Food Allergy Management Using a List of Processed Foods Containing Allergenic Proteins

Kumi Mizutani Yasuto Kondo

Fujita Health University Bantane Hospital, Pediatrics

☑ The author has no conflict of interest to disclose with respect to this presentation.

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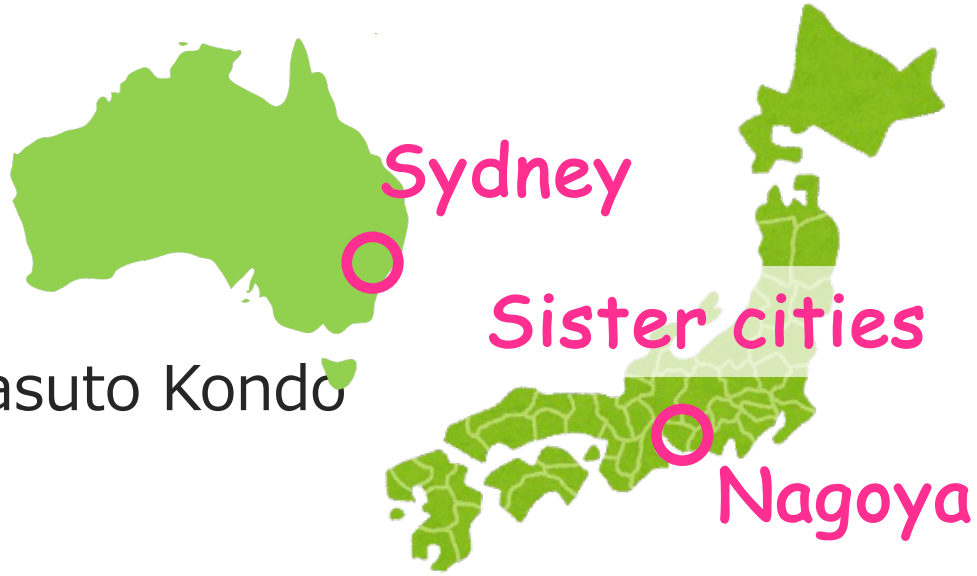

Kumi Mizutani Yasuto Kondo

Fujita Health University Bantane Hospital, Pediatrics

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Outline

- Using processed foods containing allergens as part of food allergy treatment

- List of processed foods containing allergenic proteins

- Clinical outcomes of this approach

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- List of processed foods containing allergenic proteins

- Clinical outcomes of this approach

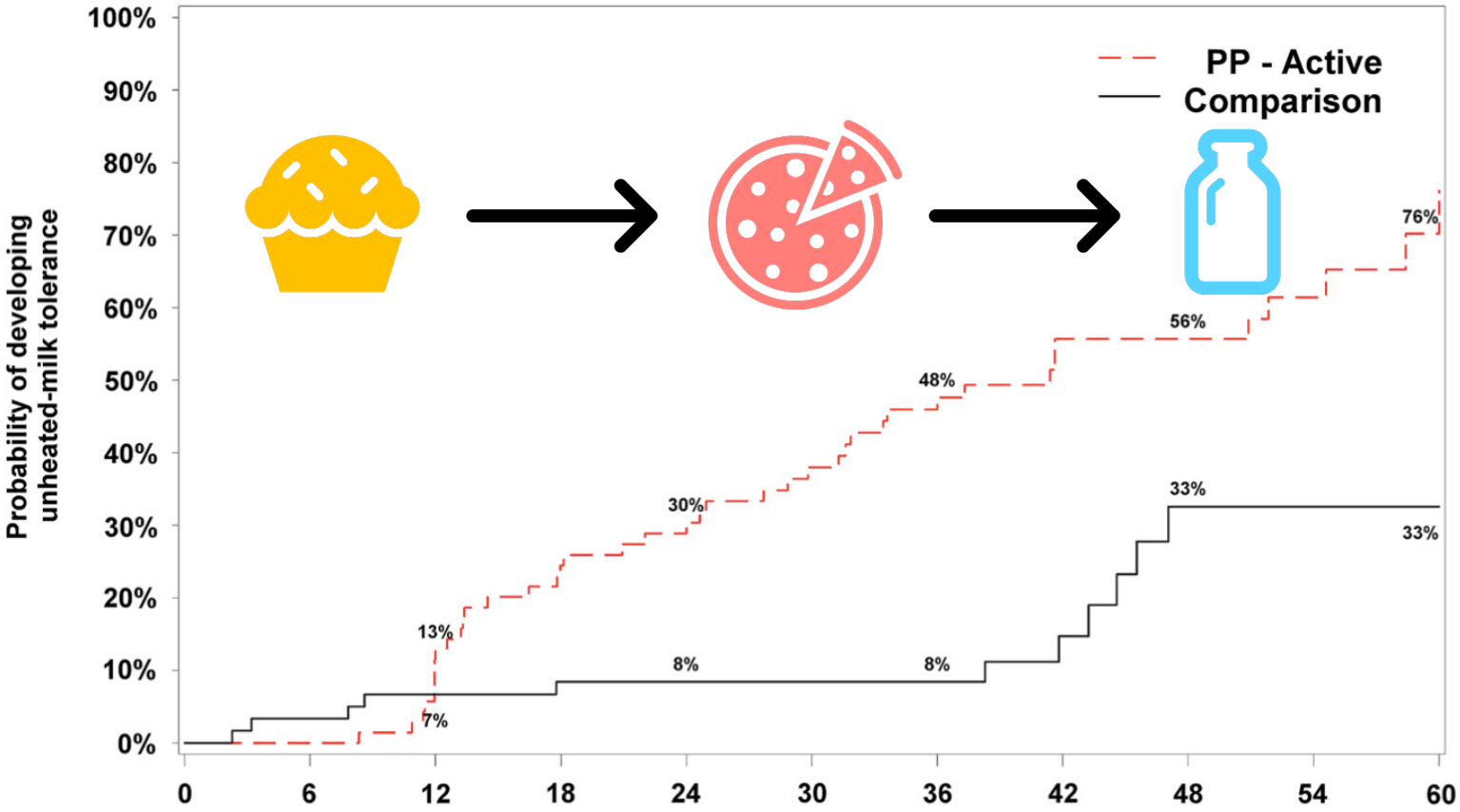
Background

Traditional guideline for food allergy(FA)[1)]

: strict avoidance of allergen

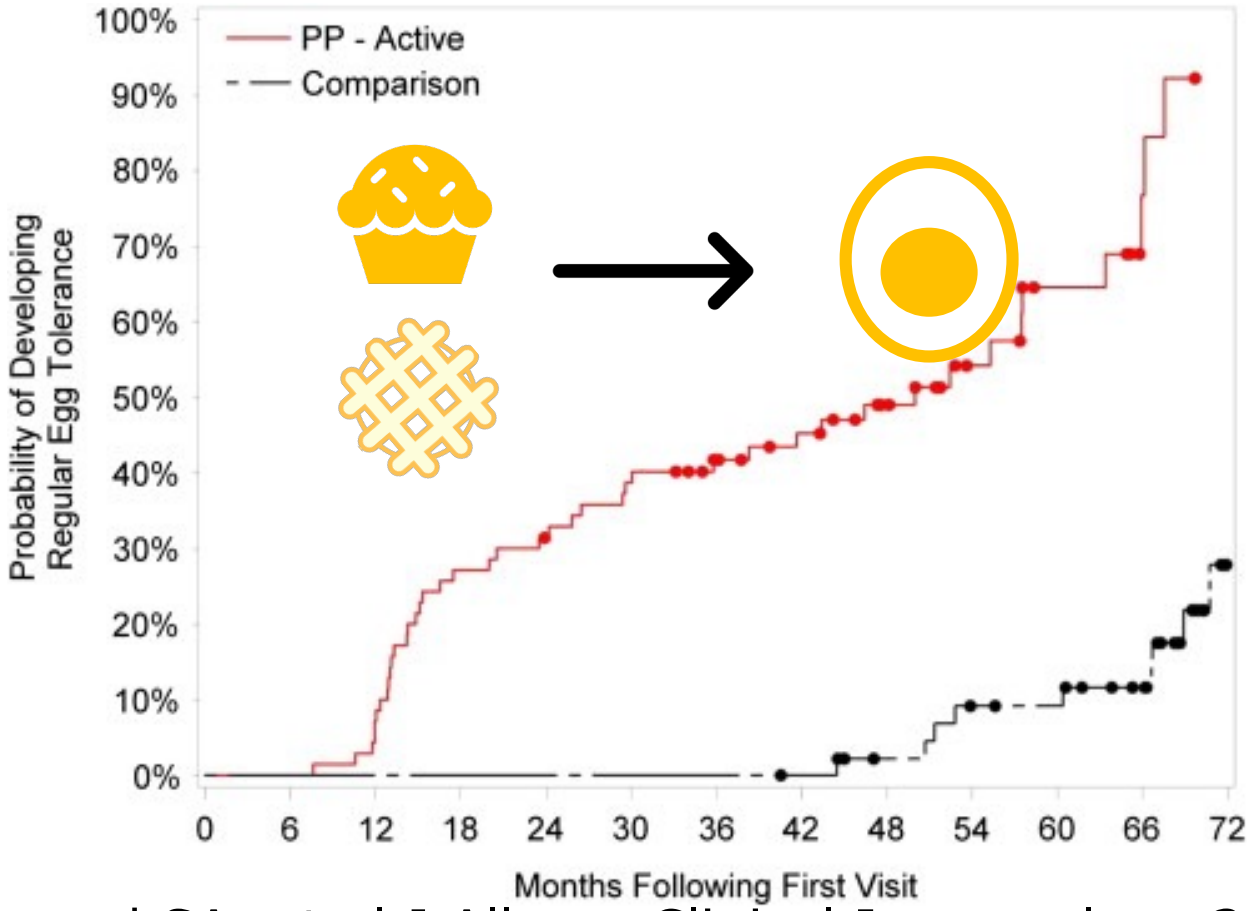
1) Centers for Disease Control and Prevention (CDC). Available online: http://www.cdc.gov/nchs/data/series/sr_10/sr10_258.pdf

