

# SKG/Jcl mice

Confirmation of the rheumatoid arthritis-inducing effect of mannan



# Purpose and Background:

$\beta$ -glucans (such as zymosan, curdlan, and laminarin) have been used to induce arthritis in SKG mice. While laminarin is recommended as a control substance that does not affect BALB/cA mice, creating a laminarin suspension requires skills and experiences, and many researchers have reported difficulties in inducing arthritis.

This article introduces a simple method to reliably induce arthritis in SKG mice, which is a valuable model for rheumatoid arthritis research.



# Experimental Overview



## Animals:

- SKG/Jcl male, 8 weeks old: 10 mice
- SKG/Jcl female, 8 weeks old: 20 mice
- SKG/Jcl female, 16 weeks old: 10 mice
- BALB/cA female, 8 weeks old: 5 mice (control)

## Housing conditions:

- Housing environment: Barrier system (SPF), under the management conditions of FTSC
- Diet: CE-2 (CLEA Japan product, Radio Isotope)
- Water: Automatic water supply
- Cages: M cages (mouse cages)
- Housing density: 1 mouse per cage

## Management:

- Individual management by animal number (identification method based on FTSC standards)

## Administration:

- Substance administered: Sigma-Aldrich M-7504 (mannan)
- Administration method and dose: Intraperitoneal injection, 100mg/ml, 20mg and 10mg

## Experimental groups: 20mg dose group

- SKG/Jcl male, 8 weeks old: 10 mice
- SKG/Jcl female, 8 weeks old: 10 mice
- SKG/Jcl female, 16 weeks old: 10 mice
- BALB/cA female, 8 weeks old: 5 mice (control)

## 10mg dose group (for dose-dependency):

- SKG/Jcl female, 8 weeks old: 10 mice

# Experimental Overview



## Measurement Conditions:

### • Initial phase:

Monitoring of ear redness onset as an indicator of the initial effects of mannan administration (images of redness will be obtained for each individual).

- Week 7: Transfer to the experimental area (acclimation): September 29, 2010
- Week 8: Mannan administration: October 6, 2010

## ※Key points:

- Ear redness: Monitor the onset of ear redness for two weeks post-administration (obtain images of redness for each individual).
- 15 weeks: Transfer (acclimation) ⇒ 16 weeks: ⇒ Mannan administration
- Monitor ear redness for two weeks post-administration.  
Joint swelling score: Evaluate joint swelling every two weeks for eight times after administration.  
Evaluation criteria will be based on the "Evaluation of Arthritis in SKG/Jcl Mice".

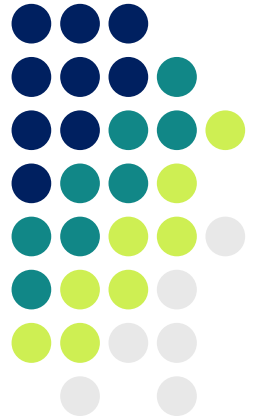
## For 8-week-old mice:

- Measurement points: 10W, 12W, 14W, 16W, 18W, 20W, 22W, 24W (8 times in total)

