



Title of Research:

21-2-01 Development of evaluation method of inflammatory particles based on alveolar macrophage function.

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Summary of Research:

The number of patients with allergic diseases have increased in developed countries, and it is suggested that particulate pollution such as PM_{2.5} might be one of factors of exacerbation of allergic inflammation. These particulates function as adjuvant and induce allergic immune responses. In general, inhaled particles are thought to be engulfed by alveolar macrophages and then excreted. Therefore, in this study we aim to develop methods of evaluation of inflammatory particles focusing on alveolar macrophage functions in response to particles. In addition, animal-free toxicity testing is recommended in these days, so we also aim to develop in vitro evaluation methods using alveolar macrophage cell lines which is useful tools for detecting inflammatory particles.

Freshly isolated alveolar macrophages were immortalized by SV40 large T gene transfer using lentiviral vector system, and then cultured with GM-CSF and PPAR- γ agonist to maintain their characteristics of alveolar macrophage. After screening of obtained cells, and we established alveolar macrophage cell line, ALV-3. The same as primary alveolar macrophages, ALV-3 cells responded to inflammatory particles and induced cell death and subsequently IL-1 α release. Furthermore, ALV-3 cells expressed Siglec F and CD11c antigens, which are unique antigens for alveolar macrophages, on their surface. MH-S cells, which are commercially available alveolar macrophage cell line, did not expressed Siglec F antigen and did not induce IL-1 α release in response to inflammatory particles. These results suggest that ALV-3 cells might be useful cell line to evaluate inflammatory particles, as an alternative in vitro method to animal testing. Now we are further investigating the characteristics of ALV-3 cells, as alternative to primary alveolar macrophages.

Timeline:

March 1, 2022—February 28, 2023

Topics:

Research meeting of LRI by JCIA, oral, “Development of evaluation method of inflammatory particles based on alveolar macrophage function”, online, August 26, 2022.

Publications:

Kuroda Etsushi “Analysis of alveolar macrophage functions in response to fine particles” The 127th Annual meeting of the Japanese Association of Anatomists, Online Symposium, 2022, March 28.

Kuroda Etsushi “DAMPs release and allergic airway inflammation caused by inhaled fine particles” SOT 61st Annual Meeting, Online Symposium, 2022, March 29.