The effects of baked milk diet for patients with milk allergies



Jennifer S. Kim, et al J Allergy Clinical Immunology 2011;128;125-131

The effects of baked egg diet for patients with egg allergies



Leonard SA, et al J Allergy Clinical Immunology 2012;130;473-480

The effects of baked egg diet for patients with egg allergies

Eating safe allergenic foods

may help treat food allergies effectively

Leonard SA, et al J Allergy Clinical Immunology 2012;130;473-480

Background

Traditional guideline for food allergy(FA)[1)]

: strict avoidance of allergen

Japanese guideline for food allergy[2)] from 2012

: minimum avoidance of causative foods

1) Centers for Disease Control and Prevention (CDC). Available online: http://www.cdc.gov/nchs/data/series/sr_10/sr10_258.pdf
2) Atsuo U. Japanese guideline for food allergy 2012

Background

Traditional guideline for food allergy(FA)[1)]

: strict avoidance of allergen

Japanese guideline for food allergy[2)] from 2012

: minimum avoidance of causative foods

☞ patients are advised to ingest safe amount of allergen

1) Centers for Disease Control and Prevention (CDC). Available online: http://www.cdc.gov/nchs/data/series/sr_10/sr10_258.pdf
2) Atsuo U. Japanese guideline for food allergy 2012

Background

Traditional guideline for food allergy(FA)[1)]

: avoidance of allergen

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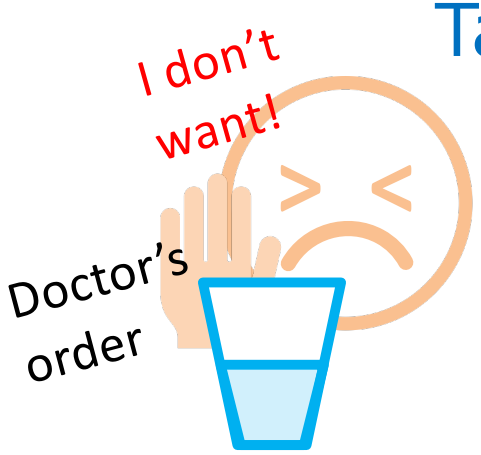


Taking allergen is sometimes difficult due to

- dislike of the taste of target food
- trauma due to past allergic reaction

1) Centers for Disease Control and Prevention (CDC). Available online: http://www.cdc.gov/nchs/data/series/sr_10/sr10_258.pdf
2) Ebisawa M et al. Allergol Int. 2020 69(3):370-386

Processed foods containing allergens

Processed foods containing allergens

Outline

- Using processed foods containing allergens as part of food allergy treatment

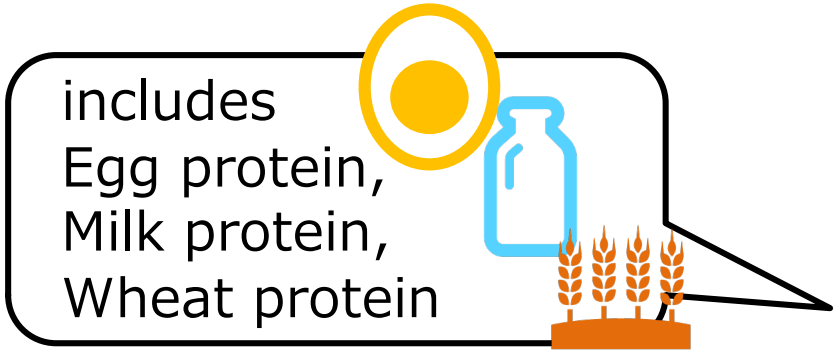
- List of processed foods containing allergenic proteins

- Clinical outcomes of this approach

Nutritional information

NUTRITIONAL INFORMATION	
Serving size: Serving per container:	2 cookies 7
Amount Per Serving	% Daily Value*
Calories 150	
Total Fat 7g	9%
Saturated Fat 3g	15%
Trans Fat 0g	
Cholesterol 10mg	3%
Sodium 85mg	4%
Total Carbohydrate 21g	8%
Dietary Fiber 1g	4%
Total Sugars 10g	
Includes 8g Added Sugars	16%
Protein 2g	

Nutritional information



NUTRITIONAL INFORMATION	
Serving size: Serving per container:	2 cookies 7
Amount Per Serving	% Daily Value*
Calories 150	
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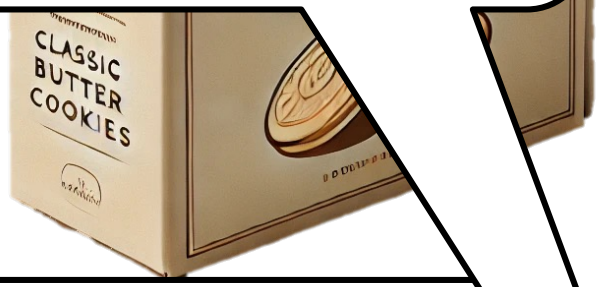
Cholesterol 10mg	3%
Sodium 85mg	4%
Total Carbohydrate 21g	8%
Dietary Fiber 1g	4%
Total Sugars 10g	
Includes 8g Added Sugars	16%
Protein 2g	

Nutritional information

Measured by

Kjeldahl Method

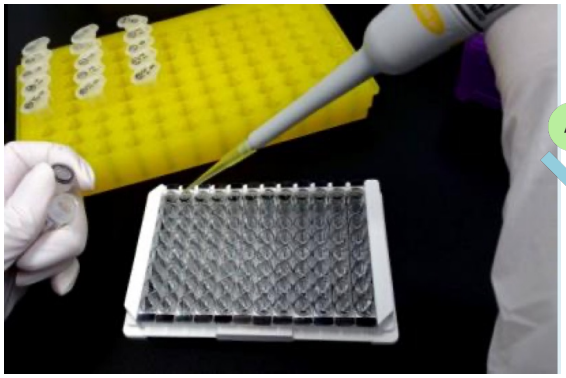


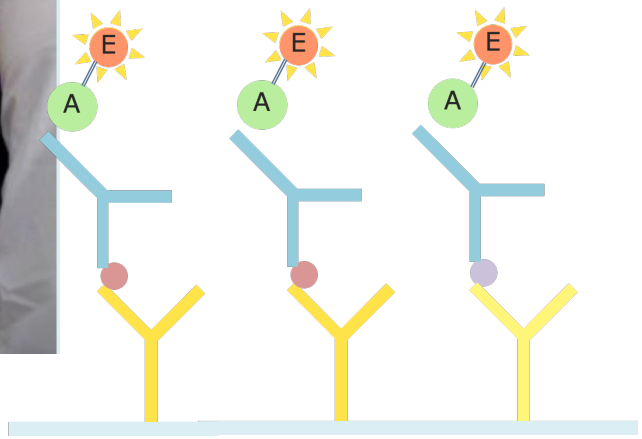
We use ELISA to measure
Egg protein,
Milk protein,
Wheat protein