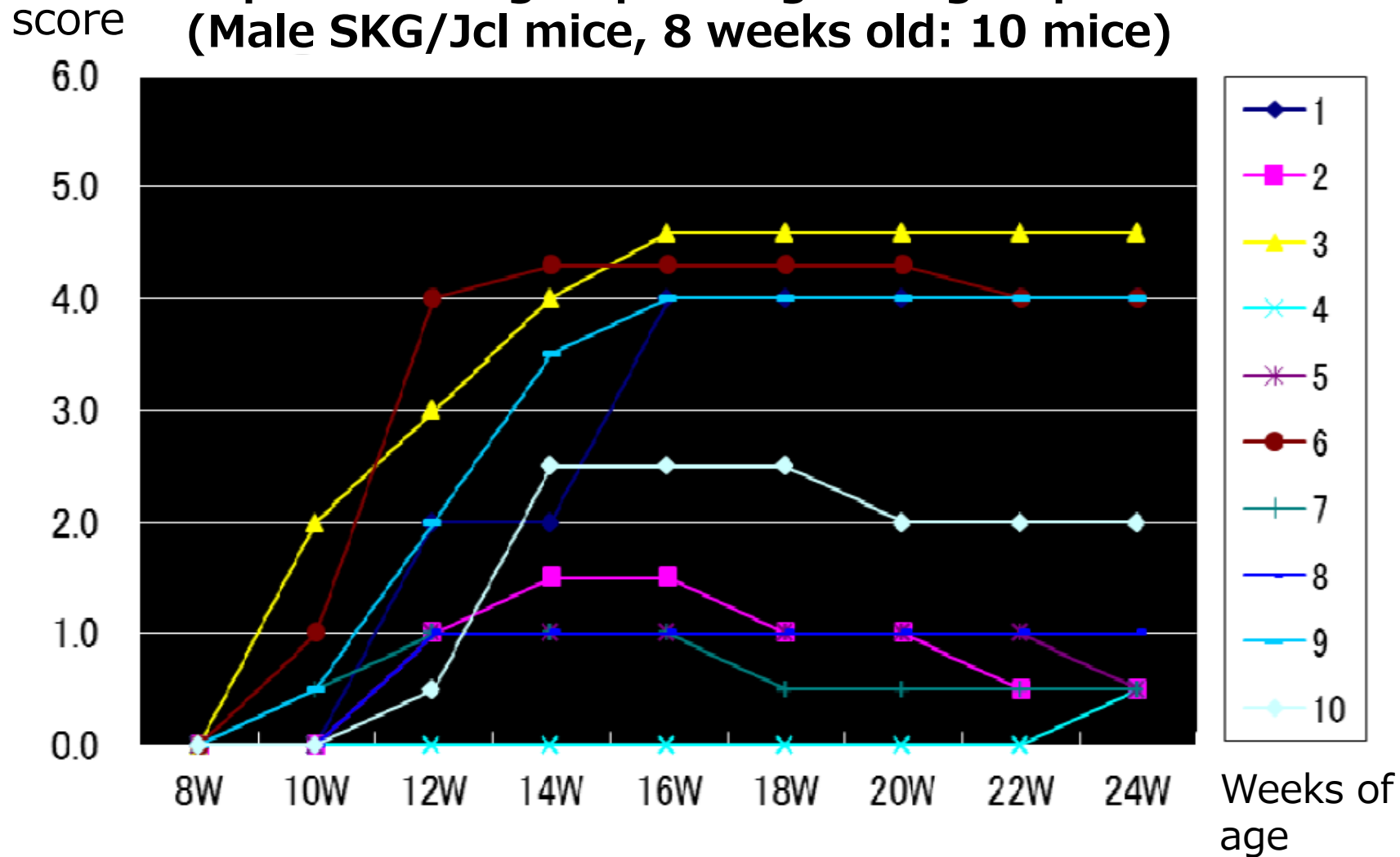
## For 16-week-old mice:

- Measurement points: 18W, 20W, 22W, 24W, 26W, 28W, 30W, 32W (8 times in total)

