

Development of artificial lung surfactant

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1994 Fiscal Year Final Research Report Summary

Development of artificial lung surfactant

Research Project

Project/Area Number

05671254

Research Category

Grant-in-Aid for General Scientific Research (C)

Allocation Type

Single-year Grants

Research Field

Anesthesiology/Resuscitation studies

Research Institution

Kanazawa University

Principal Investigator

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Project Period (FY)

1993 - 1994

Keywords

lung surfactant / phosphatidylcholine / surfactant protein / immature rabbit / static lung volume / tidal volume / inhalation therapy / adult respiratory distress syndrome

Research Abstract

1. Development of artificial surfactant

A) Investigation for the best composition of lipids (1993) : Activity of several reconstituted surfactants that consisted of synthetic dipalmitoylphosphatidylcholine (DPPC) , phosphatidylglycerol (PG) and dioleoylphosphatidylcholine (DOPC) with different ratios plus surfactant-associated proteins-B and-C (SP-B and SP-C) was evaluated in immature rabbits. The surfactant composed of DPPC : PG : DOPC at a ratio of 60 : 20

: 20 showed the best activity.

B) Investigation for the best composition of proteins (1994) : Activity of several reconstituted surfactants that consisted of isolated lipids from lung plus different doses of SP-B and SP-C were evaluated in immature rabbits. The surfactant containing SP-B at 0.7% and SP-C at 1.4% improved the static pressure-volume relationship of the lung at the best, but the tidal volume was not completely normalized. Further studies are necessary for method to combine lipids and proteins.

2. Treatment of adult respiratory distress syndrome (ARDS) with surfactant

A) Intratracheal instillation method (1993) . Instillation of surfactant suspension (50 mg/ml, 2 ml/kg) into the trachea of rats with ARDS that induced by endotoxin (50 mg/kg) improved the arterial oxygen pressure (PaO₂) from 85 mmHg to 345 mmHg (P<0.05) , but caused hypotension.

B) Administration of surfactant by inhalation (1994) : Inhalation of surfactant aerosol improved the PaO₂ of ARDS rats from 84 mmHg to 243 mmHg (P<0.05) without causing hypotension.

Comments and conclusions

The present results suggest that inhalation of aerosolized surfactant can apply for treatment of clinical ARDS. We should make haste to develop an effective artificial surfactant.

Research Products (14 results)

All Other

All Publications (14 results)

[Publications] Li,Wen-Zhi: "Aerosolized surfactant reverses respiratory failure in lung lavaged rats" Acta Anaesthesiologica Scandinavica. 38. 82-88 (1994) ▼

[Publications] Nitta,Keiko: "Impairment of surfactant activity and ventilation by proteins in lung edema fluid" Respiration Physiology. 95. 43-51 (1994) ▼

[Publications] Tashiro,Katsumi: "Effect of surfactant replacement on respiratory failure induced by intratracheal endotoxin injection" Progress in Respiration Research. 27. 212-215 (1994) ▼

[Publications] Tashiro,Katsumi: "Surfactant replacement reverses respiratory failure induced by intratracheal endotoxin in rats" Critical Care Medicine. 23. 149-156 (1995) ▼

[Publications] Kobayashi,Tsutomu: "Disparity between tidal and static volumes of immature lungs treated with reconstituted surfactants" Journal of Applied Physiology. (in press). ▼

[Publications] Tashiro,Katsumi: "Aerosolized and instilled surfactant therapies for acute lung injury by intratracheal endotoxin in rats" Critical Care Medicine. (in press). ▼

[Publications] Li, Wen-Zhi et al.: "Aerosolized surfactant reverses respiratory failure in lung lavaged rats" Acta Anaesthesiol.Scand.38. 82-88 (1994) ▼

[Publications] Nitta, Keiko et al.: "Impairment of surfactant activity and ventilation by proteins in lung edema fluid" Respir.Physiol.95. 43-51 (1994) ▼

[Publications] Tashiro, Katsumi et al.: "Effect of surfactant replacement on respiratory failure induced by intratracheal endotoxin injection" Progr.Respir.Res.27. 212-215 (1994) ▼

[Publications] Waseda, Yuko et al.: "The effect of positive end-expiratory pressure and surfactant replacement with various doses in lung-lavaged rats" J.Jpn.Med.Soc.Biol.Interface. 25. 83-88 (1994) ▼

[Publications] Yamada, Keisuke et al.: "Effect of surfactant replacement with ultrasonic nebulizer on respiratory failure induced by intratracheal endotoxin administration in rats" J.Jpn.Med.Soc.Biol.Interface. 25. 106-113 (1994) ▼

[Publications] Tachiro, Katsumi et al.: "Surfactant replacement reverses respiratory failure induced by intratracheal endotoxin in rats" Crit.Care Med.23. 149-156 (1995) ▼

[Publications] Kobayashi.Tsutomu et al.: "Disparity between tidal and static volumes of immature lung treated with reconstituted surfactants" J.Appl.Physiol.(in press). ▼

[Publications] Tashiro, Katsumi et al.: "Aerosolized and instilled surfactant therapies for acute lung injury by intratracheal endotoxin in rats" Crit.Care Med.(in press). ▼

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