NUTRITIONAL INFORMATION	
Serving size:	2 cookies
Serving per container:	7
Amount Per Serving	% Daily Value*
Calories 150	
Total Fat 7g	9%
Saturated Fat 3g	15%
Trans Fat 0g	
Cholesterol 10mg	3%
Sodium 85mg	4%
Total Carbohydrate 21g	8%
Dietary Fiber 1g	4%
Total Sugars 10g	
Includes 8g Added Sugars	16%
Protein 2g	

FASTKIT ELISA and Kjeldahl Method

<ELISA>
antigen-antibody reactions

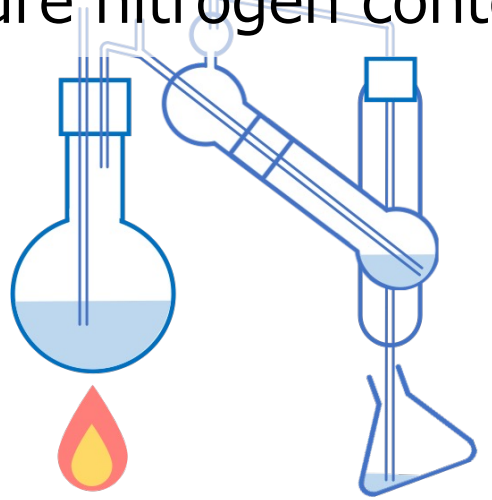




Detects specific allergenic proteins

<Kjeldahl Method>
chemical reactions

measure nitrogen content



calculate total protein

FASTKIT ELISA and Kjeldahl Method

Feature	ELISA	Kjeldahl Method
Purpose	Detects specific allergenic proteins	Measures total protein content
Principle	Antigen-antibody reaction	Nitrogen quantification
Sensitivity	**High** (ng level)	Moderate (mg level)
Specificity	**High**	Low
Application	Food allergen testing	Food nutrition analysis

FASTKIT ELISA and Kjeldahl Method

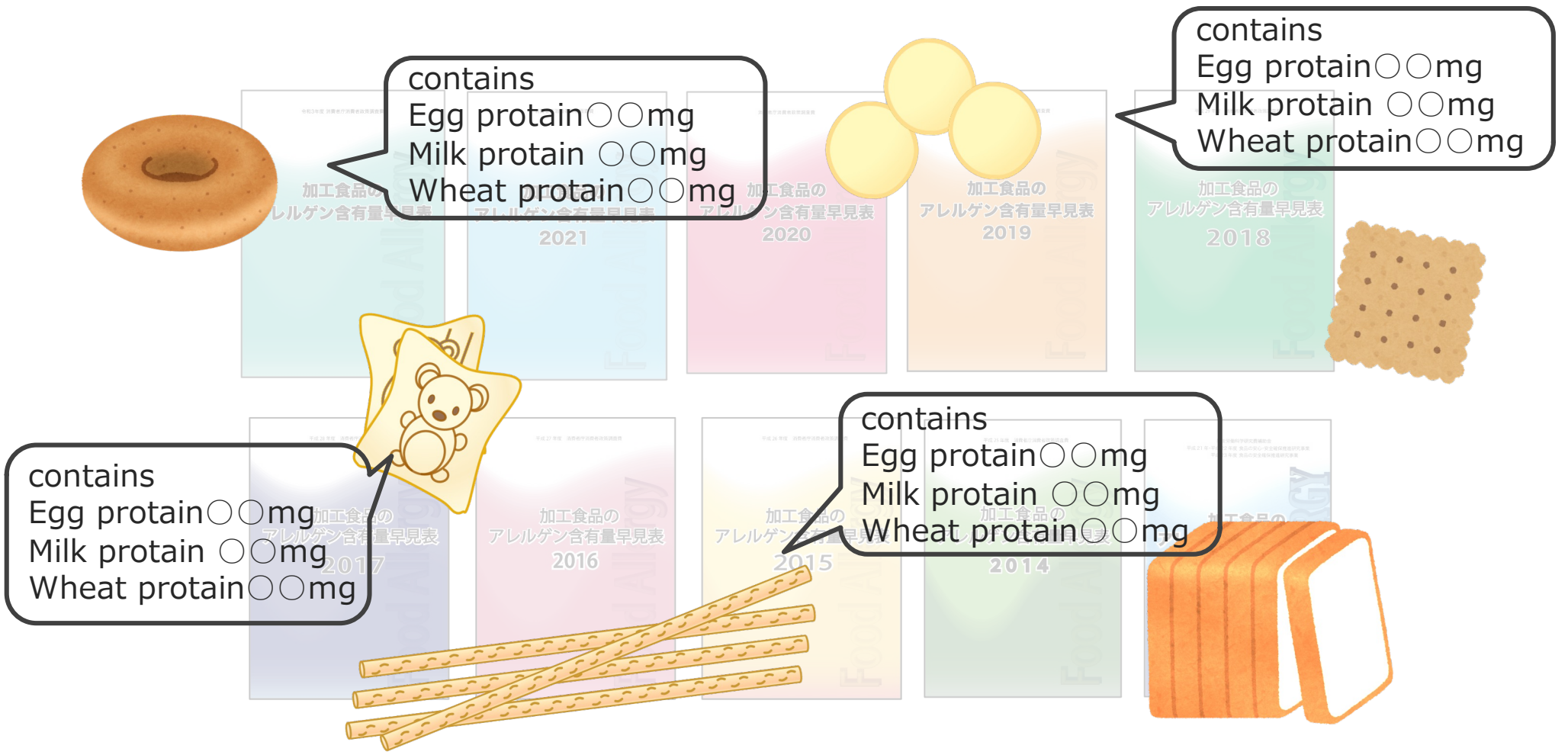
Feature	ELISA	Kjeldahl Method
Purpose	Detects specific allergenic	
Principle	Antigen-reaction	
Sensitivity	**High** (r	
Specificity	**High**	
Application	Food alle	

In Japan,

・Allergen labelling is mandatory under the Food Labelling Law

・ELISA is widely used in industry for accurate and quantitative allergen testing

Detected allergenic protein by ELISA



Advantages of eating processed food

- Patients can choose what they want to eat such as snack foods or sweets.
- Patients feel happy that they can eat the same foods as other people.
- Patients with severe allergy can eat some products.

Advantages of eating processed food

- Pat eat
  suc
- Pat e same
  foo
- Pat e
  prc

- ordered online from **doctors**
- only charged for shipping

Collaborating companies and products

House

MORINAGA

Example of the list

Product	Company	g/piece	protain(mg)/piece		
			Egg	Milk	wheat
Marie biscuit	Morinaga	5.81	0	11	421
Chocohips cookie	Morinaga	9.5	0	30	306
Hamburg helper	house	11.5	66	51	112
Bread roll	ABC company	34.7	0	37	3460

Example of the list

Avarage data

Product	Company	g/piece	protain(mg)/piece		
			Egg	Milk	wheat
Marie biscuit	Morinaga	5.81	0	11	421
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Hamburg h	house				?
Brea ll	AB ny				0

Need to consider the differences b/w individuals

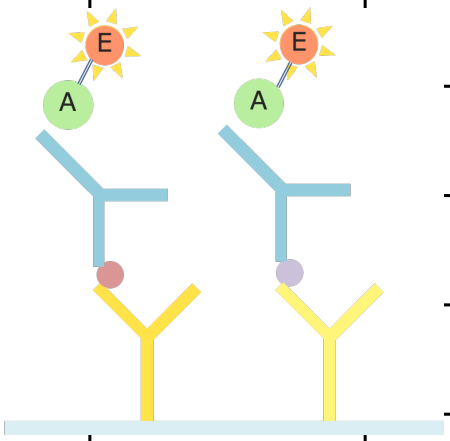
Example of the list

Product	Company	g/piece	protain(mg)/piece		
			Egg	Milk	wheat
Marie biscuit	Morinaga	5.81	0	11	421
Chocohips cookie	Morinaga	9.5	0	30	306
Hamburg h	house				?
Brea ll	AB ny				0