# Confirmation of the Arthritogenic Effects of Mannan in SKG/Jcl Mice

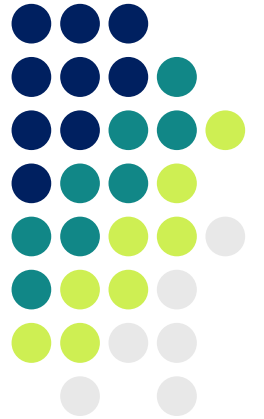
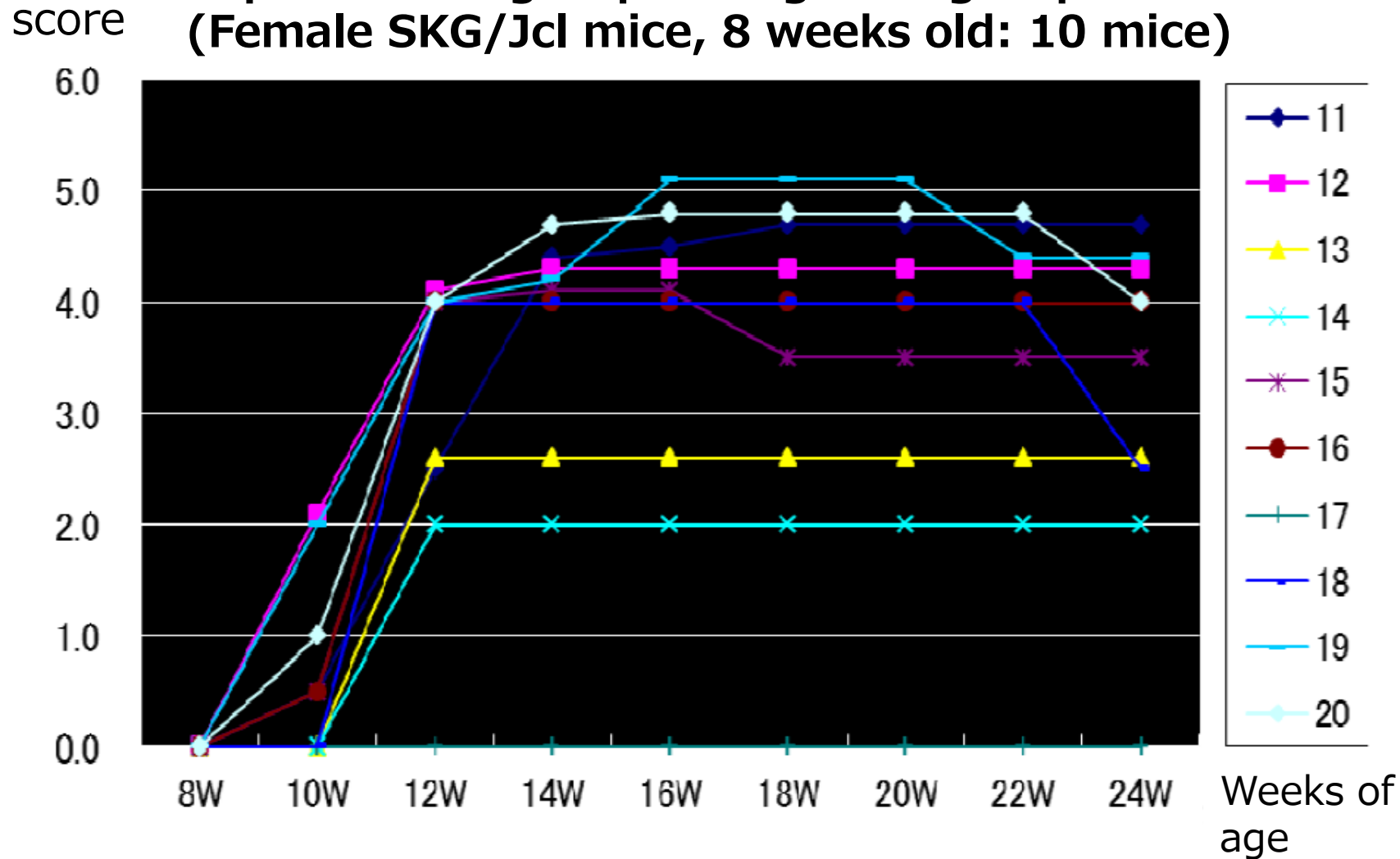


