

**New Approach in nutrition education:  
electronic dietary recording and  
self-monitoring.**

**Nutritional Science – 2014**

**Valencia, Spain**

**September 23-25, 2014**



# Education Materials

- Food Guide Pyramid/ MyPlate
- Food labelling scheme of pre-packaged foods
- Seminar-led
- eLearning

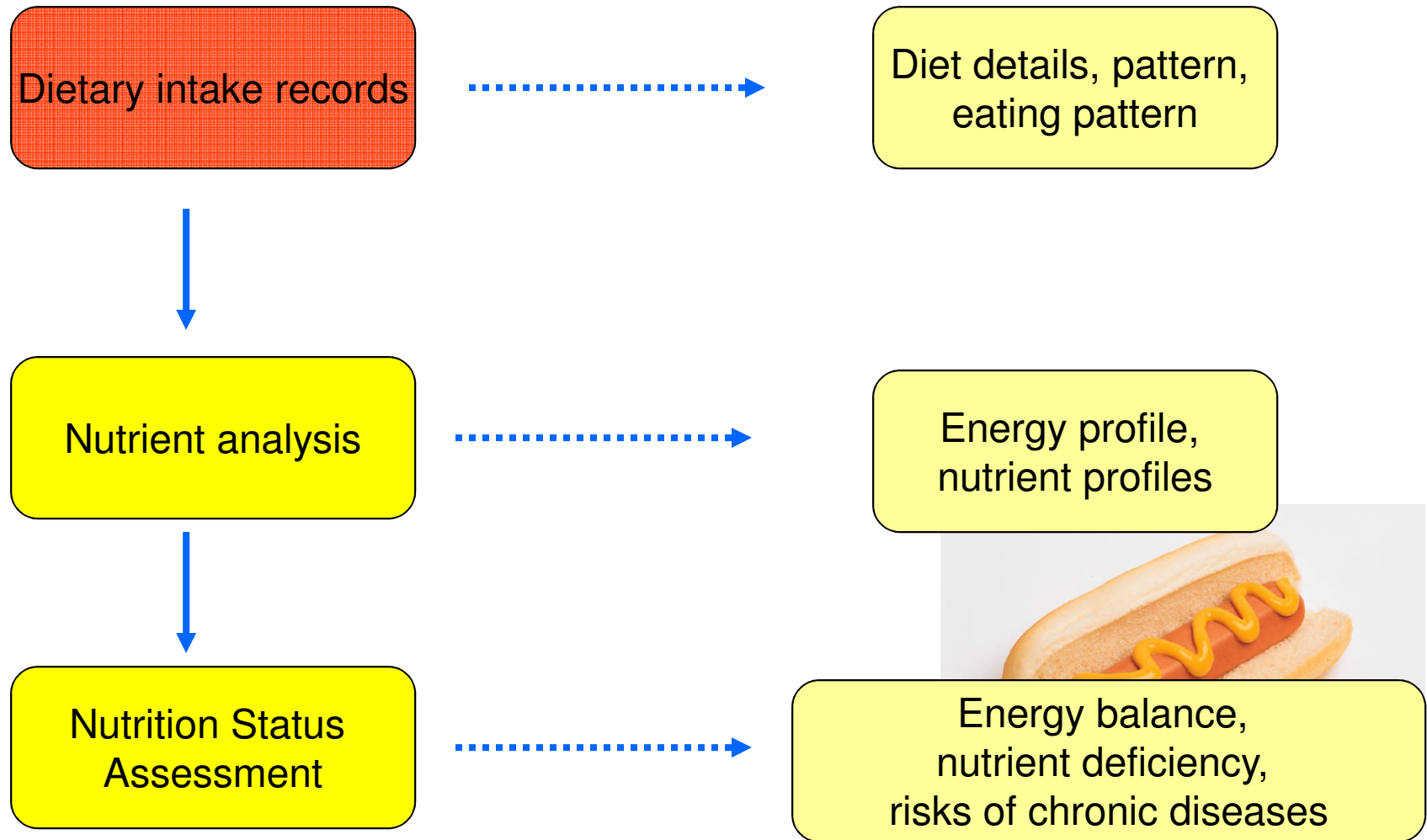


# eLearning

- Web-based or mobile-based (apps)
- Education purpose
- Dietary recording
- Dietary analysis
- Energy reporting
- Nutrient reporting
- Self-monitoring



# Dietary Recording Process





# SuperTracker

The SuperTracker can help you plan, analyze, and track your diet and physical activity.

