

[H27-3]

特発性肺線維症患者の肺組織中元素解析の検討

Elemental Analysis of the Lungs in Patients with Idiopathic Pulmonary Fibrosis

古賀康彦^{A)}、佐藤隆博^{B)}、解良恭一^{C)}、江夏昌志^{B)}、久田剛志^{A)}、土橋邦生^{#,D)}、
Yasuhiko Koga^{A)}、Takahiro Satoh^{B)}、Kyoichi Kaira^{C)}、Masashi Koka^{D)}、Tsuyoshi Hisada^{A)}、Kunio Dobashi^{E)}

^{A)}Department of Allergy and Respiratory Medicine, Gunma University Graduate School of Medicine

^{B)}Takasaki Advanced Radiation Research Institute, Japan Atomic Energy Agency

^{C)}Department of Oncology Clinical Development, Gunma University Graduate School of Medicine

^{D)}Beam Operation Co., Ltd.

^{E)}Jobu Respiratory Hospital Inter-University Laboratory for the Common Use of Nuclear Facilities

Abstract

It has been well known that inhalation of asbestos can be a risk factor of interstitial pneumonia. The relationship between inhalation of elements and interstitial pneumonias still remains unknown. Any biomarkers indicating prognosis of interstitial pneumonia has not been established yet. In this study, we focused on idiopathic pulmonary fibrosis (IPF) showing usual interstitial pneumonia in the histology and examined the inhaled elements in the lung by in-air micro particle-induced X-ray emission analysis (in-air micro PIXE). The relationship between contents of elements in the lung and the progression of IPF were analyzed. In-air micro PIXE detected various elements in the lung. Among them, inhaled silica/silicates were correlated with annual declined forced vital capacity and diffusing capacity for carbon monoxide. Other elements detected by in-air micro PIXE did not show any association of the progression of IPF. These results indicate that accumulated silica/silicates in the lung are associated with the progression of IPF. This study showed that in-air micro PIXE can detect small amount of inhaled elements in the lung and is useful for the analysis of progression in IPF patients.

Keyword: idiopathic pulmonary fibrosis, PIXE

1. 背景

微量な肺組織を用いた元素分布の測定が可能な大気マイクロ PIXE (Particle Induced X-ray Emission) の手法を用いて我々は肺と縦隔リンパ節における元素濃度の検討を行ってきた^[1]。この手法を用いて本研究では、特発性肺線維症を対象とした肺組織中の元素解析を行い、肺組織中の元素濃度と特発性肺線維症の進行度との関連性を検討した。

2. 方法

肺組織検体のパラフィン切片にイオンマイクロビームを照射し、パラフィン切片内の元素分布を測定した。対象検体は、胸腔鏡下肺生検で病理学的に usual interstitial pneumonia pattern を呈している特発性肺線維症とした。

3. 結果

大気マイクロ PIXE 分析により、肺組織中の Al, Mg, Si, S, P, Ca, Fe, Zn を検出した。肺組織中のシリカと特発性肺線維症の肺機能の変化との間に有意な相関関係を認めた。その他の肺組織中元素と肺機能の推移との間には相関関係は認められなかった (Figure 1)。

4. 考察

大気マイクロ PIXE によって検出された肺組織中の微量のシリカが、特発性肺線維症の進行度と相関関係があることが示された。

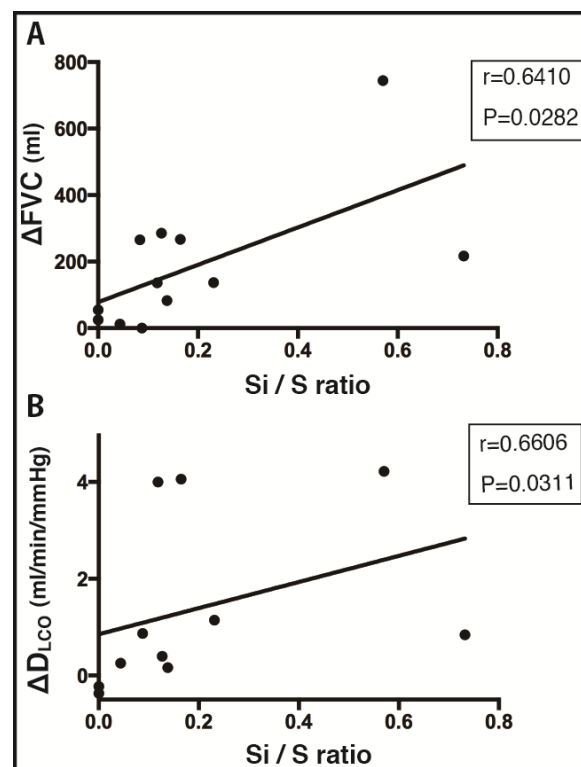


Figure 1. Relationship between annual declined pulmonary functions and accumulated silica/silicates in the lung. Accumulation of silica/silicates in the lung

[H27-3]

significantly correlated with both annual declined forced vital capacity (A) and diffusing capacity for carbon monoxide (D_{LCO}) (B).

参考文献

- [1] Y.Koga, T.Satoh, M.Koka, K.Dobashi et al. Elemental and immunohistochemical analysis of the lungs and hilar lymph node in a patient with asbestos exposure, a pilot study. *Environ Health Prev Med.* 21(6):492-500. 2016