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Study provides insight into aging immune systems

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A study featured on the cover of the March 15 *Journal of Immunology* is providing insight into why the elderly are so vulnerable to pneumonia and other bacterial infections.

Compared with younger adults, the elderly are at higher risk of becoming seriously ill or dying from pneumonia. Moreover, vaccines against the disease are less effective in the elderly.

To help understand why, Loyola researchers examined two types of immune system cells, macrophages and B cells, located in specialized areas in the spleens of mice. (Macrophages gobble up bacteria, while B cells produce antibodies that fight bacteria.)

Macrophages and B cells appeared to be just as effective in old mice as they were in younger mice. But there were fewer of them.

"If we knew how to replenish these cells, we might be able to lower the risk of bacterial infections in the elderly," said senior author Pamela Witte, a professor in the Department of Microbiology and Immunology at Loyola University Chicago Stritch School of Medicine. "This is an unexplored area in aging."

The finding also could provide clues to developing vaccines against pneumococcal pneumonia that would be more effective in the elderly, said first author Shirin Birjandi, who is completing her PhD at Loyola.

For example, Birjandi said, current vaccines instruct B cells to make antibodies against bacteria that cause pneumonia. But if humans are like mice, the elderly will have fewer B cells. So it might make more sense to develop vaccines that instead target other immune system cells, Birjandi said.

In their study, Loyola researchers examined B cells and macrophages that form microscopic rings in the spleen called marginal zones. These marginal zones form protective rings, preventing bacteria from passing through.

Photographs taken by the researchers show that in the spleens of young mice, macrophages form distinct rings in the marginal zones. (One of these photos appears on the cover of the Journal of Immunology.) In old mice, however, the photographs show that marginal zone rings are dramatically disrupted. (In humans, the equivalent ages of the old mice would be between 70 and 80.)

Researchers wrote that understanding changes such as these "is important for developing more efficient therapies for preventing diseases, such as bacterial pneumonia, that have shown to be highly detrimental in the elderly."

Provided by Loyola University Health System