

Supplementary materials

Bensaada et al.

Development of an assay for Soy Isoflavones in Women's Hair and validation of a French Dietary Habits Inquiry

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Abstract: Soy isoflavones have estrogenic and anti-thyroidal effects in animals and humans that can be beneficial or adverse, depending on consumers' physiological status. Hence, knowing the consumers' isoflavones exposure can help when looking for health issues related to estrogenic or thyroidal effects. Several extraction methods were tested on 60 volunteer's hair samples from a hairdresser and from the clinical trial 2017T2-29. The acidic digestion method was the most efficient regarding isoflavones. A dietary habit inquiry was developed based on the analysis of 12,707 food labels from France. A score for the consumer's exposure to isoflavones was built considering, among other parameters, soy-based diet and foodstuff containing soy as an ingredient, i.e. "hidden-soy". The correlation between this score and isoflavones measurements in hair reached 0.947; $p < 0.001$. Therefore, providing that relevant data are considered to assess isoflavones exposure, hair which smoothen daily isoflavones intakes' variations, is a relevant tissue to assess human isoflavones exposure for subsequent health analysis.

Keywords: soy isoflavones; consumer exposure; hair samples; dietary inquiry; digestion method.

Abbreviations:

DAI: Daidzein aglucone form

IFS: Isoflavone Food score

GEN: Genistein aglucone form

IHS: Isoflavone Hair score

Data presented:

Supplementary material S1: Dietary Inquiry Proposed to Volunteers

Supplementary material S2: Matrix used to Calculate IFS and IHS

Supplementary material S3: Evidencing a Questionable Answer to the Food Questionnaire

Supplementary material S4: Pearson Regression Correlation Between Individual Isoflavones and HIS

Supplementary materials Bensaada et al.

1 Supplementary data S1: Dietary Inquiry

Subject and study parameters

Study acronym	<input style="width: 90%;" type="text"/>	Promotor's name	<input style="width: 90%;" type="text"/>
Subject code	<input style="width: 90%;" type="text"/>	Inquiry date	<input style="width: 90%;" type="text"/>
Investigator ID	<input style="width: 90%;" type="text"/>	Investigator's name	<input style="width: 90%;" type="text"/>

Hair treatments questionnaire

Sex of the volunteer	<input style="width: 90%;" type="text"/>	Subject's age	<input style="width: 90%;" type="text"/>	Casual treatment since	<input style="width: 90%;" type="text"/>
Natural colour of the hair	<input style="width: 90%;" type="text"/>	Last colouring	<input style="width: 90%;" type="text"/>	Casual product used	<input style="width: 90%;" type="text"/>
Shampoo frequency	<input style="width: 90%;" type="text"/>	Colouring frequency	<input style="width: 90%;" type="text"/>	Last product used	<input style="width: 90%;" type="text"/>
Hair length	<input style="width: 90%;" type="text"/>	Last perm	<input style="width: 90%;" type="text"/>	Casual product used	<input style="width: 90%;" type="text"/>
Cutting frequency	<input style="width: 90%;" type="text"/>	Perm frequency	<input style="width: 90%;" type="text"/>	Last product used	<input style="width: 90%;" type="text"/>