**Experimental group: 20mg dose group  
(Male SKG/Jcl mice, 8 weeks old: 10 mice)**



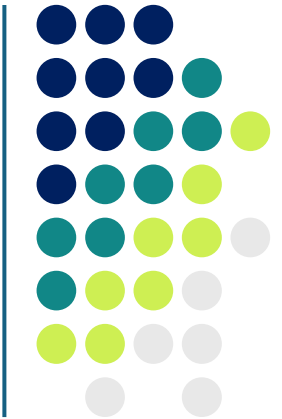
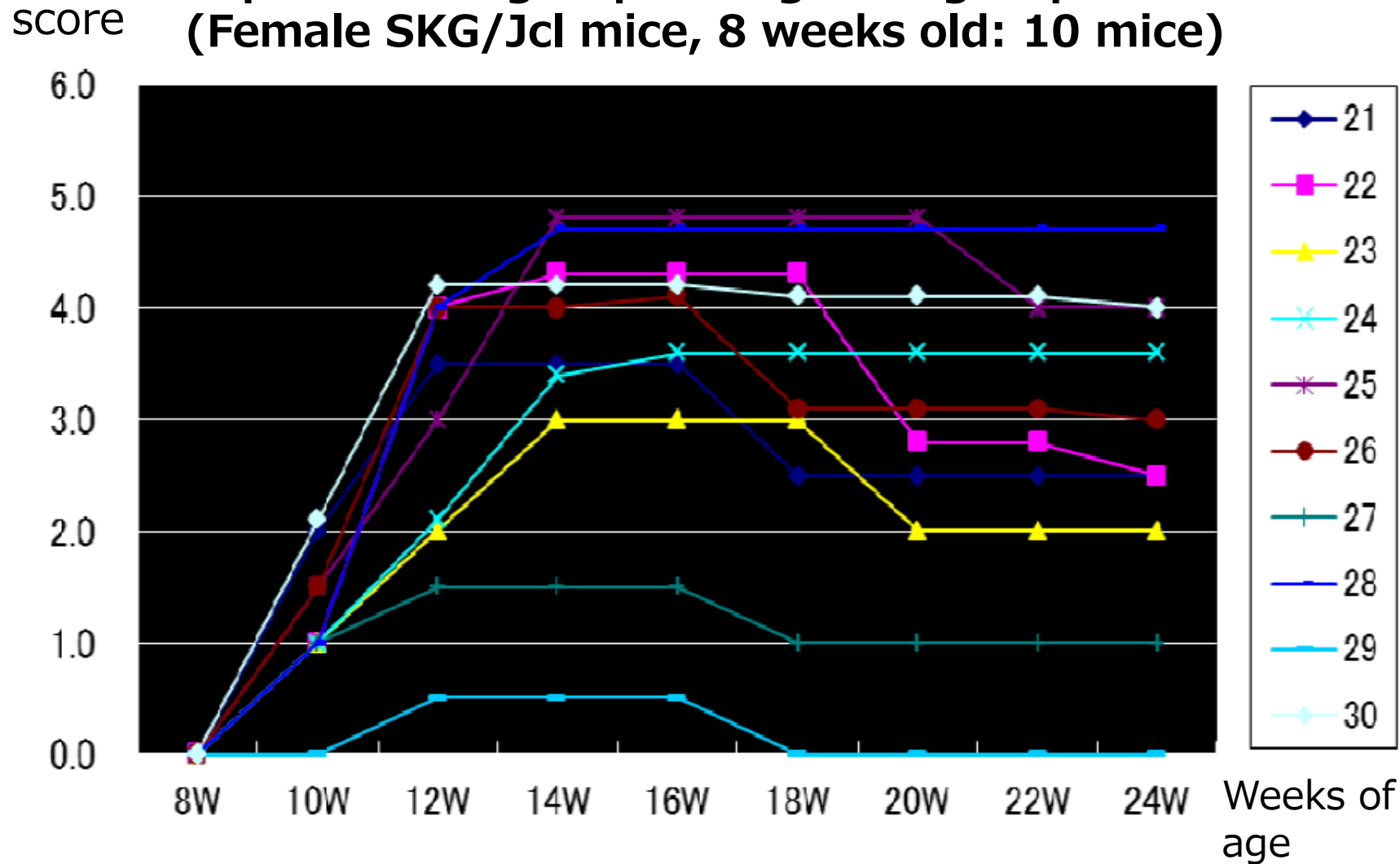
# Confirmation of the Arthritogenic Effects of Mannan in SKG/Jcl Mice

Experimental group: 20mg dose group  
(Female SKG/Jcl mice, 8 weeks old: 10 mice)



