Obesity is documented to be a state of chronic mild inflammation associated with increased macrophage infiltration into adipose tissue and liver and skeletal muscle. As a pleiotropic inflammatory mediator, macrophage migration inhibitory factor (MIF) is associated with metabolic disease, so MIF may signal molecular links between adipocytes and myocytes. MIF expression was modified during myoblast differentiation, but the role of MIF during this process is unclear. C2C12 cells were transfected with MIF to investigate their role during differentiation. MIF expression attenuated C2C12 differentiation. It did not change proliferation, but downregulated cyclin D1 and CDK4, causing cell accumulation in the G1 phase. p21 protein was increased significantly and MyoD, MyoG, and p21 mRNA also increased significantly in the C2C12 cells treated with ISO-1, suggesting that inhibition of MIF promotes differentiation. MIF inhibits the myoblast differentiation by affecting the cell cycle progression, but does not affect proliferation.

Effects of MIF on C2C12 cell proliferation and the cell cycle showed that MIF inhibits myogenic differentiation via interference with cell cycle progression.