Food consumption profile

Food habits	I eat at home <small>3 times a day</small>	I eat in a canteen <small>3 times a day</small>	I eat in a restaurant <small>3 times a day</small>	Cooking practices	Frequency per week <small>(number of times)</small>
<input style="width: 20px;" type="checkbox"/> Omnivorous	<input style="width: 40px;" type="text"/> 2 times a day	<input style="width: 40px;" type="text"/> 2 times a day	<input style="width: 40px;" type="text"/> 2 times a day	<input style="width: 40px;" type="text"/> Frying	<input style="width: 40px;" type="text"/>
<input style="width: 20px;" type="checkbox"/> Vegetarian	<input style="width: 40px;" type="text"/> once a day	<input style="width: 40px;" type="text"/> once a day	<input style="width: 40px;" type="text"/> once a day	<input style="width: 40px;" type="text"/> Vapor cooking	<input style="width: 40px;" type="text"/>
<input style="width: 20px;" type="checkbox"/> Lacto-vegetarian				<input style="width: 40px;" type="text"/> Boiling	<input style="width: 40px;" type="text"/>
<input style="width: 20px;" type="checkbox"/> Vegan	<input style="width: 40px;" type="text"/> I go to the fast-food <small>once a week</small>	<input style="width: 40px;" type="text"/> I eat in my office	<input style="width: 40px;" type="text"/> at least once a week	<input style="width: 40px;" type="text"/> Grill	<input style="width: 40px;" type="text"/>
<input style="width: 20px;" type="checkbox"/> Flexivegetarian	<input style="width: 40px;" type="text"/> I don't have 3 meals a day	<input style="width: 40px;" type="text"/> I have snacks all day	<input style="width: 40px;" type="text"/> I have food supplements	<input style="width: 40px;" type="text"/> Wok/Oven	<input style="width: 40px;" type="text"/>
	<input style="width: 40px;" type="text"/> I am a small-eater	<input style="width: 40px;" type="text"/> I am a medium-eater	<input style="width: 40px;" type="text"/> I am a big-eater	Which food supplements	
For how-long have you been on this diet?	<input style="width: 40px;" type="text"/>				
	If your case is not considered please tell us if you have a specific diet (allergies, ...)				

Supplementary materials
Bensaada et al.

3 Supplementary data S1: Dietary Inquiry (continued)

Consumption of foodstuff based on "plant-milk"

1	Do you drink soy-milk?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size																	
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																						
	1		glass																						
	2		bowl																						
	3		plate																						
2	Do you eat soy-yogurts?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size																	
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																						
	1		glass																						
	2		bowl																						
	3		plate																						
3	Do you eat soy-cream?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size																	
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																						
	1		glass																						
	2		bowl																						
	3		plate																						
4	Do you eat soy-cheese or tofu?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size																	
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																						
	1		glass																						
	2		bowl																						
	3		plate																						
5	Do you drink "plant-milks" (coconut, hase lnut, almond, rice...)	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size																	
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
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	2		bowl																						
	3		plate																						

Supplementary materials
Bensaada et al.

6 Supplementary data S1: Dietary Inquiry (continued)

Consumption of elaborated dishes

6	Do you eat soy-based products Which season	<input type="text"/>	Winter	<input type="text"/>	Spring	<input type="text"/>	Summer	<input type="text"/>	Autumn	<input type="text"/>	All year	Casual portion size																
	(Sausages, burgers, minced meat, balls...)																											
	<input type="text"/> several a day <input type="text"/> everyday <input type="text"/> sometimes a week <input type="text"/> once a week <input type="text"/> < once a week <input type="text"/> several a month <input type="text"/> < once a month <input type="text"/> never											<table border="0" style="border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																									
	1		glass																									
	2		bowl																									
	3		plate																									
7	Do you eat meat-based elaborated dishes? Which season	<input type="text"/>	Winter	<input type="text"/>	Spring	<input type="text"/>	Summer	<input type="text"/>	Autumn	<input type="text"/>	All year	Casual portion size																
	(paté, sauces...)																											
	<input type="text"/> several a day <input type="text"/> everyday <input type="text"/> sometimes a week <input type="text"/> once a week <input type="text"/> < once a week <input type="text"/> several a month <input type="text"/> < once a month <input type="text"/> never											<table border="0" style="border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																									
	1		glass																									
	2		bowl																									
	3		plate																									
8	Do you eat fish-based elaborated dishes? Which season	<input type="text"/>	Winter	<input type="text"/>	Spring	<input type="text"/>	Summer	<input type="text"/>	Autumn	<input type="text"/>	All year	Casual portion size																
	(surimi, paté...)																											
	<input type="text"/> several a day <input type="text"/> everyday <input type="text"/> sometimes a week <input type="text"/> once a week <input type="text"/> < once a week <input type="text"/> several a month <input type="text"/> < once a month <input type="text"/> never											<table border="0" style="border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																									
	1		glass																									
	2		bowl																									
	3		plate																									
9	Do you eat vegetable-based elaborated dishes? Which season	<input type="text"/>	Winter	<input type="text"/>	Spring	<input type="text"/>	Summer	<input type="text"/>	Autumn	<input type="text"/>	All year	Casual portion size																
	<input type="text"/> several a day <input type="text"/> everyday <input type="text"/> sometimes a week <input type="text"/> once a week <input type="text"/> < once a week <input type="text"/> several a month <input type="text"/> < once a month <input type="text"/> never											<table border="0" style="border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																									
	1		glass																									
	2		bowl																									
	3		plate																									
10	Do you eat pizzas? Which season	<input type="text"/>	Winter	<input type="text"/>	Spring	<input type="text"/>	Summer	<input type="text"/>	Autumn	<input type="text"/>	All year	Casual portion size																
	<input type="text"/> several a day <input type="text"/> everyday <input type="text"/> sometimes a week <input type="text"/> once a week <input type="text"/> < once a week <input type="text"/> several a month <input type="text"/> < once a month <input type="text"/> never											<table border="0" style="border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																									
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	2		bowl																									
	3		plate																									