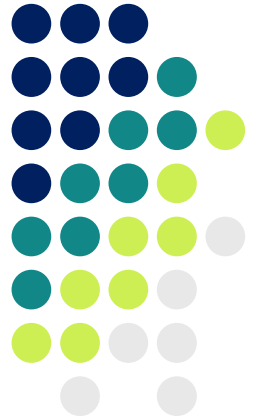
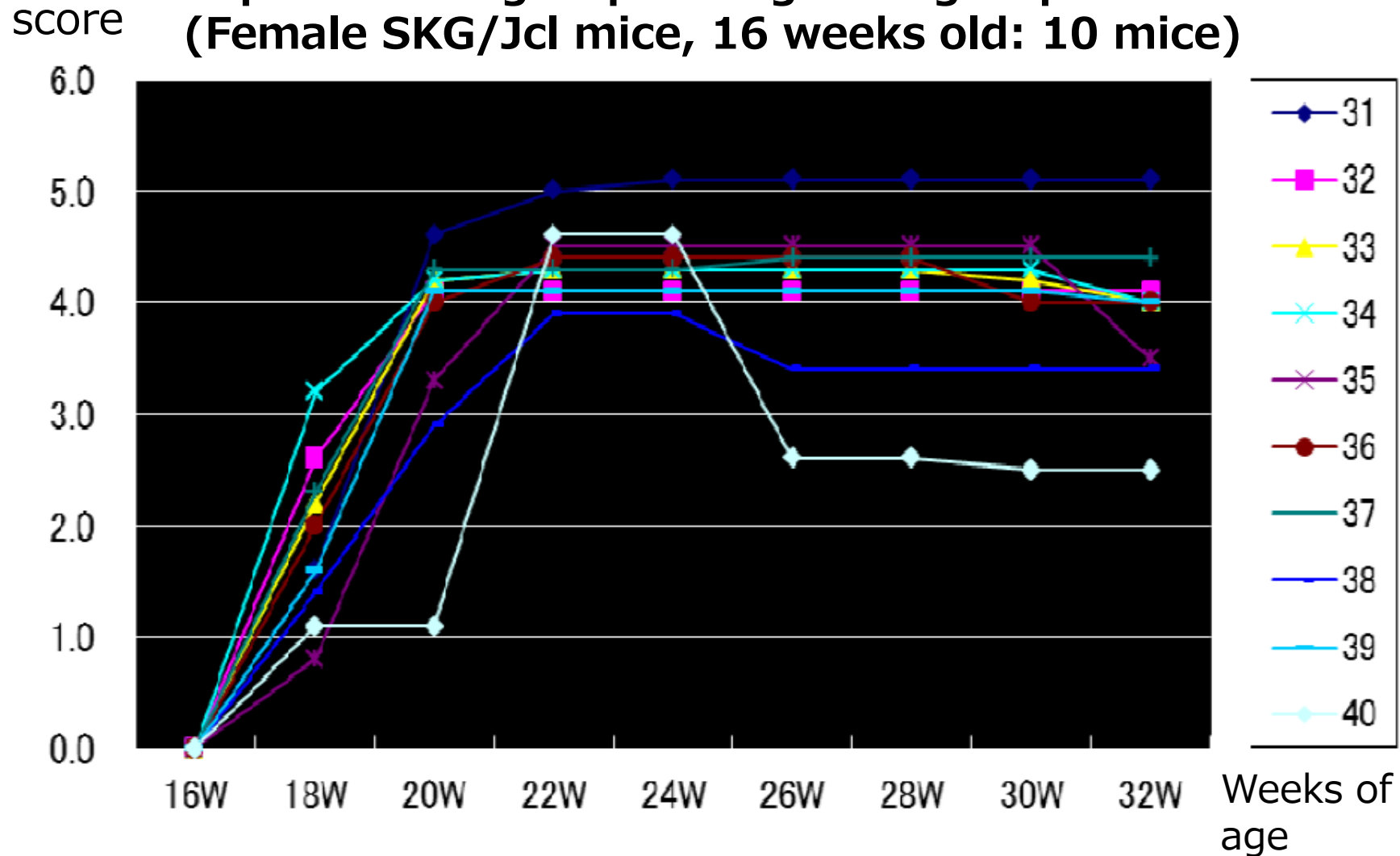
# Confirmation of the Arthritogenic Effects of Mannan in SKG/Jcl Mice

Experimental group: 10mg dose group  
(Female SKG/Jcl mice, 8 weeks old: 10 mice)



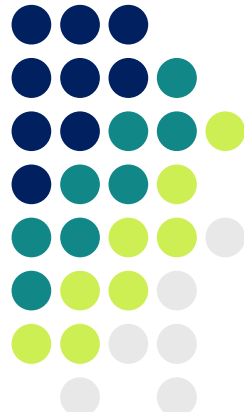
# Confirmation of the Arthritogenic Effects of Mannan in SKG/Jcl Mice

Experimental group: 20mg dose group  
(Female SKG/Jcl mice, 16 weeks old: 10 mice)