<http://www.choosemyplate.gov/supertracker-tools/supertracker.html>


- Text-based food searching
- Mainly western food and dishes



[www.eatright.org](http://www.eatright.org)



# Photo-Supported System



eDietary Intake Portal

WELCOMES TO THIS eDIETARY INTAKE PORTAL  
IN THIS PORTAL, YOU CAN:

- Check and record your eating habits
- Submit your record to your nutritionist

Come on in!

USER LOGIN

User ID:

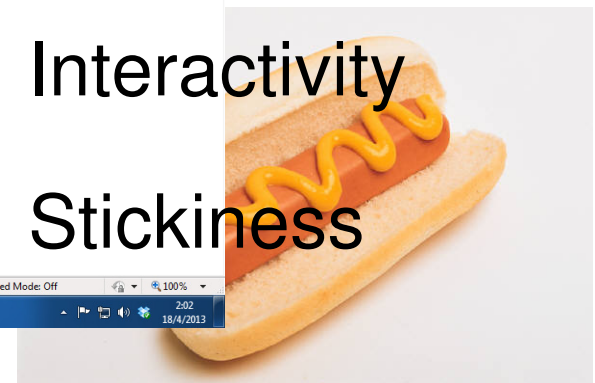
Password:

SUBMIT RESET

The Hong Kong Institute of Education  
香港教育學院

This site is best viewed with Internet Explorer 6.0+ / Firefox 2+ and a screen resolution of 1024 x 768

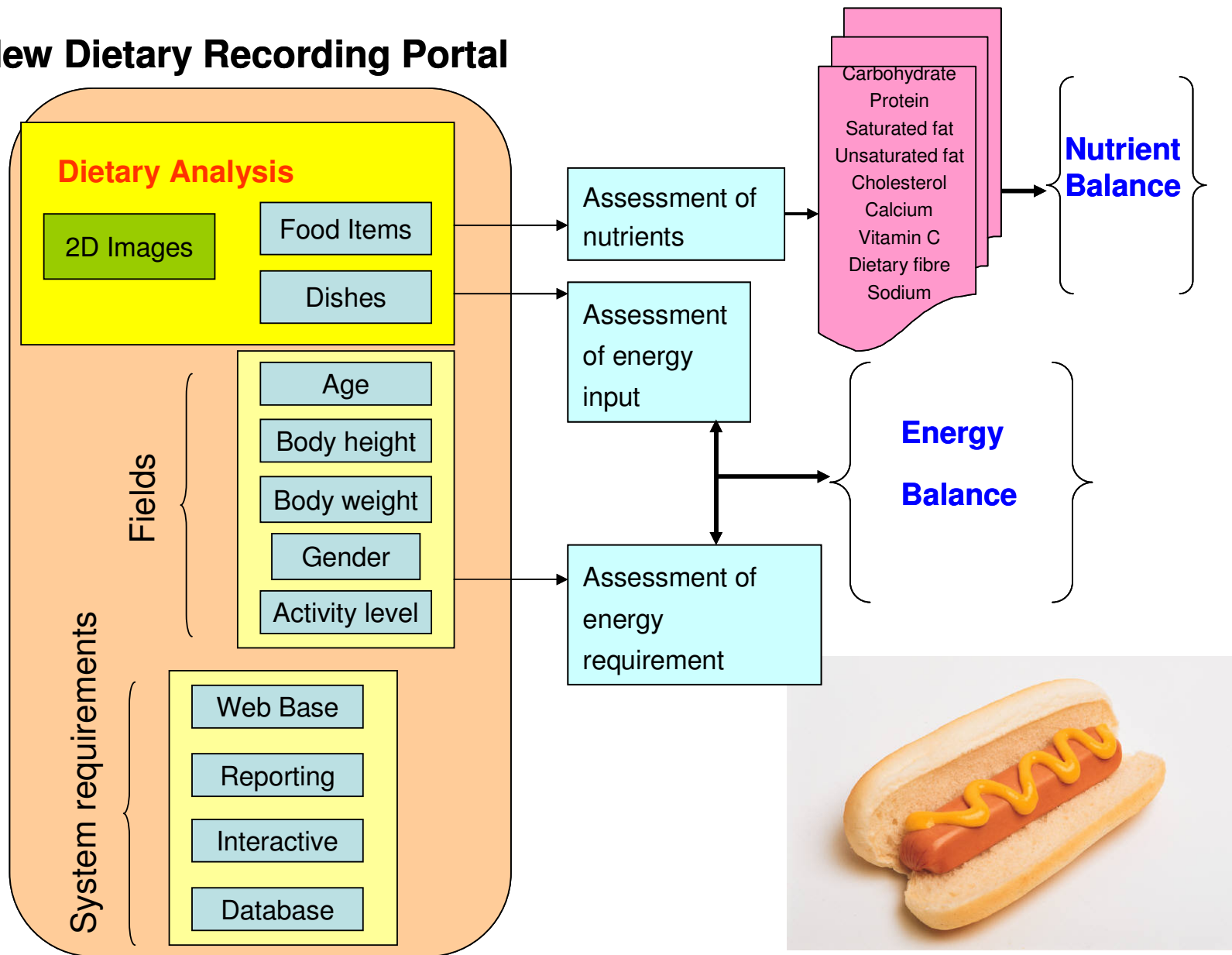
- Accessibility
- Individualization
- User-friendliness
- Interactivity
- Stickiness





