TRPV1 activation impedes VSMC foam cell formation by inducing autophagy

With the support by the National Natural Science Foundation of China, Prof. Li Jingcheng and colleagues from the Third Military University reported their research findings in an article "TRPV1 activation impedes foam cell formation by inducing autophagy in oxLDL-treated vascular smooth muscle cells" in *Cell Death Dis* (2014, 5: e1182).

Foam cells formation is the key early event in atherosclerosis. Vascular smooth muscle cells (VSMCs) are the major resource of foam cells in advanced atherosclerosis lesions. Fully elucidating the mechanisms underlying VSMC foam cell formation would be helpful for the prevention and treatment of atherosclerosis. The present study was to investigate the potential role of autophagy in VSMC foam cell formation, as well as the potential effect of transient receptor potential vanilloid subfamily 1 (TRPV1) on autophagy during VSMC foam cell formation induced by oxidized low-density lipoprotein (oxLDL).

In this study, rapamycin (Rap, an inducer of autophagy) inhibited the VSMC foam cell formation, whereas 3-methyladenine (3-MA, an inhibitor of autophagy) exerted the opposite effect (Figure A). In the VSMCs transfected with control siRNA, the activation of TRPV1 by capsaicin significantly induced autophagy, which was then manifested by increased LC3-II/LC3-I ratio (Figure B), and inhibited VSMC foam cell formation, which was later manifested by decreased lipid droplets accumulation (Figure C). On the contrary, in the Atg7 knocked-down VSMCs, the activation of TRPV1 by capsaicin failed to impede the oxLDL-induced lipid accumulation, accompanied by an unchanged LC3-II/LC3-I ratio. Thus, our study reveals a novel pathological role of autophagy in VSMC foam cell formation and highlights TRPV1 as a promising therapeutic target in atherosclerosis.

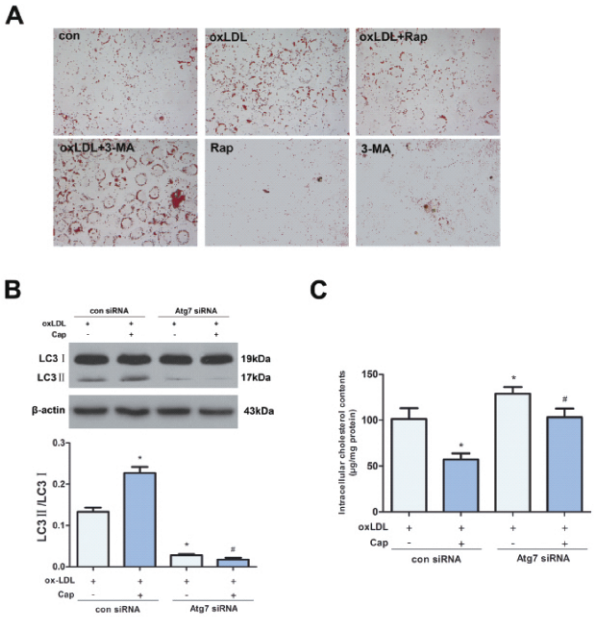

Figure A, Primary VSMCs were treated with either the vehicle solution (con) or oxLDL (80 μg/mL) in the absence or presence of rapamycin (Rap; 10 nM) and 3-methyladenine (3-MA; 5 mM) as indicated for 24 h. Rap reduced whereas 3-MA increased lipid droplet accumulation; B and C, Capsaicin (Cap) significantly increased the LC3-II/LC3-I ratio, and decreased lipid droplets accumulation in VSMCs transfected with con siRNA, whereas no alteration was shown in VSMCs transfected with Atg7 siRNA.