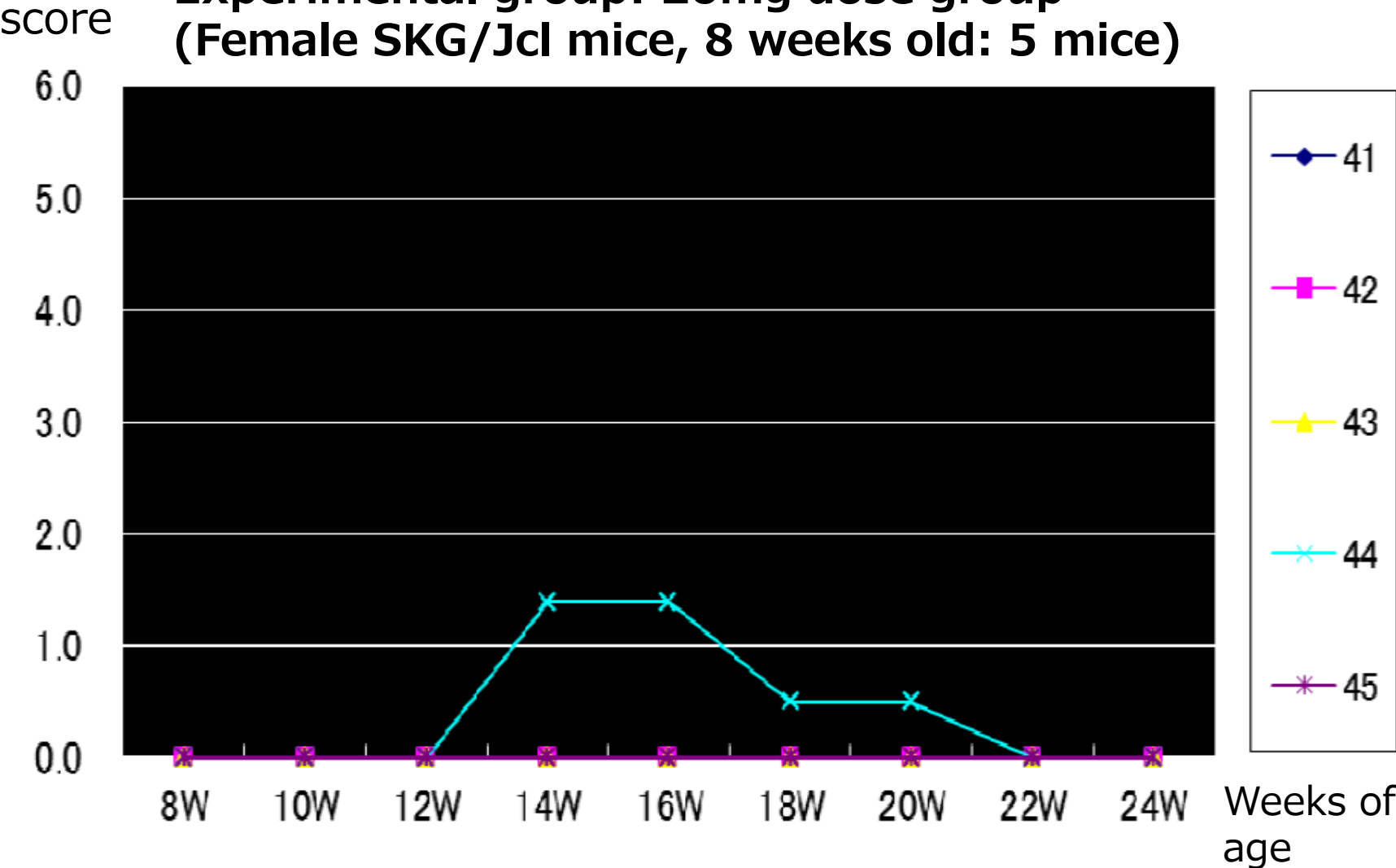




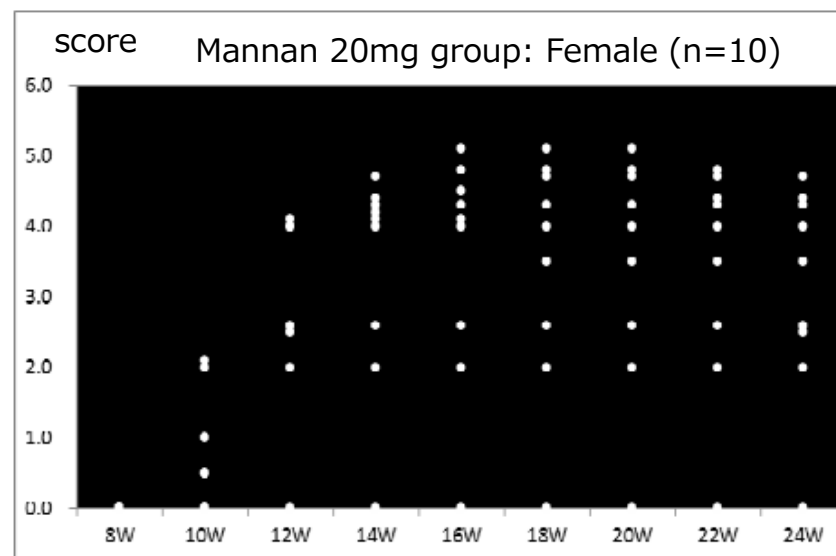
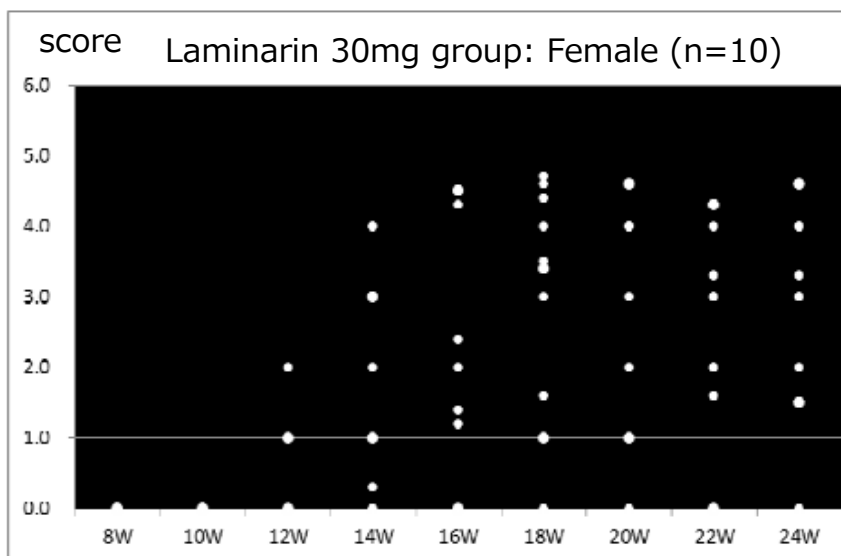
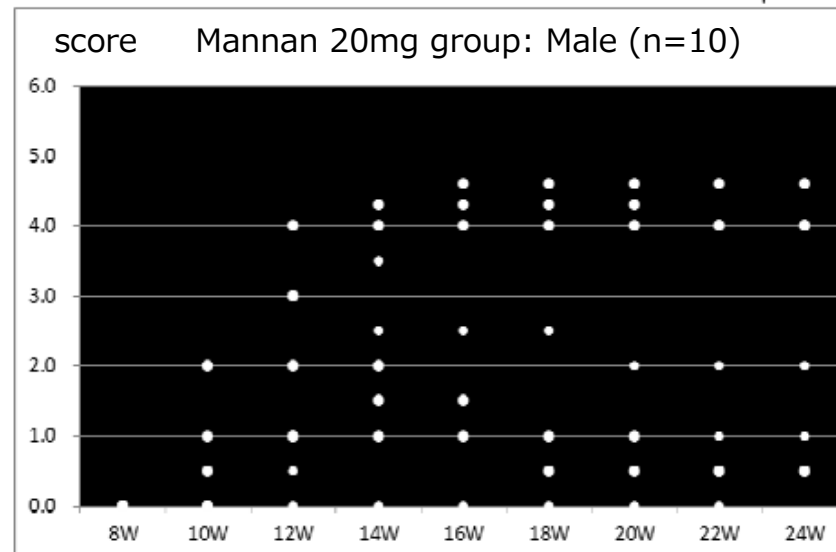
