

Effect of Ultrafine Nano-Zinc Particles on Cardiac Structure and Function in Myocardial Infarction Rabbits

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Abstract: Due to ultrafine Nano-zinc particles are major component of PM_{0.1}, so we aimed to investigate how ultrafine Nano-zinc particles effect on cardiac structure and function in myocardial infarction (MI) rabbits. We chose twenty-four New Zealand rabbits who were divided into sham group, MI group and MI exposure group randomly, 8 rabbits in each group. We preformed LAD ligation operation in MI group and MI exposure group. After two weeks rabbits suffered from MI successfully, we put the MI exposure group into ventilation chamber filled with 500 ug/m³ ultrafine Nano-zinc particles for 6 hours per day. Sham group and MI group were raised in normal environment. Four weeks later, the heart function was detected using vevo2100 machine and all rabbits sacrificed, because we need to collect blood sample and heart tissue. According to echocardiography measurements, we found EF and FS both in MI group and MI exposure group decreased significantly, especially MI exposure group had severe decrease compared with MI group. In addition, left ventricular end-diastolic pressure (LVEDP) in MI exposure group increased obviously and LV +dp/dt max decreased significant. Both the formers in MI group changed to a lesser degree. HE staining results showed myocytes disorganization and LV wall thinning in MI and MI exposure groups. Masson trichrome staining showed that MI exposure group had maximum collagen. In summary, inhalation of ultrafine Nano-zinc particles indeed is harmful for MI rabbits. Moreover, ultrafine Nano-zinc particles can effect on myocardial systolic and diastolic function, thus promote the development from MI to heart failure.

Keywords: Ultrafine nano-zinc particles, myocardial infraction, systolic function, diastolic function.

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