# New Dietary Recording Portal

## Specifications



Specifications of new dietary recording portal



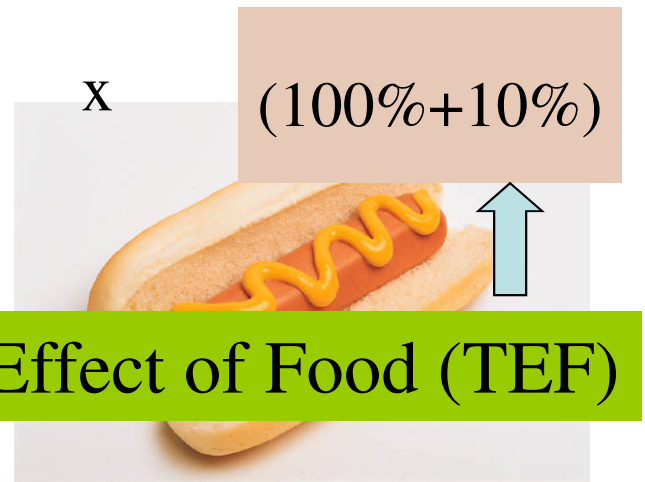
# Defining Energy Balance

Energy Requirement (Energy Output) =

Resting Energy Expenditure (REE) x

Physical Activity Level (PAL) x (100%+10%)

Thermic Effect of Food (TEF)




(Poehlman and Horton, 1988, Shetty et al. 1996, Hildreth and Johnson, 1995)





# Defining Daily Nutrient Values

Carbohydrates	DRV	>60%
Protein	DRV	10%
Fat	DRV	<30%
Saturated Fat	DRV	<10%
Cholesterol	DRV	300mg
Dietary Fiber	DRV	>25g
Sodium	DRV	2400mg
Calcium	RDI	>1000mg
Vitamin C	RDI	>60mg