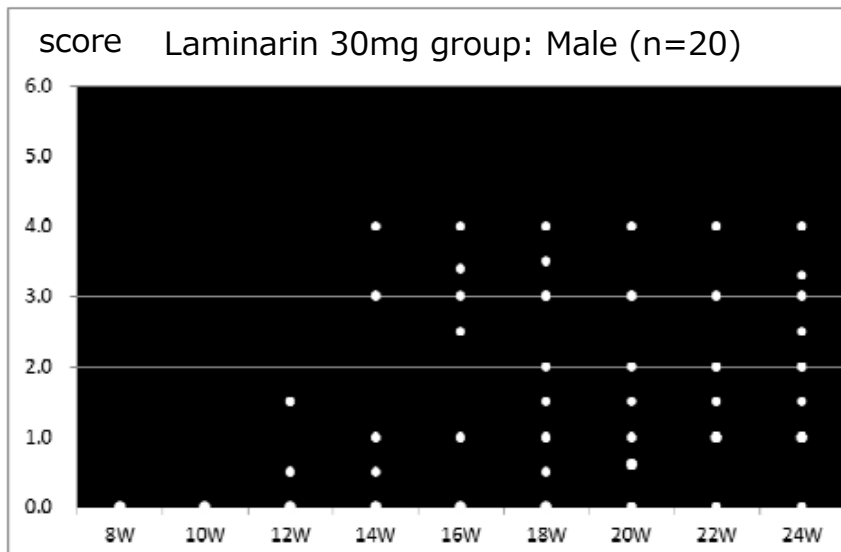
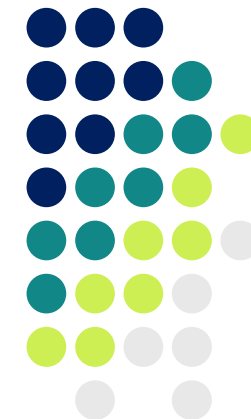
# Confirmation of the arthritis-inducing effect of mannan: Control group: BALB/cAJcl mice