Supplementary materials
Bensaada et al.

8

9 **Supplementary data S1: Dietary Inquiry (continued)**

11	Do you eat fresh elaborated dishes?	Which season		Winter		Spring		Summer		Autumn		All year	Casual portion size																
	<input style="width: 50px; height: 20px;" type="text"/> several a day <input style="width: 50px; height: 20px;" type="text"/> everyday <input style="width: 50px; height: 20px;" type="text"/> sometimes a week <input style="width: 50px; height: 20px;" type="text"/> once a week <input style="width: 50px; height: 20px;" type="text"/> < once a week <input style="width: 50px; height: 20px;" type="text"/> several a month <input style="width: 50px; height: 20px;" type="text"/> < once a month <input style="width: 50px; height: 20px;" type="text"/> never												<table border="0"> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1/2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">spoon</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">glass</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">bowl</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">3</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">plate</td> </tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																										
	1		glass																										
	2		bowl																										
	3		plate																										
12	Do you eat meat-based canned dishes?	Which season		Winter		Spring		Summer		Autumn		All year	Casual portion size																
	<input style="width: 50px; height: 20px;" type="text"/> several a day <input style="width: 50px; height: 20px;" type="text"/> everyday <input style="width: 50px; height: 20px;" type="text"/> sometimes a week <input style="width: 50px; height: 20px;" type="text"/> once a week <input style="width: 50px; height: 20px;" type="text"/> < once a week <input style="width: 50px; height: 20px;" type="text"/> several a month <input style="width: 50px; height: 20px;" type="text"/> < once a month <input style="width: 50px; height: 20px;" type="text"/> never												<table border="0"> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1/2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">spoon</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">glass</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">bowl</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">3</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">plate</td> </tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																										
	1		glass																										
	2		bowl																										
	3		plate																										
13	Do you eat nuggets frozen or not?	Which season		Winter		Spring		Summer		Autumn		All year	Casual portion size																
	<input style="width: 50px; height: 20px;" type="text"/> several a day <input style="width: 50px; height: 20px;" type="text"/> everyday <input style="width: 50px; height: 20px;" type="text"/> sometimes a week <input style="width: 50px; height: 20px;" type="text"/> once a week <input style="width: 50px; height: 20px;" type="text"/> < once a week <input style="width: 50px; height: 20px;" type="text"/> several a month <input style="width: 50px; height: 20px;" type="text"/> < once a month <input style="width: 50px; height: 20px;" type="text"/> never												<table border="0"> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1/2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">spoon</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">glass</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">bowl</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">3</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">plate</td> </tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																										
	1		glass																										
	2		bowl																										
	3		plate																										
14	Do you eat Kebbabs or hamburgers?	Which season		Winter		Spring		Summer		Autumn		All year	Casual portion size																
	<input style="width: 50px; height: 20px;" type="text"/> several a day <input style="width: 50px; height: 20px;" type="text"/> everyday <input style="width: 50px; height: 20px;" type="text"/> sometimes a week <input style="width: 50px; height: 20px;" type="text"/> once a week <input style="width: 50px; height: 20px;" type="text"/> < once a week <input style="width: 50px; height: 20px;" type="text"/> several a month <input style="width: 50px; height: 20px;" type="text"/> < once a month <input style="width: 50px; height: 20px;" type="text"/> never												<table border="0"> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1/2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">spoon</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">glass</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">bowl</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">3</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">plate</td> </tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																										
	1		glass																										
	2		bowl																										
	3		plate																										
15	Do you eat meat-balls frozen or not?	Which season		Winter		Spring		Summer		Autumn		All year	Casual portion size																
	<input style="width: 50px; height: 20px;" type="text"/> several a day <input style="width: 50px; height: 20px;" type="text"/> everyday <input style="width: 50px; height: 20px;" type="text"/> sometimes a week <input style="width: 50px; height: 20px;" type="text"/> once a week <input style="width: 50px; height: 20px;" type="text"/> < once a week <input style="width: 50px; height: 20px;" type="text"/> several a month <input style="width: 50px; height: 20px;" type="text"/> < once a month <input style="width: 50px; height: 20px;" type="text"/> never												<table border="0"> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1/2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">spoon</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">1</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">glass</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">2</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">bowl</td> </tr> <tr> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">3</td> <td style="border: 1px solid black; width: 40px; height: 20px;"></td> <td style="padding: 0 5px;">plate</td> </tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																										
	1		glass																										
	2		bowl																										
	3		plate																										