\*DRV=Daily reference value, RDI=Dietary reference intakes



# Dietary Intake Interface with Individualized Food Questionnaire

## eDietary Intake Portal

| food dietary | report | questionnaire

Hi! Abbie | [logout](#) |



Pick Your Intake Date: Aug 7 2008

Breakfast	Lunch	Afternoon Tea	Dinner	Midnight Snack
This intake has been recorded previously. <input type="button" value="Re-Submit"/>	This intake has been recorded previously. <input type="button" value="Re-Submit"/>	This intake has been recorded previously. <input type="button" value="Re-Submit"/>	Cheese Cake(1) Cappucino(1)	Cup Noodle(1) Meon(1) Milk(1)
			<input type="button" value="Submit"/>	<input type="button" value="Submit"/>



# Daily Dietary Reports

## eDietary Intake Portal

| food dietary | report | questionnaire

Hi! Abbie | [logout](#) |

Pick Your Intake Date: Aug 8 2008

Food Name	Unit	Calories	Carbohydrate	Protein	Total fat	Saturated fat	Non-saturated fat	Fibre	Calcium	Potassium	Sodium	Cholesterol
Breakfast												
Bread	1	9.0	9.0	9.0	18.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Milk	1	9.0	9.0	9.0	18.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Lunch												
Rice	1	250.0	30.0	30.0	60.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Cappucino	1	5.0	5.0	5.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Tea												
Cheese Cake	1	2400.0	8.0	8.0	16.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Dinner												
Rice	1	250.0	30.0	30.0	60.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Melon	1	9.0	9.0	9.0	18.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Beer	1	9.0	9.0	9.0	18.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Night Snacks												
Cup Noodle	1	9.0	9.0	9.0	18.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
<b>Total</b>		<b>2950.0</b>	<b>118.0</b>	<b>118.0</b>	<b>236.0</b>	<b>118.0</b>	<b>118.0</b>	<b>118.0</b>	<b>118.0</b>	<b>118.0</b>	<b>118.0</b>	<b>118.0</b>

Energy Requirement 1888 Kcal

<b>Total Energy Intake</b>	2950.0 Kcal
<b>Carbohydrate</b>	118.0 g
<b>Protein</b>	118.0 g
<b>Total Fat</b>	236.0 g
<b>Saturated Fat</b>	118.0 g
<b>Calcium</b>	118.0 mg
<b>Sodium</b>	118.0 mg
<b>Cholesterol</b>	118.0 mg

### Nutritional Status

Too Much
Not Enough
Not Enough
Pass
Pass
Not Enough
Pass
Pass



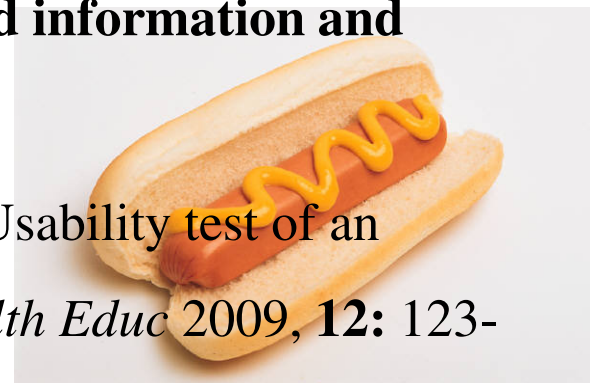
# Reliability, Accuracy, Usability

- **Good reliability and accuracy in food evaluation (ICC=0.916, F=17.001, p<0.001)**

Chung, L.M.Y, Chung, J.W.Y. Tele-dietetics with food images as dietary intake records in nutrition assessment. *Telemed eHealth*, 2010, **16(6)**: 691-698.

- **Good usability in terms of system usability and information and interface quality**

Chung, L.M.Y., Chung, J.W.Y., Wong, T.K.S. Usability test of an interactive dietary recording. *Int Electron J Health Educ* 2009, **12**: 123-134.



