Safe structural food bolus in elderly: the relevant parameters

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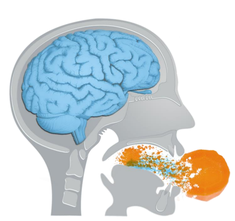
Introduction

The median particle size of the food bolus is commonly used to characterize food bolus structure, either expressed in weight, diameter or area using sieve or image analysis (Kreuler et al., 2012; Witter et al., 2013; Le Bleis et al., 2013; Tournier et al., 2015). However, the median particle size does not take into account bolus heterogeneity. Furthermore, the studies have investigated a fully dentate population. The aim of the present study is to evaluate the relevance of the median particle size to discriminate elderlies carrot bolus properties and to identify relevant parameters of bolus' structure to differentiate safe to unsafe bolus among the elderlies contrasting by their dental status.

Subjects

n	sex		mean age (yo)	Mean number of posterior dental occlusion	Mean resting salivary flow (ml/min)
	women	men			
93	56	37	72 ± 0.6	5.8 ± 0.3	0.3 ± 0.02

Protocol



Chewing until obtaining a bolus ready to be swallowed

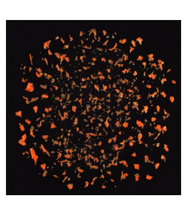


Image analysis

Median size calculation

Limit of the median size parameter

Subject #1

Subject #2

	Subject 1	Subject 2
Number of particle	91	526
Mastication time (sec)	77	26
Median size (mm)	**1.16**	**1.35**

The two median particle size are very close to each other but the other characteristics are different

Sorting out other parameters

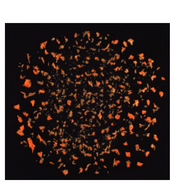


Image analysis

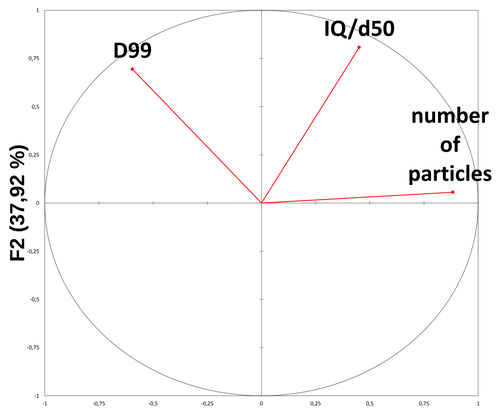
Number of particles
Median size (d50)
Upper size (d99)
Interval inter-quartile (IQ)
Time needed to form the bolus

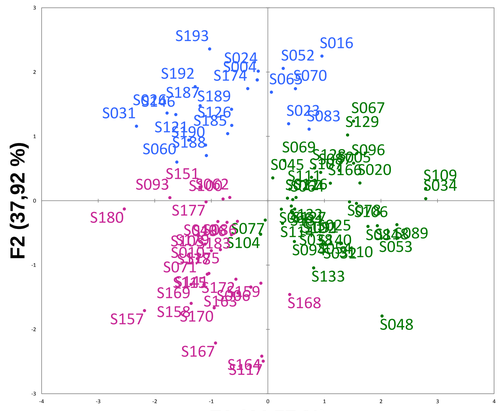
Statistical analysis

Selection of the relevant parameters

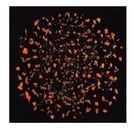
Results

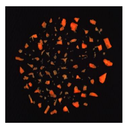
Identification of relevant parameters

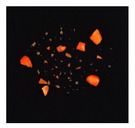




Categorization of the studied population using hierarchical clustering







	P-value	Group 1	Group 2	Group 3
N		41	30	22
Number of particle	***	498.5 (b)	288.3 (a)	324.8 (a)
Median particle size (mm)	***	1.5 (a)	2.4 (b)	1.7 (a)
D99 (mm)	***	7.4 (a)	8.4 (b)	10.6 (c)
Interval inter-quartile	***	2.3 (a)	2.7 (b)	2.9 (b)
Dentition status	***	7.3 (b)	4.3 (a)	5.3 (a)
Resting salivary flow	NS	0.29	0.30	0.37

Conclusion

Four parameters from the image analysis of carrot boluses were identified as relevant to discriminate the elderly population in terms of ability to form a food bolus. Based on these four parameters, three groups resulted from the hierarchical clustering. Group 1 seem to be able to form a food bolus safe to swallow. Groups 2 and 3 made a bolus with less and heterogeneous size of particles, these two groups also have less dental occlusion than group 1. As a perspective, it would be interesting to evaluate in what extent the heterogeneous food boluses can lead to swallowing disorders and/or a poor digestibility of food components in an elderly population.

Centre des Sciences du Goût et de l'Alimentation

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https://www2.dijon.inra.fr/senior-et-sens/index.php

AlimaSSenS

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