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Supplementary materials
Bensaada et al.

12

13 **Supplementary data S1: Dietary Inquiry (continued)**

16	Do you eat "escaloppe cordon bleu" frozen or not?	Which season	<input type="checkbox"/> Winter	<input type="checkbox"/> Spring	<input type="checkbox"/> Summer	<input type="checkbox"/> Autumn	<input type="checkbox"/> All year	Casual portion size																
	<input type="checkbox"/> several a day	<input type="checkbox"/> everyday	<input type="checkbox"/> sometimes a week	<input type="checkbox"/> once a week	<input type="checkbox"/> < once a week	<input type="checkbox"/> several a month	<input type="checkbox"/> < once a month	<input type="checkbox"/> never																
								<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																					
	1		glass																					
	2		bowl																					
	3		plate																					
17	Do you eat stuffed vegetables frozen or not?	Which season	<input type="checkbox"/> Winter	<input type="checkbox"/> Spring	<input type="checkbox"/> Summer	<input type="checkbox"/> Autumn	<input type="checkbox"/> All year	Casual portion size																
	<input type="checkbox"/> several a day	<input type="checkbox"/> everyday	<input type="checkbox"/> sometimes a week	<input type="checkbox"/> once a week	<input type="checkbox"/> < once a week	<input type="checkbox"/> several a month	<input type="checkbox"/> < once a month	<input type="checkbox"/> never																
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	1/2		spoon																					
	1		glass																					
	2		bowl																					
	3		plate																					
18	Do you eat frozen ground beef?	Which season	<input type="checkbox"/> Winter	<input type="checkbox"/> Spring	<input type="checkbox"/> Summer	<input type="checkbox"/> Autumn	<input type="checkbox"/> All year	Casual portion size																
	<input type="checkbox"/> several a day	<input type="checkbox"/> everyday	<input type="checkbox"/> sometimes a week	<input type="checkbox"/> once a week	<input type="checkbox"/> < once a week	<input type="checkbox"/> several a month	<input type="checkbox"/> < once a month	<input type="checkbox"/> never																
								<table border="0" style="display: inline-table; vertical-align: middle;"> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">1/2</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">spoon</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">1</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">glass</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">2</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">bowl</td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">3</td><td style="border: 1px solid black; width: 20px; height: 15px;"></td><td style="padding: 0 5px;">plate</td></tr> </table>		1/2		spoon		1		glass		2		bowl		3		plate
	1/2		spoon																					
	1		glass																					
	2		bowl																					
	3		plate																					
19	Do you eat industrial biscuits?	Which season	<input type="checkbox"/> Winter	<input type="checkbox"/> Spring	<input type="checkbox"/> Summer	<input type="checkbox"/> Autumn	<input type="checkbox"/> All year	Casual portion size																
	<input type="checkbox"/> several a day	<input type="checkbox"/> everyday	<input type="checkbox"/> sometimes a week	<input type="checkbox"/> once a week	<input type="checkbox"/> < once a week	<input type="checkbox"/> several a month	<input type="checkbox"/> < once a month	<input type="checkbox"/> never																
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	1		glass																					
	2		bowl																					
	3		plate																					