# Potential Applications

- Promotion of nutrition knowledge
- Weight management intervention
- Behavioural modification
- Benefits to large scale research



# Relevant Research

- **Comparing weight loss effect in 3 groups: controlled group, paper format and electronic dietary recording methods.**

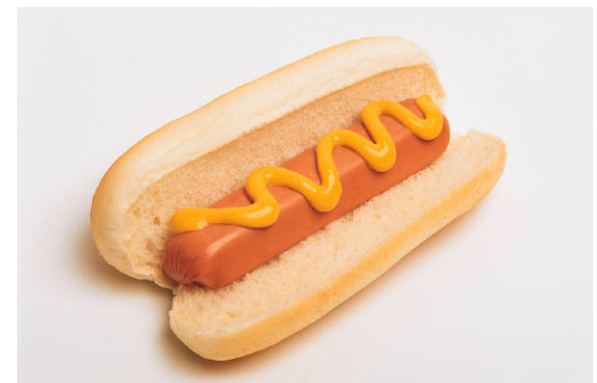
**Chung, L.M.Y., Law, Q.P.S., Fong, S.S.M., & Chung, J.W.Y. (2014). Tele-dietetics improves weight reduction: a randomized controlled trial.**

***Telemedicine and eHealth* 20(1), 55-62.**



# Nutrition Education (Obese adults)

- RCT-pre-post design, 3 groups (electronic recording, paper recording, no recording), N=60
- General Nutrition Knowledge (Parmenter & Wardle, 1999)
- It consists of 110 multiple-choice and short-answer questions
- It tests participants' knowledge
  - dietary recommendations
  - sources of nutrients
  - choosing everyday foods
  - diet-disease relationships





# Results

With-in group diff.	EG (n=20)		FD (n=20)		CG (n=20)	
	Mean (s.d.)	<i>p</i>	Mean (s.d.)	<i>p</i>	Mean (s.d.)	<i>p</i>
Nutrition knowledge score	-1.30 (2.0)	<0.05	-0.80 (1.7)	<0.05	-0.20 (2.2)	>0.05
Sources of nutrients	-3.95 (9.8)	>0.05	-4.65 (5.2)	<0.05	-1.80 (11.8)	>0.05
Choosing everyday foods	-0.35 (1.6)	>0.05	0.30 (1.6)	>0.05	-0.30 (1.1)	>0.05
Diet-disease relationships	-0.20 (2.5)	>0.05	-0.70 (2.1)	>0.05	-0.85 (2.6)	>0.05

Between-group diff.	Effect Size	<i>p</i>
Nutrition knowledge score	0.021	>0.05
Sources of nutrients	0.038	>0.05
Choosing everyday foods	0.124	<0.05
Diet-disease relationships	0.030	>0.05

# Reflective Learning in Higher Education

- 43 university students studied in a co-curricular course of healthy eating.
- They recorded their 14 days diet using the electronic dietary system.

## Outcome measures:

- Average dietary intake (first 7 days, last 7 days)
- Reflection on submitted reflective journals



# Results

**Table 1. Paired samples t-test in daily pre-post energy and nutrients.**

Energy/Nutrients	1 <sup>st</sup> week Mean± s.d.	2 <sup>nd</sup> week Mean± s.d.	t	p-value
Total calorie	1131±554	996±424	2.567	<0.05 <sup>a</sup>
Carbohydrate (gram)	174±190	133±57	1.492	>0.05
Protein (gram)	46±23	44±21	1.131	>0.05
Saturated fat (gram)	11.0±7.6	8.9±5.0	2.463	<0.05 <sup>a</sup>
Dietary fibre (gram)	9.1±5.7	8.2±6.1	1.397	>0.05
Calcium (milligram)	276±189	271±178	0.200	>0.05
Sodium (milligram)	1631±827	1526±705	1.002	>0.05
Cholesterol (milligram)	185±122	171±121	0.894	>0.05
Trans-fat (gram)	0.5±0.95	0.3±0.49	1.898	>0.05
Sugar (gram)	184±995	178±995	2.578	<0.05 <sup>a</sup>
Vitamin C (milligram)	73±158	62±104	0.787	>0.05
Total fat (gram)	39.6±25	31.8±15.6	2.830	<0.05 <sup>a</sup>

All energy and nutrients were analysis in daily basis.