Need to consider the differences b/w individuals

Example of the list

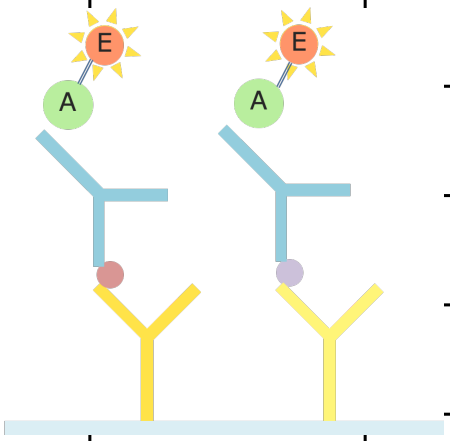
Need to consider the characteristic of ELISA



			protain(mg)/piece		
			Egg	Milk	wheat
			0	11	421
			0	30	306
Humburg helper	house	11.5	66	51	112
Bread roll	ABC company	34.7	0	37	3460

Example of the list

Need to consider the characteristic of ELISA



			protain(mg)/piece		
			Egg	Milk	wheat
			0		421
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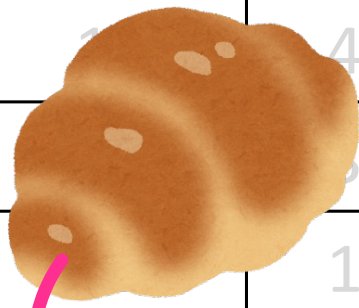
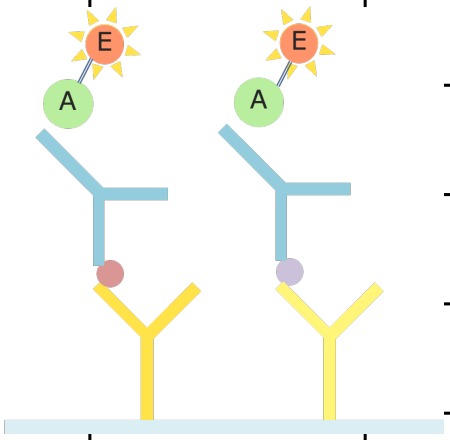


Needs to be diluted to measure wheat protein

Example of the list

Need to consider the characteristic of ELISA



			protain(mg)/piece		
			Egg	Milk	wheat
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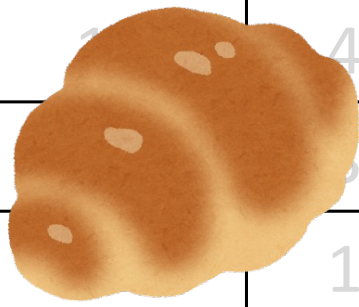
			0		306
Humburg helper	house	11.5	66		112
Bread roll	ABC company	34.7	0	37	3460

