

**Significance Statement**

In the current study, the authors validate for the first time that Mst1 inhibition reduced ROS production, increased antioxidant enzyme SOD1/2, CAT, GPx expression, maintained ΔΨm, and alleviated cell apoptosis in H2O2-treated BM-MSCs. In addition, this phenomenon was closely correlated with the autophagy/Keap1/Nrf2 signal pathway. The autophagy inhibitor, the antioxidant pathway Keap1/Nrf2, was also blocked when autophagy was inhibited by 3-MA. However, Keap1 or Nrf2 knockout via siRNA had no effect on autophagy activation or suppression. These findings present the efficient protective capacity of transplanted MSCs in PAH.