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## Data Article

# Data supporting regulating temporospatial dynamics of morphogen for structure formation of the lacrimal gland by chitosan biomaterials

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## ABSTRACT

The lacrimal gland is responsible for tear synthesis and secretion, and is derived from the epithelia of ocular surface and generated by branching morphogenesis. The dataset presented in this article is to support the research results of the effect of chitosan biomaterials on facilitating the structure formation of the lacrimal gland by regulating temporospatial dynamics of morphogen. The embryonic lacrimal gland explants were used as the standard experimental model for investigating lacrimal gland branching morphogenesis. Chitosan biomaterials promoted lacrimal gland branching with a dose-dependent effect. It helped *in vivo* binding of hepatocyte growth factor (HGF) related molecules in the epithelial-mesenchymal boundary of emerging epithelial branches. When mitogen-activated protein kinase (MAPK) or protein kinase B (Akt/PKB) inhibitors applied, the chitosan effects reduced. Nonetheless, the ratios of MAPK and Akt/PKB phosphorylation were still greater in the chitosan group than the control. The data demonstrated here confirm

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E-mail address: [yangtl@ntu.edu.tw](mailto:yangtl@ntu.edu.tw) (T.-L. Yang).<http://dx.doi.org/10.1016/j.dib.2016.11.042>2352-3409/© 2016 Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

the essential role of HGF-signaling in chitosan-promoted structure formation of the lacrimal gland.

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## Specifications Table

Subject area	<i>Biology; Biomaterials</i>
More specific subject area	<i>The morphogenetic effect of chitosan biomaterials on the lacrimal gland structure formation</i>
Type of data	<i>Figures and Charts</i>
How data was acquired	<i>An ex vivo culture of the embryonic lacrimal gland explants was used. The ligands and receptors of HGF-related molecules were tested.</i>
Data format	<i>Raw and analyzed Data</i>
Experimental factors	<i>The lacrimal gland explants were cultured in a chitosan-containing system to induce branching morphogenesis. The effect of morphogen was tested.</i>
Experimental features	<i>The effect of chitosan on branching of the lacrimal gland explants was determined by imaging and quantitative analyses.</i>
Data source location	<i>The National Taiwan University, Taipei, Taiwan</i>
Data accessibility	<i>Data is available with this article</i>

## Value of the data

- The data allow other researchers to investigate the effect of biomaterial using the explants of embryonic lacrimal glands as an experimental model.
- The data reveals the morphogenetic effects of chitosan in facilitating lacrimal gland structure formation.
- The chitosan-mediated morphogenetic effects on lacrimal gland explants originated from increasing expression and binding of hepatocyte growth factor (HGF) related molecules.

## 1. Experimental design, materials and methods

### 1.1. Preparation of the chitosan-containing system

To establish the chitosan-containing system for *ex vivo* culture of lacrimal gland explants, the water-soluble form of chitosan was firstly prepared. A 2 wt.% (w/v) chitosan solution was prepared by dissolving chitosan (Sigma–Aldrich Chemical Co. St. Louis, MO, USA) in 1 M acetic acid. The chitosan solution was then mixed with the medium used for lacrimal gland explant culture, neutralized with sodium hydroxide, added with additives, and prepared in the concentrations ranging from 0.1 to 0.4 mg/ml [1,2]. For comparison, the mock was prepared similarly as that of the chitosan-containing medium, by adding the same amount of acetic acid and sodium hydroxide without chitosan. It had been confirmed that the mock and the control media had similar effects without significant differences in *ex vivo* explant morphogenesis [3]. It is therefore the control medium was used for comparison in all explant assays.

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