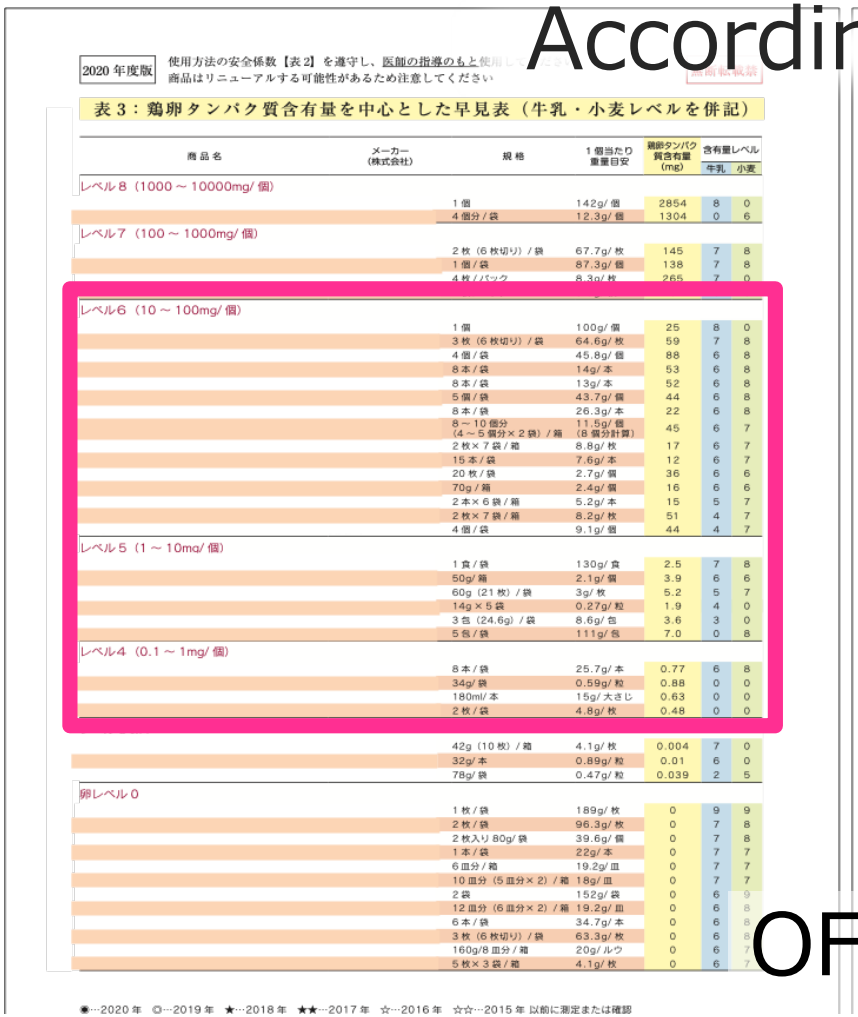


↑

It is not very accurate

Example of the examination

According to the result of OFC,

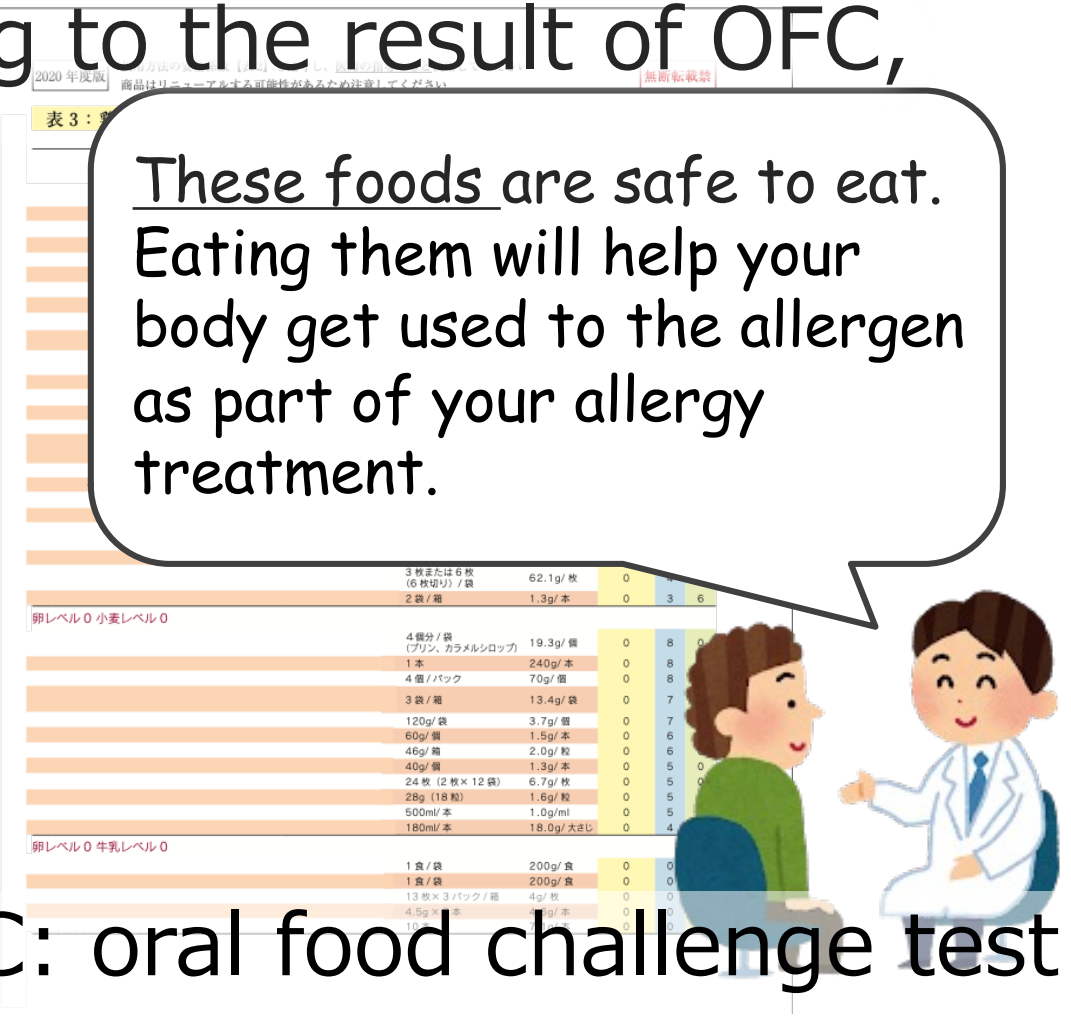


2020 年度版　使用方法の安全係数【表 2】を遵守し、医師の指導のもと使用してください。
商品はリニューアルする可能性があるため注意してください。　無断転載禁

表 3：鶏卵タンパク質含有量を中心とした早見表（牛乳・小麦レベルを併記）

商品名	メーカー（株式会社）	規格	1個当たり重量目安	鶏卵タンパク質含有量（mg）	含有量レベル 牛乳	含有量レベル 小麦
レベル 8（1000 ～ 10000mg/ 個）						
		1 個	142g/ 個	2854	8	0
		4 個分 / 袋	12.3g/ 個	1304	0	6
レベル 7（100 ～ 1000mg/ 個）						
		2 枚（6 枚切り）/ 袋	67.7g/ 枚	145	7	8
		1 個 / 袋	87.3g/ 個	138	7	8
		4 枚 / パック	8.3g/ 枚	265	7	0
レベル 6（10 ～ 100mg/ 個）						
		1 個	100g/ 個	25	8	0
		3 枚（6 枚切り）/ 袋	64.6g/ 枚	59	7	8
		4 個 / 袋	45.8g/ 個	88	6	8
		8 本 / 袋	14g/ 本	53	6	8
		8 本 / 袋	13g/ 本	52	6	8
		5 個 / 袋	43.7g/ 個	44	6	8
		8 本 / 袋	26.3g/ 本	22	6	8
		8 ～ 10 個分（4 ～ 5 個分 × 2 袋）/ 箱	11.5g/ 個（8 個分計算）	45	6	7
		2 枚 × 7 袋 / 箱	8.8g/ 枚	17	6	7
		15 本 / 袋	7.6g/ 本	12	6	7
		20 枚 / 袋	2.7g/ 個	36	6	6
		70g / 箱	2.4g/ 個	16	6	6
		2 本 × 6 袋 / 箱	5.2g/ 本	15	5	7
		2 枚 × 7 袋 / 箱	8.2g/ 枚	51	4	7
		4 個 / 袋	9.1g/ 個	44	4	7
レベル 5（1 ～ 10mg/ 個）						
		1 食 / 袋	130g/ 食	2.5	7	8
		50g/ 箱	2.1g/ 個	3.9	6	6
		60g（21 枚）/ 袋	3g/ 枚	5.2	5	7
		14g × 5 袋	0.27g/ 粒	1.9	4	0
		3 包（24.6g）/ 袋	8.6g/ 包	3.6	3	0
		5 包 / 袋	111g/ 包	7.0	0	8
レベル 4（0.1 ～ 1mg/ 個）						
		8 本 / 袋	25.7g/ 本	0.77	6	8
		34g/ 袋	0.59g/ 粒	0.88	0	0
		180ml/ 本	15g/ 大さじ	0.63	0	0
		2 枚 / 袋	4.8g/ 枚	0.48	0	0
		42g（10 枚）/ 箱	4.1g/ 枚	0.004	7	0
		32g/ 本	0.89g/ 粒	0.01	6	0
		78g/ 袋	0.47g/ 粒	0.039	2	5
卵レベル 0						
		1 枚 / 袋	189g/ 枚	0	9	9
		2 枚 / 袋	96.3g/ 枚	0	7	8
		2 枚入り 80g/ 袋	39.6g/ 個	0	7	8
		1 本 / 袋	22g/ 本	0	7	7
		6 皿分 / 箱	19.2g/ 皿	0	7	7
		10 皿分（5 皿分 × 2）/ 箱	18g/ 皿	0	7	7
		2 袋	152g/ 袋	0	6	9
		12 皿分（6 皿分 × 2）/ 箱	19.2g/ 皿	0	6	8
		6 本 / 袋	34.7g/ 本	0	6	8
		3 枚（6 枚切り）/ 袋	63.3g/ 枚	0	6	8
		160g/8 皿分 / 箱	20g/ ルウ	0	6	7
		5 枚 × 3 袋 / 箱	4.1g/ 枚	0	6	7

◉…2020 年　◎…2019 年　★…2018 年　★★…2017 年　☆…2016 年　☆☆…2015 年 以前に測定または確認



OFC: oral food challenge test

Outline

- Using processed foods containing allergens as part of food allergy treatment

- List of processed foods containing allergenic proteins

- Clinical outcomes of this approach

Study Groups and Method

Processed Food (PF) group :

Patients with egg, milk and wheat allergy who consumed processed foods at home

Control group:

Patients who continued strict allergens avoidance before visiting our hospital

Method:

Retrospective analysis of changes in specific IgE

Case details

	egg	milk	wheat
PF group	42	30	20
control group	13	10	7

Statistical analysis

Performed with GraphPad prism 10.4.1(627)

Egg allergy patients characteristics

	PF	control	p value	
n(M:F)	42(30:12)	13(10:3)	0.621*	ns
Age of the first OFC	1y7m (9m-14y3m)	2y10m (1y7m-5y11m)	0.096**	ns
OVM sIgE (U_A/mL)	7.98 (0.01-109)	10.8 (1.06)	0.885**	ns
Egg white sIgE (U_A/mL)	13.55 (1.28-84.1)	36.7 (0.1-348)	0.176**	ns
Period between IgE tests (month)	12m (6-18)	11m (6-16)	0.692**	ns

OFC:oral food challenge test　OVM:ovomucoid　sIgE:specific IgE　ns: not significant

*Fisher's exact test, **Mann-Whitney test

Milk allergy patients characteristics

	PF	control	p value	
n(M:F)	30(16:14)	10(5:5)	>0.999*	ns
Age of the first OFC	4y1m (9m-13y7m)	3y4m (1y4m-6y1m)	0.764**	ns
Milk sIgE (U_A/mL)	17.5 (0.47-406)	33.5 (5.77-199.2)	0.332**	ns
Casein white sIgE (U_A/mL)	16.75 (0.38-336)	41.45 (5.21-187)	0.451**	ns
Period between IgE tests (month)	14m (7-39)	27m (17-42)	0.0003**	

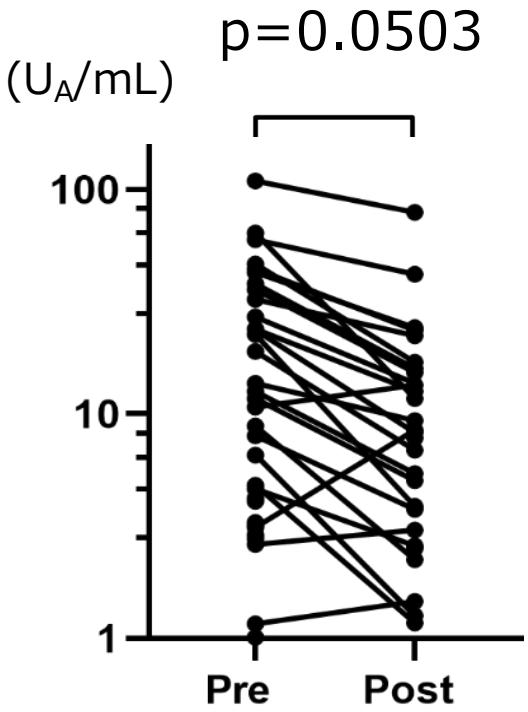
*Fisher's exact test, **Mann-Whitney test

