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# THE JOURNAL OF Pathology

The Journal of  
The Pathological Society  
*Understanding Disease*

Original Paper

Age-related susceptibility to *Streptococcus pyogenes* infection in mice: underlying immune dysfunction and strategy to enhance immunity

Oliver Goldmann, Sabine Lehne, Eva Medina\*

Article first published online: 17 NOV 2009  
DOI: 10.1002/path.2664

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## Abstract

Epidemiological studies have shown that the elderly are at higher risk of severe *Streptococcus pyogenes* infections. In this study, we used a mouse model that displays the age-related loss of resistance to *S. pyogenes* infection seen in humans to investigate the impaired immune mechanism underlying the age-associated susceptibility to this pathogen. Young (2–3 months old) and aged (>20 months old) BALB/c mice

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were subcutaneously or intravenously inoculated with *S. pyogenes* and their capacity to control infection was compared. **Aged mice showed faster progression of disease, earlier morbidity, and increased mortality when compared with young animals.** Since **macrophages** are critical for host defence against *S. pyogenes*, we investigated whether susceptibility of **aged mice may be due to an age-associated decline in the functionality of these cells.** Our results showed that macrophages from aged mice were as capable as those from young animals to uptake and kill *S. pyogenes*, but the number of **resident tissue macrophages was significantly reduced in the aged host.** Treatment of aged mice with **macrophage colony-stimulating factor (M-CSF)** significantly increased the number of resident macrophages and improved their **response to infection.** Our results indicate that treatment with **M-CSF** can restore, at least in part, the mechanisms affected by immunosenescence and enhance the natural resistance of aged mice to infection with *S. pyogenes*. Copyright © 2009 Pathological Society of Great Britain and Ireland. Published by John Wiley & Sons, Ltd.

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