**Experimental group: 20mg dose group  
(Female SKG/Jcl mice, 8 weeks old: 5 mice)**

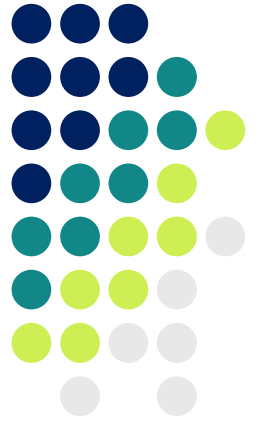


# Comparison of the arthritogenic effects of mannan and laminarin in SKG/Jcl mice

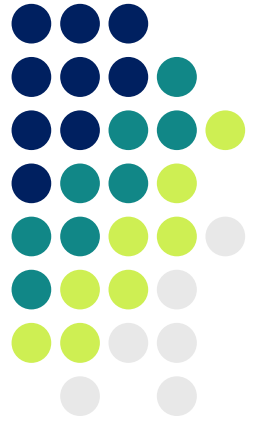


# Reference

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- Sakaguchi N, Takahashi T, Hata H, Nomura T, Tagami T, Yamazaki S, Sakihama T, Matsutani T, Negishi I, Nakatsuru S, Sakaguchi S. Altered thymic T-cell selection due to a mutation of the ZAP-70 gene causes autoimmune arthritis in mice. *Nature.* 2003 Nov 27;426(6965):454-60.
- Yoshitomi H, Sakaguchi N, Brown G, Tagami T, Sakihama T, Nomura T, Akira S, Gordon S, Nakamura T, and Sakaguchi S. Environmental stimulation of innate immunity triggers chronic arthritis in mice genetically prone to produce arthritogenic autoimmune T cells: a key role of fungal  $\beta$ -glucans and their receptor Dectin-1. *J. Exp. Med.* 201: 949-960, 2005



# Cases of arthritis induced by arthritis-inducing



Approximately two weeks after the administration of  $\beta$ -glucan, redness of the ears was observed as evidence of induction.



Mild inflammation of the wrist (score: 0.5/1)



Mild inflammation of the ankle (score: 0.5/1)



Inflammation of the fingers (score: 0.1/1)



Severe inflammation of the wrist (score: 1.0/1)



Severe inflammation of the ankle (score: 1.0/1)