Wheat allergy patients characteristics

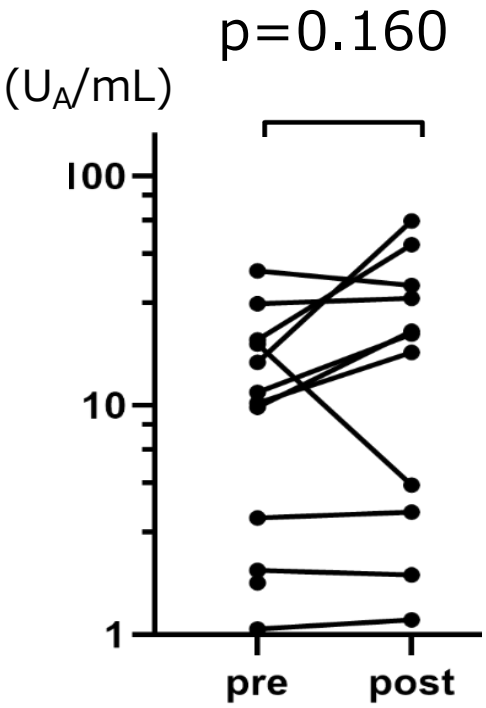
	PF	control	p value	
n(M:F)	20(10:10)	7(3:4)	p＞0.999*	ns
Age of the first OFC	4y1m (7m-13y3m)	1y10m (7m-4y11m)	p=0.0835**	ns
Wheat sIgE (U_A/mL)	6.825 (0.12-173)	3.19 (0.44-69.5)	p=0.8926**	ns
ω-5 gliadin sIgE (U_A/mL)	62.7 (3.87-380)	36.8 (2.37-147)	p=0.3138**	ns
Period between IgE tests (month)	12m (7-21)	15m (9-24)	p=0.09**	ns

