Skin immunization by microneedle patch overcomes statin-induced suppression of flu vaccine response in mice

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Statin therapy is prescribed for 20 percent of the US population over the age of 40 and nearly 50 percent of the population over 75 years old to reduce the risk of cardiovascular disease by lowering blood cholesterol levels. Although statins have become a common treatment for elderly individuals at risk of coronary disease, the impact of statin use on immune responses to vaccines has been given little attention.

Recent studies have found that in elderly individuals, statin therapy is associated with a reduced response to influenza vaccination. Higher rates of influenza-related respiratory illness have also been reported in vaccinated statin-users compared to vaccinated non-users. This information is concerning because the aged population is already at high risk for morbidity and mortality caused by influenza, due in part to immunosenescence, or diminishing effectiveness of the immune system over time. Thus, finding a way to overcome statin-induced suppression of immune response to vaccination in older individuals is an important goal.

A new study published in *Scientific Reports* and led by Elena Vassilieva, Ph.D., and Richard Compans, Ph.D., at Emory University School of Medicine used a mouse model to investigate the effect of statin treatment on immune responses to influenza vaccination. They observed that long-term statin therapy in aged mice reduced the immune response when influenza vaccine was administered using a standard hypodermic

needle. However, the response was enhanced up to 20-fold if vaccine was administered through the skin using dissolving microneedles, a technology developed by Mark Prausnitz, Ph.D., and colleagues at Georgia Tech.

The skin immunization induces a stronger immune response compared to the traditional injection with a needle. The microneedles are made of a dissolving polymer incorporating the vaccine, delivering it to the body through skin cells, rather than being injected into the muscle. Earlier this year, a successful human Phase I clinical trial was conducted in which the seasonal influenza vaccine was administered using microneedle patches. The present study indicates that the microneedle patch technology can be useful as an approach to counteract statin-induced immune suppression in the aging population.

More information: Elena V. Vassilieva et al. Skin immunization by microneedle patch overcomes statin-induced suppression of immune responses to influenza vaccine, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-18140-0

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