<sup>a</sup> indicates significant difference at  $\alpha=0.05$  level.

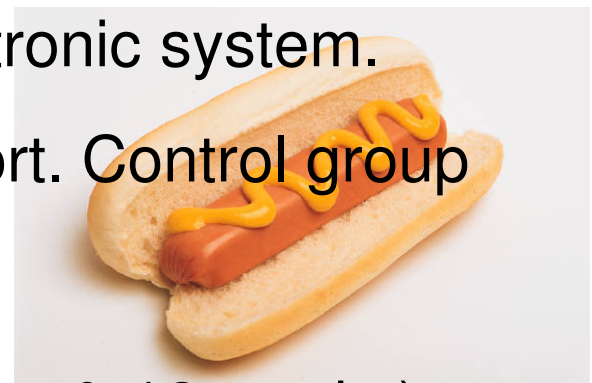


# Nutrition Education in Secondary Students (a pilot study)

- S2 students (N=27)
- Control group : 13
- Intervention group : 14
- Method:

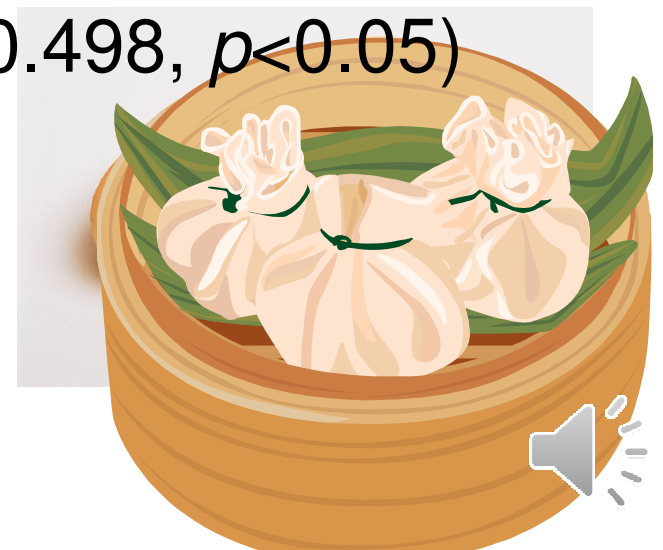


- 12 weeks dietary recording with electronic system.  
Intervention group review online report. Control group cannot review online report.
- General Nutrition Knowledge (baseline & 12 weeks)



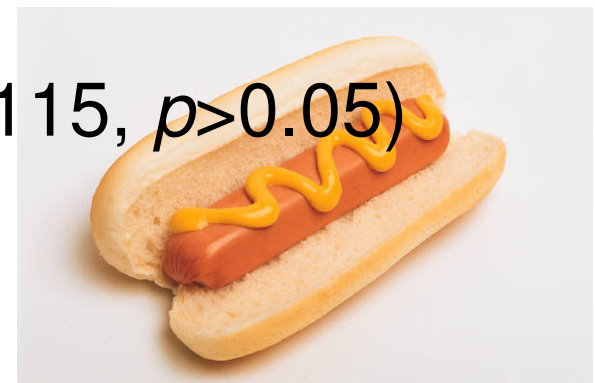
# Results

- Within-subject differences
  - dietary recommendations ( $\eta=0.664$ ,  $p<0.05$ )
  - sources of nutrients ( $\eta=0.688$ ,  $p<0.05$ )
  - choosing everyday foods ( $\eta=0.662$ ,  $p<0.05$ )
  - diet-disease relationships ( $\eta=0.498$ ,  $p<0.05$ )



# Results

- Between-groups differences:
  - dietary recommendations ( $\eta=0.216$ ,  $p<0.05$ )
  - sources of nutrients ( $\eta=0.607$ ,  $p<0.05$ )
  - choosing everyday foods ( $\eta=0.193$ ,  $p<0.05$ )
  - diet-disease relationships ( $\eta=0.115$ ,  $p>0.05$ )



# Thank You



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