*Fisher's exact test, **Mann-Whitney test

OVM sIgE change



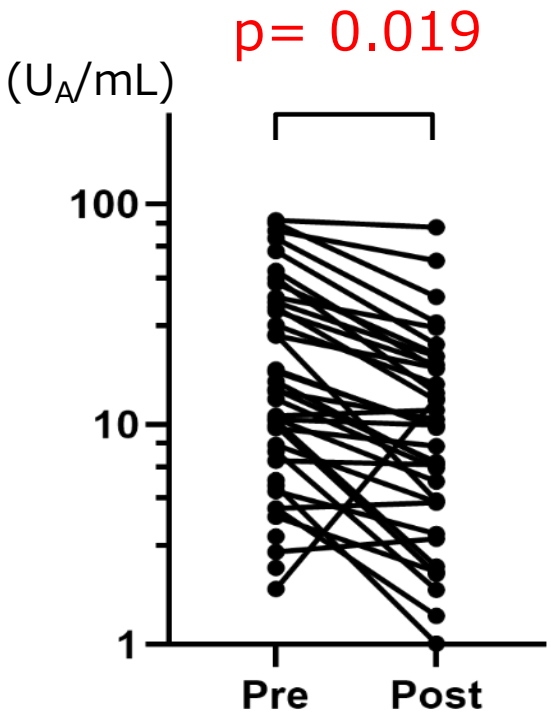
PF
n=42



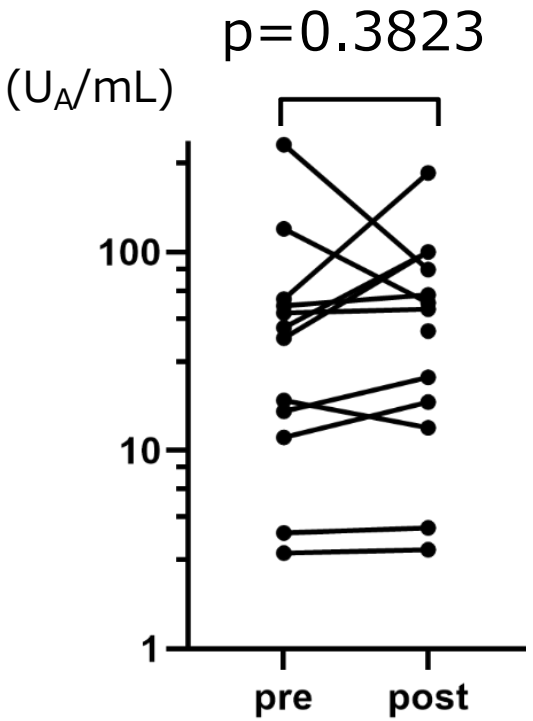
control
n=13

Mann-Whitney test

Egg White sIgE change



PF
n=42

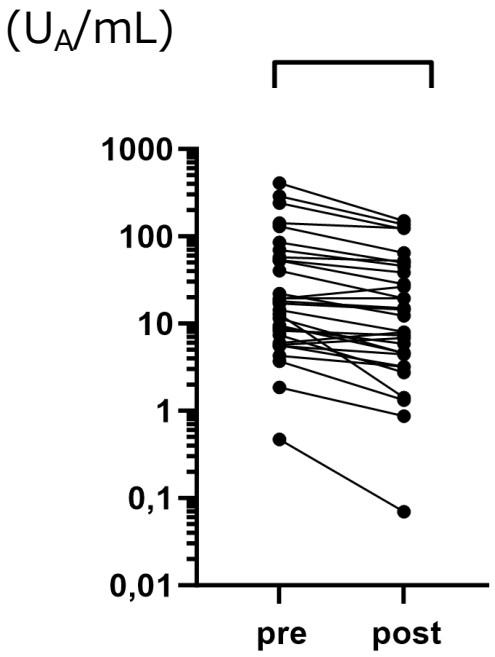


control
n=13

Mann-Whitney test

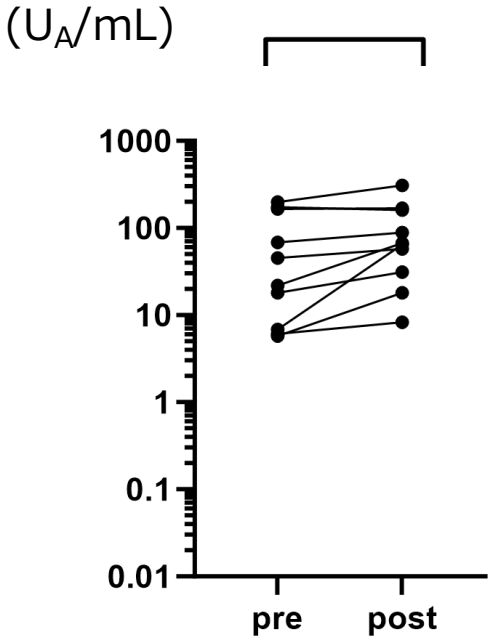
Milk sIgE change

p<0.0001



PF
n=30

p=0.0098

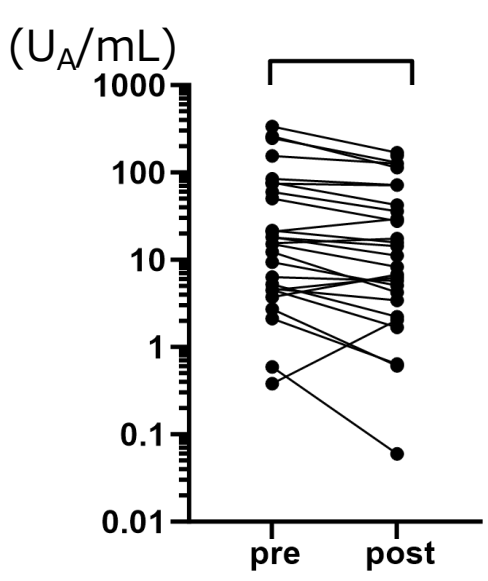


control
n=10

Mann-Whitney test

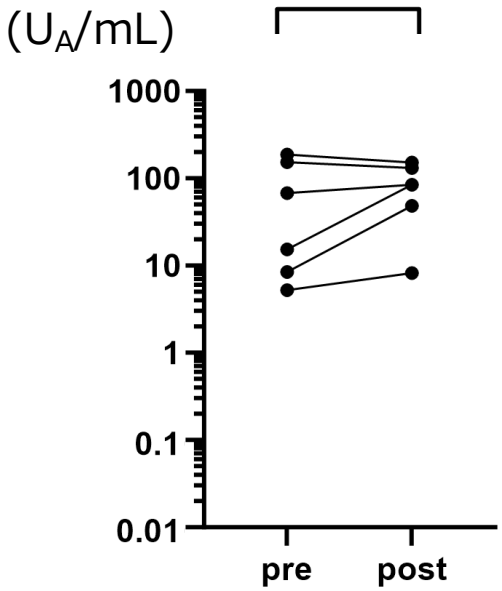
Casein sIgE change

p <0.0001



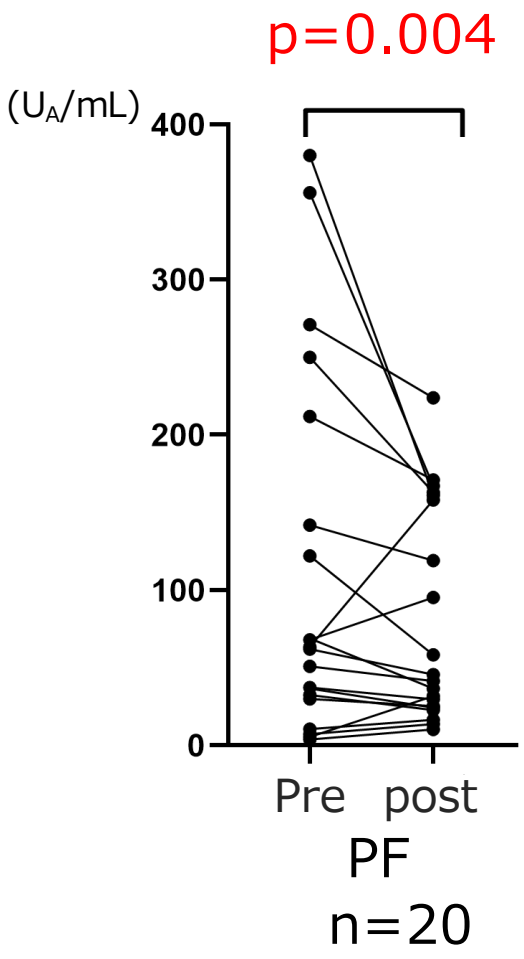
PF
n=30

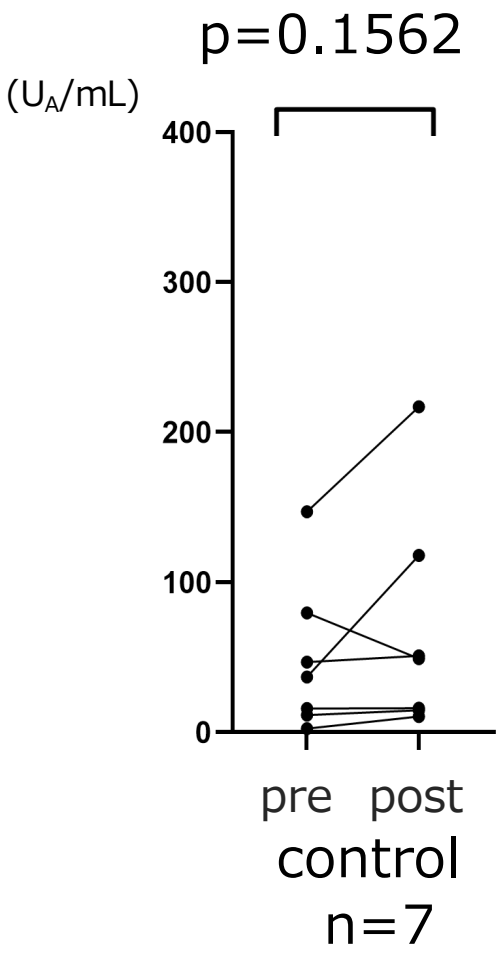
p=0.5625



control
n=10

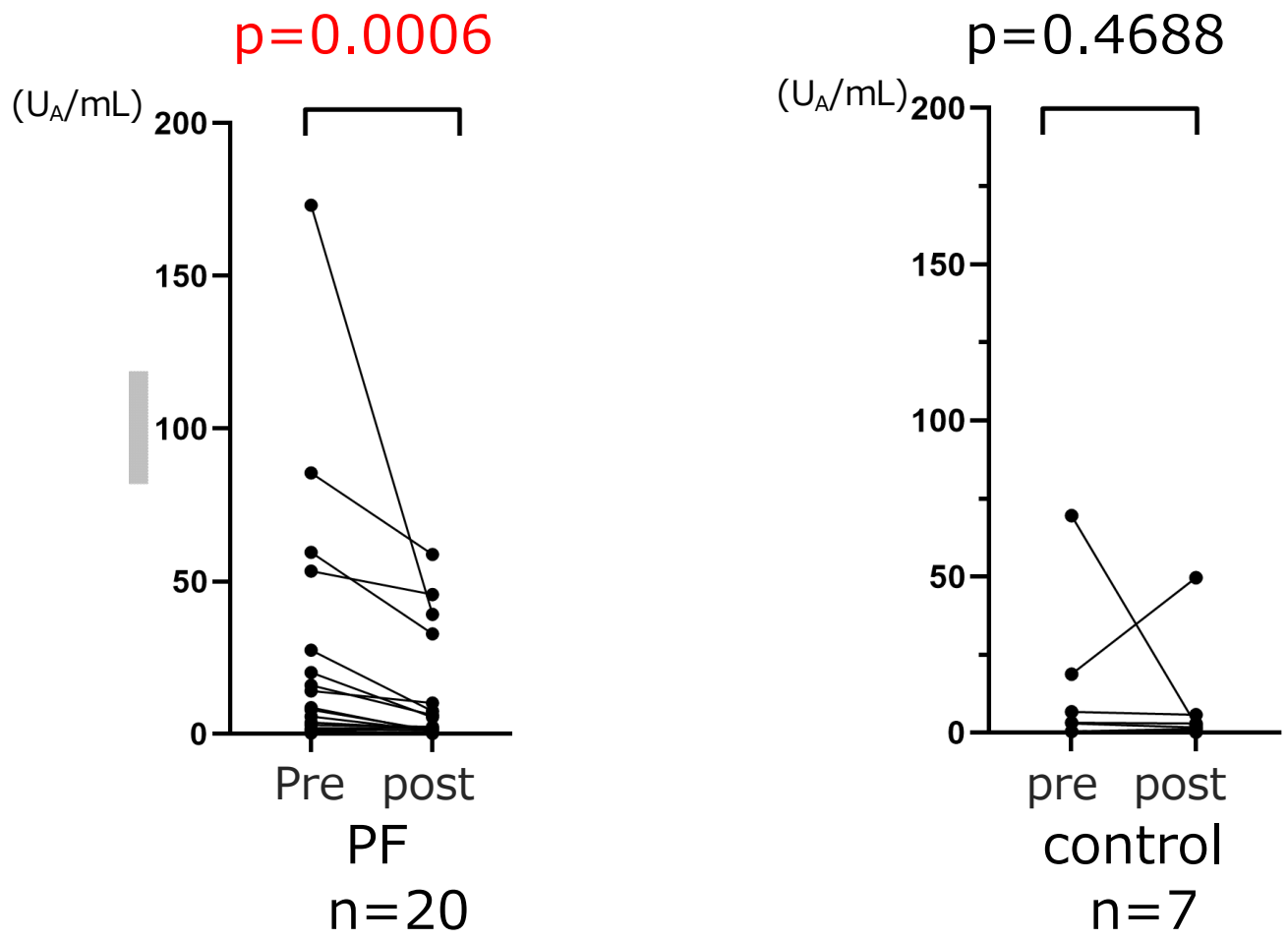
Wheat sIgE change





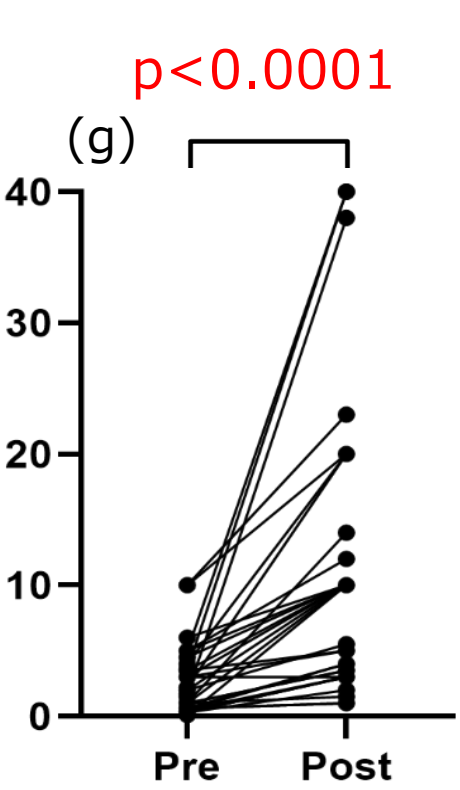
Mann-Whitney test

ω-5 Gliadin sIgE change

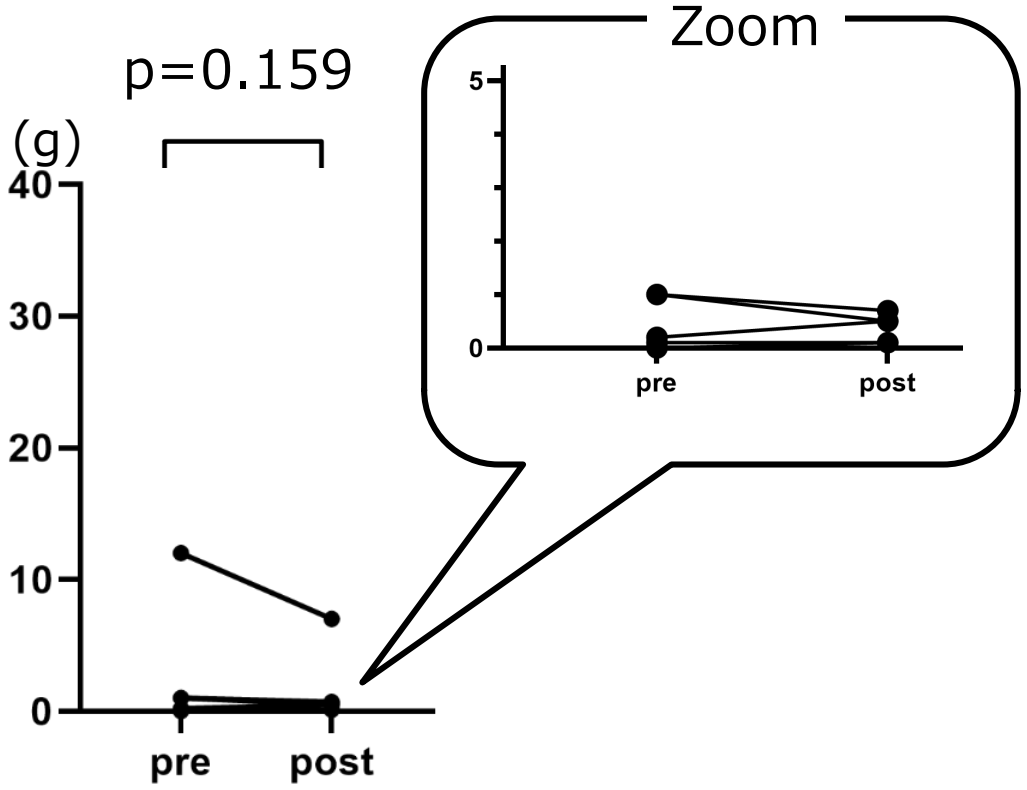


Mann-Whitney test

Safe Amount of boiled egg white



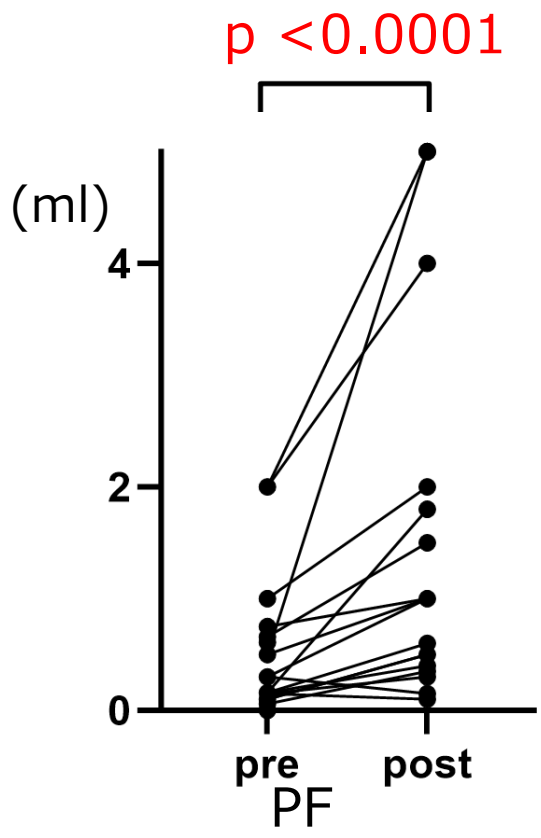
PF
n=42



control