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16

Supplementary materials
Bensaada et al.

17 Supplementary data S1: Dietary Inquiry (continued)

Legume consumption raw or cooked

20	Do you eat legumes like beans, lentils, peas	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size		
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<input type="text"/> 1/2 <input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 3	<input type="text"/> spoon <input type="text"/> glass <input type="text"/> bowl <input type="text"/> plate
21	Do you eat chick-peas?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size		
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<input type="text"/> 1/2 <input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 3	<input type="text"/> spoon <input type="text"/> glass <input type="text"/> bowl <input type="text"/> plate
22	Do you eat soybeans ?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size		
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<input type="text"/> 1/2 <input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 3	<input type="text"/> spoon <input type="text"/> glass <input type="text"/> bowl <input type="text"/> plate
23	Do you eat mungo-sprouts?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size		
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<input type="text"/> 1/2 <input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 3	<input type="text"/> spoon <input type="text"/> glass <input type="text"/> bowl <input type="text"/> plate
24	Do you eat alfalfa or clover sprouts?	Which season	<input type="text"/> Winter	<input type="text"/> Spring	<input type="text"/> Summer	<input type="text"/> Autumn	<input type="text"/> All year	Casual portion size		
	<input type="text"/> several a day	<input type="text"/> everyday	<input type="text"/> sometimes a week	<input type="text"/> once a week	<input type="text"/> < once a week	<input type="text"/> several a month	<input type="text"/> < once a month	<input type="text"/> never	<input type="text"/> 1/2 <input type="text"/> 1 <input type="text"/> 2 <input type="text"/> 3	<input type="text"/> spoon <input type="text"/> glass <input type="text"/> bowl <input type="text"/> plate

Supplementary materials
Bensaada et al.

19 Supplementary material S2: Calculation of IFS and HIS

Hair						Multiplying factor
Length	Short 0,5	Medium 0,2	Long 0,1		A	a = A + B + C
Frequency of cutting	<2 month 0,5	<4 month 0,2	>4 month 0,1		B	
Treatments	Shampoo 0,5	Colouring 0,2	Perm 0,1		C	

Dietary tendencies						Multiplying factor
Big eater 1,5	Medium eater 1	Small eater 0,5			D	b = D
Diet duration (months) E		Hair length F				c = a + b
					G=E/F	

Vegan 1	Vegetarian 0,8	Lactovegetarian 0,8	Flexitarian 0,5	Omnivore 0,2	a
Asian 1	Exotic 0,8	Gluten free 0,2	Lactose free 0	Other	b
Wok/Oven 1	Vapor 0,8	Grill 0,5	Frying 0,2	Boiling 0	c
Ultratransformed 1	Industrial 0,5	Home-made 0,2			d
Canteen >3 times/week 1	Fast food >2times /w 0,8	Restaurant > 2times/w 0,5	Home > 3times/w 0,2		e

20

21

Supplementary materials
Bensaada et al.

