

# Real-Time Monitoring of the Regional Velocity, Distribution of Blood Flow, and Perfused Vessel for Sciatic Nerve and Foot Pads

## Background and Customer Needs

As an important kinase regulating energy homeostasis, AMPK is one of the central regulators of eukaryotic cell and organism metabolism, responsible for regulating the input and output of cell capacity and maintaining the smooth operation of cell physiological activities. AMPK is also a key protein involved in multiple signaling pathways. Once activated, AMPK mainly regulates four major categories of metabolism in mammals: protein metabolism, lipid metabolism, carbohydrate metabolism, autophagy, and mitochondrial homeostasis, almost covering the entire physiological metabolic activities of living organisms.

AMP-activated protein kinase (AMPK) senses oxidative stress and mitochondrial function playing a central role in the regulation of Diabetic peripheral neuropathy (DPN).

DW14006 as a direct AMPK $\alpha$  activator efficiently ameliorated DPN in both streptozotocin (STZ)-induced type 1 and BKS db/db type 2 diabetic mice.

## The Demand for the Research

The real-time regional velocity and distribution of blood flow and perfused blood vessels of the sciatic nerve and foot pads need to be detected.

Along with Western blot results, figure out the signaling pathway from DW14006-AMPK-NAD<sup>+</sup>-SIRT1-PGC1-Mito biogenesis Oxidative metabolism to Diabetic Neuropathy.

## How was the System Used

The [RFLSI III Laser Speckle Imaging System](#) captures the images of regional blood flow and perfusion ratio in the sciatic nerve and foot pad tissues of diabetic peripheral neuropathy mice. All perfusion data could be normalized as mean  $\pm$  SEM.

## Results and Effects

- DW14006 promoted neurite outgrowth of DRG neuron by activating AMPK $\alpha$
- DW14006 treatment improved the neurological functions of diabetic mice by activating AMPK $\alpha$
- DW14006 treatment improved vascular function in peripheral nerve tissue of diabetic mice by activating AMPK $\alpha$
- DW14006 ameliorated mitochondrial function of DRG neuron from diabetic mice by upregulating AMPK $\alpha$ /SIRT1/PGC-1 $\alpha$  pathway and mitochondrial complexes I and IV expressions
- DW14006 downregulated Akt/mTOR pathway in DRG tissue from diabetic mice
- DW14006 reduced oxidative stress in diabetic mice by activating AMPK $\alpha$ /Nrf2 pathway
- DW14006 suppressed inflammation in diabetic mice through AMPK $\alpha$ /NF- $\kappa$ B signaling
- Animal agent: Male C57BL/6J mice  
Journal: Diabetes