n=13

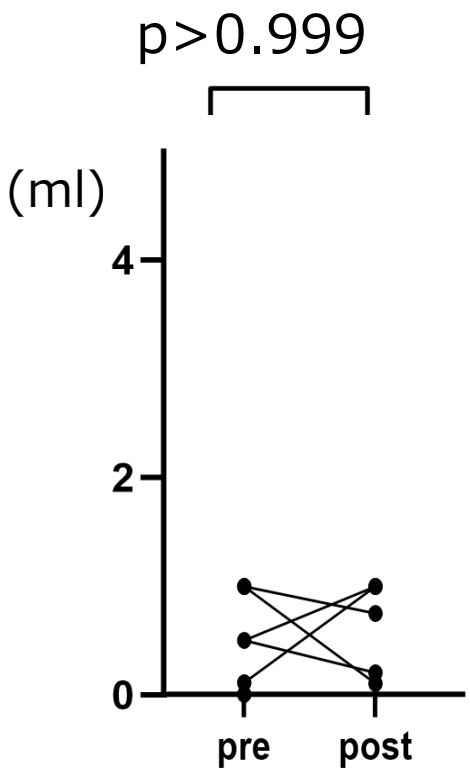
Mann-Whitney test

Safe Amount of milk



PF

n=30

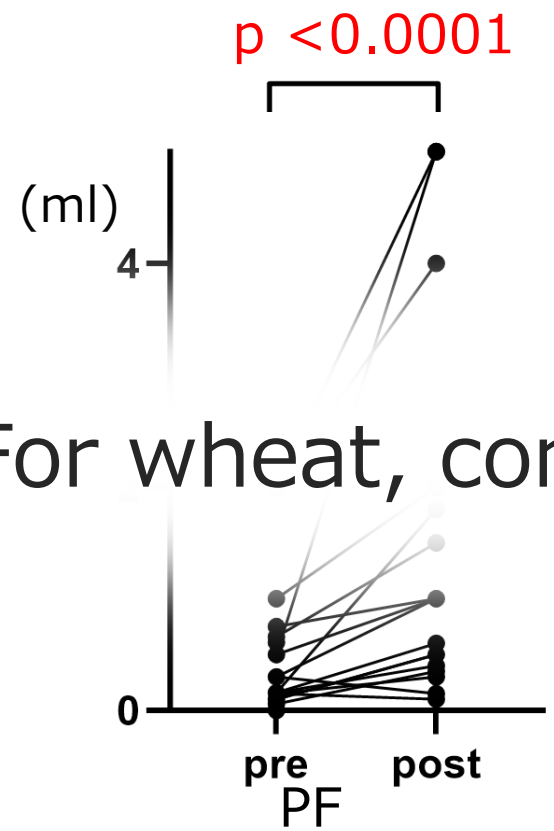


control

n=10

Mann-Whitney test

Safe Amount of milk



PF
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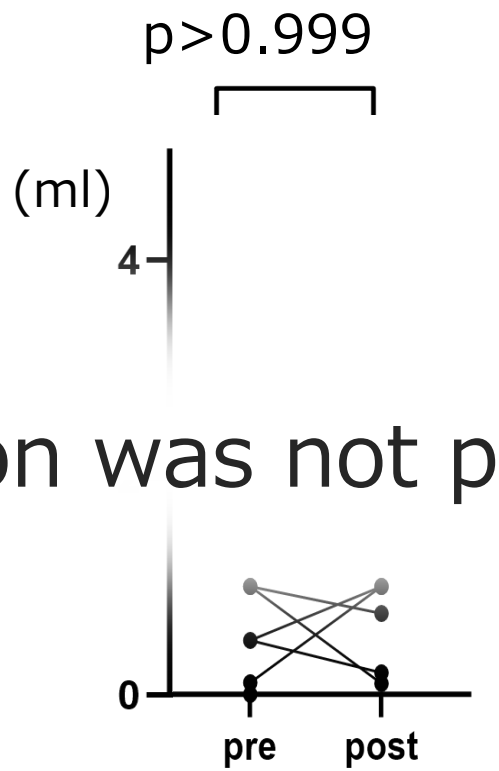

control
n=10

For wheat, comparison was not possible

Mann-Whitney test

Eating processed food with allergens

- Support dietary guidance for FA patients
- May help improve allergy test results
- Makes treatment easier and less stressful for FA patients

Eating processed food with allergens

- Support dietary guidance for FA patients
- May help improve allergy test results
- Makes treatment easier and less stressful

for FA patients

Our food list supports this treatment
by showing safe-to-eat processed foods

The booklet is funded by the Japanese Consumer Affairs Agency budget.

Our Allergy treatment on YouTube

YouTube https://youtu.be/TDZzafNX2oo