22 Supplementary material S2: Calculation of IFS and HIS (continue)

Soy-consumption

Soy juice	Every day 2	> once a week 1	< once a week 0,5	never 0	f	
Soy yogurt	Every day 0,8	> once a week 0,3	< once a week 0,1	never 0	g	
Soy cream and icecream	Every day 2	> once a week 1	< once a week 0,5	never 0	h	
Soy cheese and tofu	Every day 1	> once a week 0,5	< once a week 0,2	never 0	i	
Other plant juices	Every day 0	> once a week 0	< once a week 0	never 0	j	
Other soy products (miso, tempeh...)	Every day 2	> once a week 1	< once a week 0,5	never 0	k	
Meat based dishes	Every day 0,2	> once a week 0,1	< once a week 0	never 0	l	If Canteens, increased to the upper level
Fish based dishes	Every day 0,2	> once a week 0	< once a week 0	never 0	m	If Canteens, increased to the upper level
Vegetables based dishes	Every day 0,4	> once a week 0,2	< once a week 0	never 0	n	If Canteens, increased to the upper level
Pizzas	Every day 0,1	> once a week 0	< once a week 0	never 0	o	If Canteens, increased to the upper level
Elaborated dishes	Every day 0,3	> once a week 0,1	< once a week 0	never 0	p	If Canteens, increased to the upper level
Canned recipes	Every day 0,2	> once a week 0,1	< once a week 0	never 0	q	If Canteens, increased to the upper level
Nuggets	Every day 0,2	> once a week 0,1	< once a week 0	never 0	r	If soy increased to the upper level
Hamburgers / Kebabs	Every day 0,5	> once a week 0,2	< once a week 0,1	never 0	s	If soy increased to the upper level
Meat balls	Every day 0,5	> once a week 0,2	< once a week 0,1	never 0	t	If soy increased to the upper level

Supplementary materials
Bensaada et al.

24 Supplementary material S2: Calculation of IFS and HIS (continue)

Escalope cordon bleu	Every day 0,2	> once a week 0,1	< once a week 0	never 0	u	If soy increased to the upper level
Stuffed vegetables (tomatoes, cabbages...)	Every day 0,2	> once a week 0,1	< once a week 0	never 0	v	If Canteens, increased to the upper level
Frozen minced steaks	Every day 0,5	> once a week 0,2	< once a week 0,1	never 0	w	If Canteens, increased to the upper level
Industrial biscuits	Every day 0,15	> once a week 0,1	< once a week 0	never 0	x	If Canteens, increased to the upper level
Other legumes	Every day 0,2	> once a week 0,1	< once a week 0	never 0	y	
Chick peas	Every day 0,2	> once a week 0,1	< once a week 0	never 0	z	
Soy seeds	Every day 3	> once a week 2	< once a week 1	never 0	aa	
soybean sprouts	Every day 0,5	> once a week 0,2	< once a week 0,1	never 0	ba	
Alfalfa or clover sprouts	Every day 3	> once a week 2	< once a week 1	never 0	ca	

25

Food supplements	Soy/Alfalfa/Clover 1	Others 0	None 0		da
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Isoflavone Food Score (IFS)

$$IFS = \text{SUM}(a:da) * c$$

Isoflavone Hair Score (IHS)

