

HEMOGLOBIN OXYGEN AFFINITY, TISSUE OXYGENATION, AND ATHLETIC ABILITY

T. Shirasawa

Research Team for Molecular Biomarkers, Tokyo Metropolitan Institute of Gerontology, Itabashi-ku, Tokyo, Japan; sirasawa@tmig.or.jp

The oxygen affinity of hemoglobin is critical for gas exchange in the lung and oxygen delivery in peripheral tissues. In the present lecture, I will show the model mice that carry low affinity hemoglobin with the Titusville mutation in the alpha-globin gene or Presbyterian mutation in the beta-globin gene. The mutant mice showed increased O₂ consumption and CO₂ production in tissue metabolism, suggesting enhanced O₂ delivery by mutant Hbs. The histological study of muscle showed a phenotypical conversion from a fast glycolytic to fast oxidative fiber type. Surprisingly, mutant mice spontaneously ran twice as far as control mice despite mild anemia. The oxygen affinity of hemoglobin may control the basal level of erythropoiesis, tissue O₂ consumption, physical activity, and behavior in mice.