioengineering
Graduate School of Engineering Science, Osaka University
Lecture Room A403
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BIOMECHANICS OF THE LUNG PARENCHYMA: ROLES OF COLLAGEN AND MECHANICAL FORCES IN HEALTH AND DISEASE

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The biomechanical properties of connective tissues play fundamental roles in how mechanical interactions of the body with its environment produce physical forces at the cellular level. The connective tissues are composed of cells and ECM that includes water and a variety of biological macromolecules. The macromolecules that are most important in determining the mechanical properties of these tissues are collagen, elastin and proteoglycans. Among these macromolecules, the most abundant and perhaps most critical for structural integrity is collagen. In this seminar, I will describe how mechanical forces affect the physiological functioning of the lung parenchyma with special emphasis on the role of collagen. First, I will overview the composition of the connective tissue of the lung and its complex structural organization. I will then describe how mechanical properties of the parenchyma arise from its composition as well as from the architectural organization of the connective tissue. Finally, I will overview the interactions between the parenchymal collagen network and cellular remodeling and speculate how mechanotransduction might contribute to disease propagation and the development of small and large scale heterogeneities with implications to impaired lung function in emphysema.