$$IHS = IFS * G$$

26

27

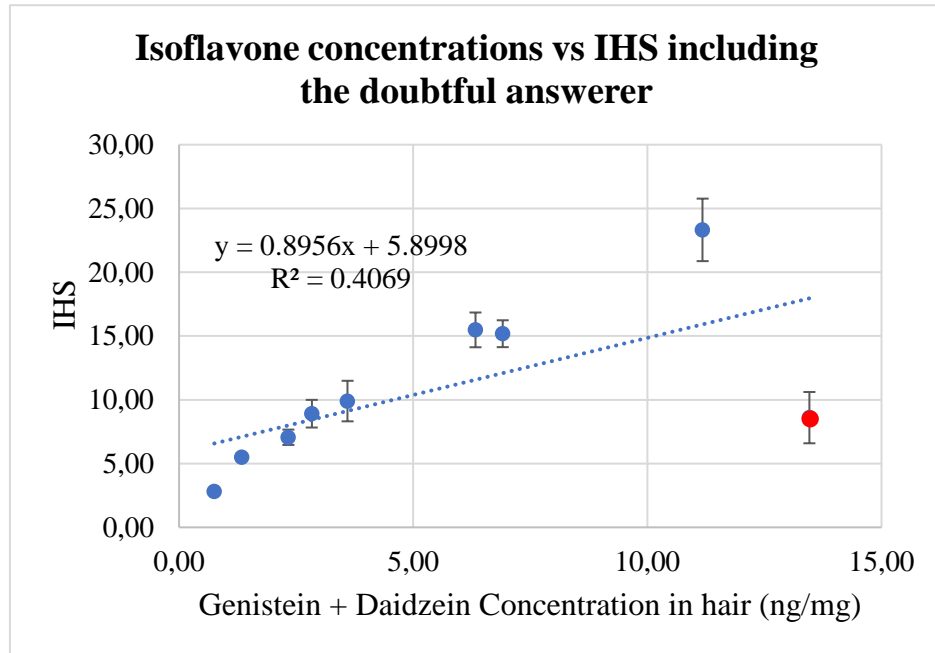
Supplementary materials
Bensaada et al.

28

29 Supplementary material S3: Evidencing a Questionable Answer to the Food Questionnaire

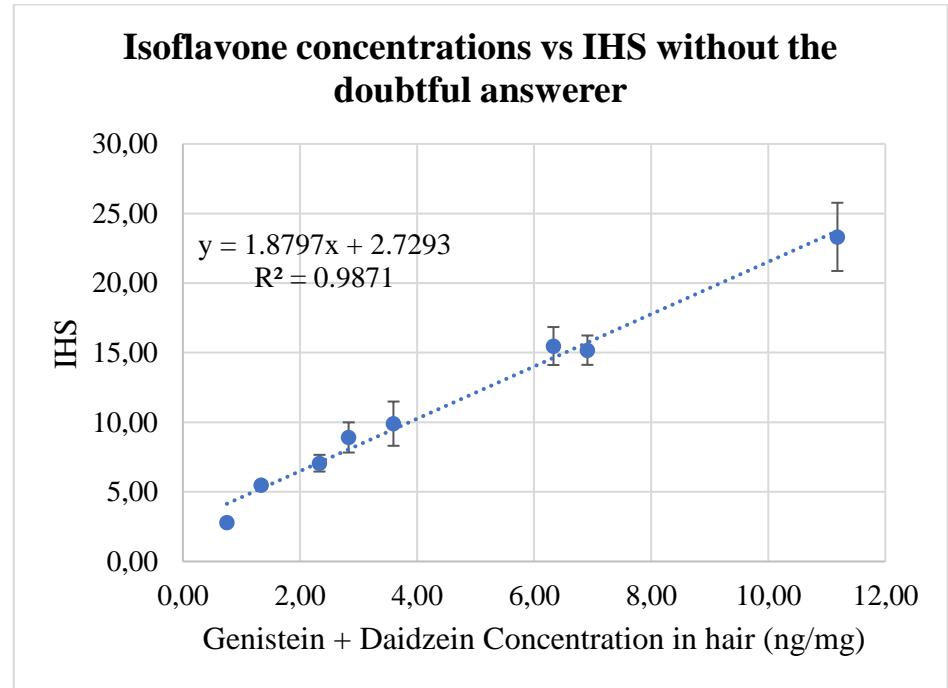
30

A



N= 9; r = 0.638 p<0.1

B



N = 8; r = 0.993 p<0.001

31

32

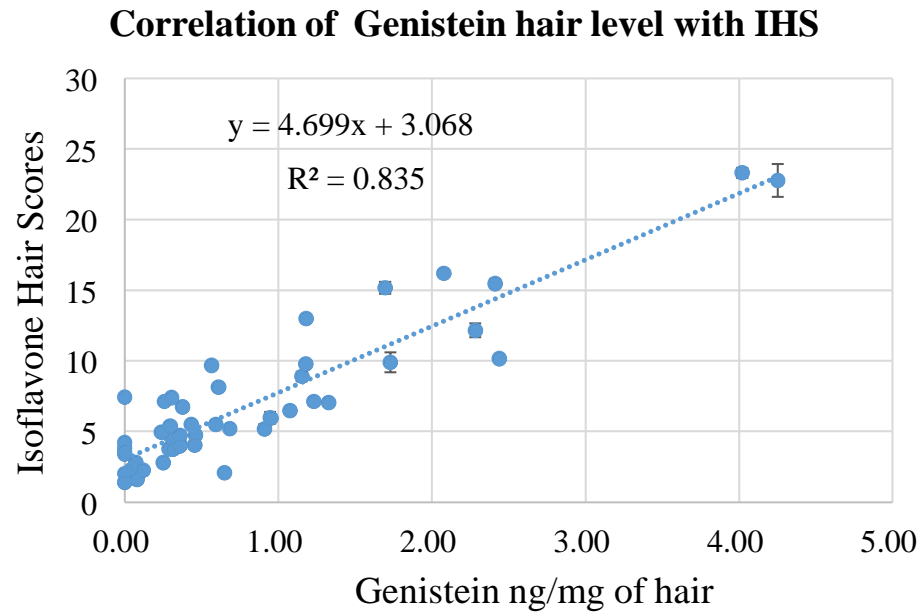
Supplementary materials
Bensaada et al.

33

34 Supplementary material S4: Pearson Regression Correlation Between Individual Isoflavones and IHS

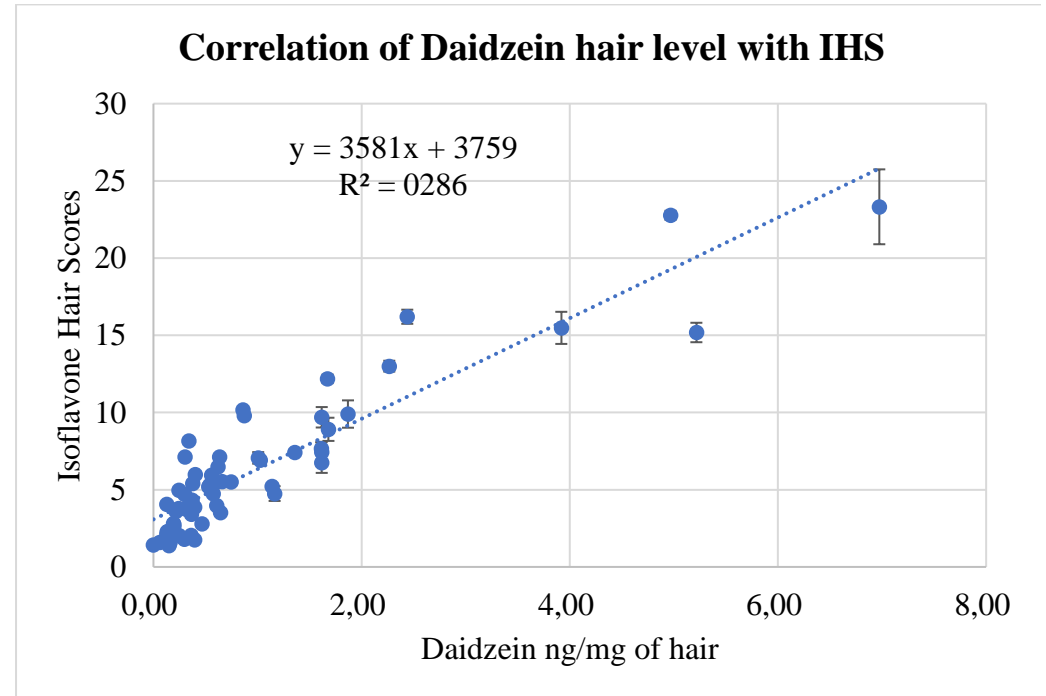
35

A



N = 60; $r_G = 0.914$ $p < 0.001$

B



N = 60; $r_D = 0.91$; $p < 0.001$

36

37