School of Psychology and Clinical Language Sciences

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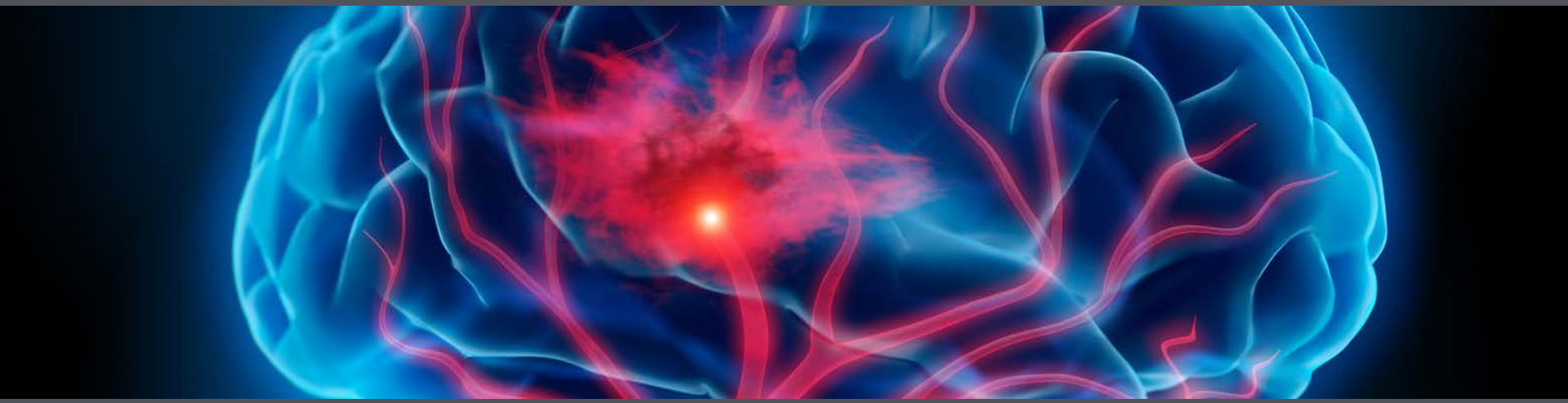
Use of ONS in Patients with Dementia



Prof Margot Gosney

Professor of Elderly Care Medicine

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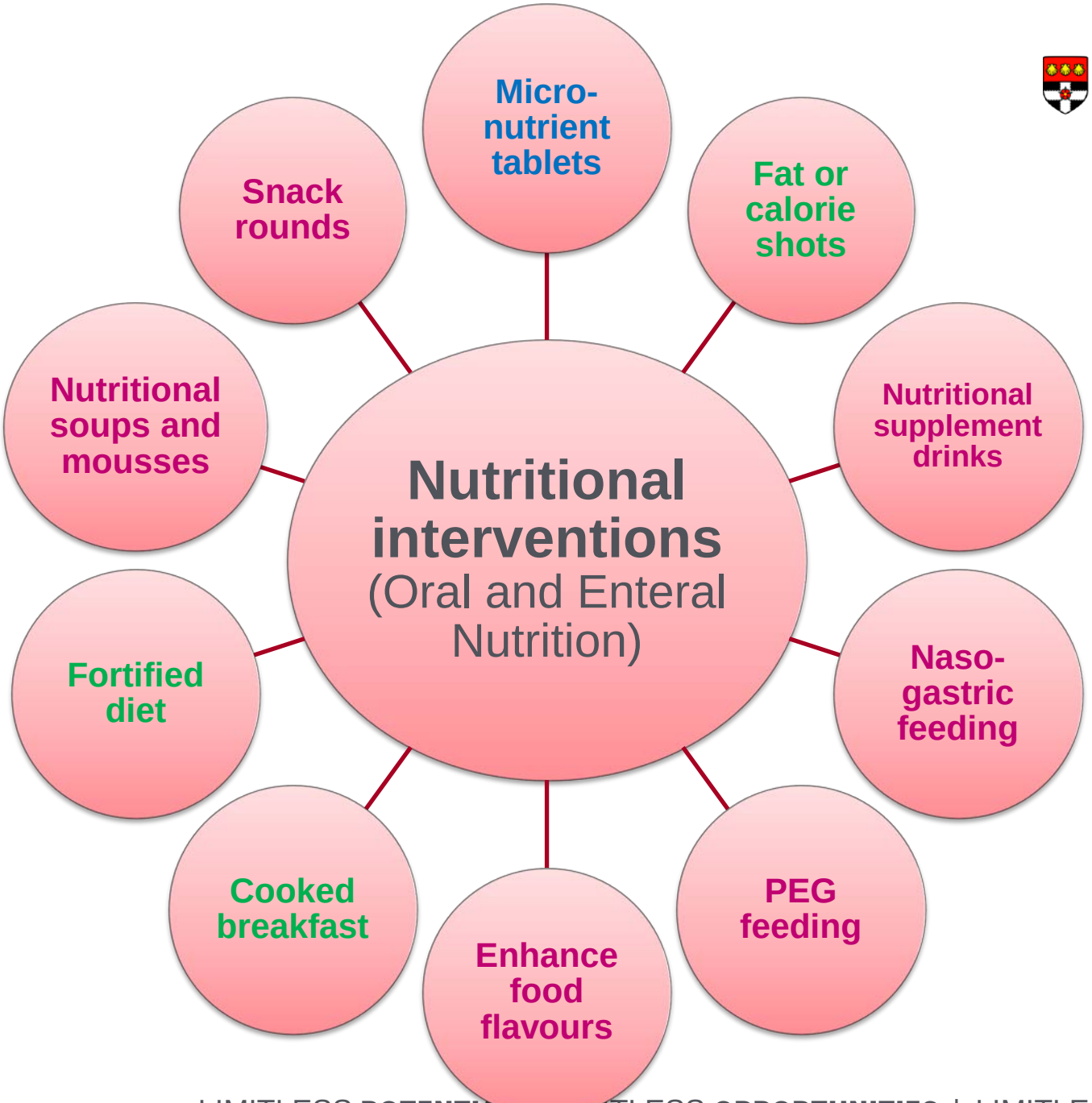
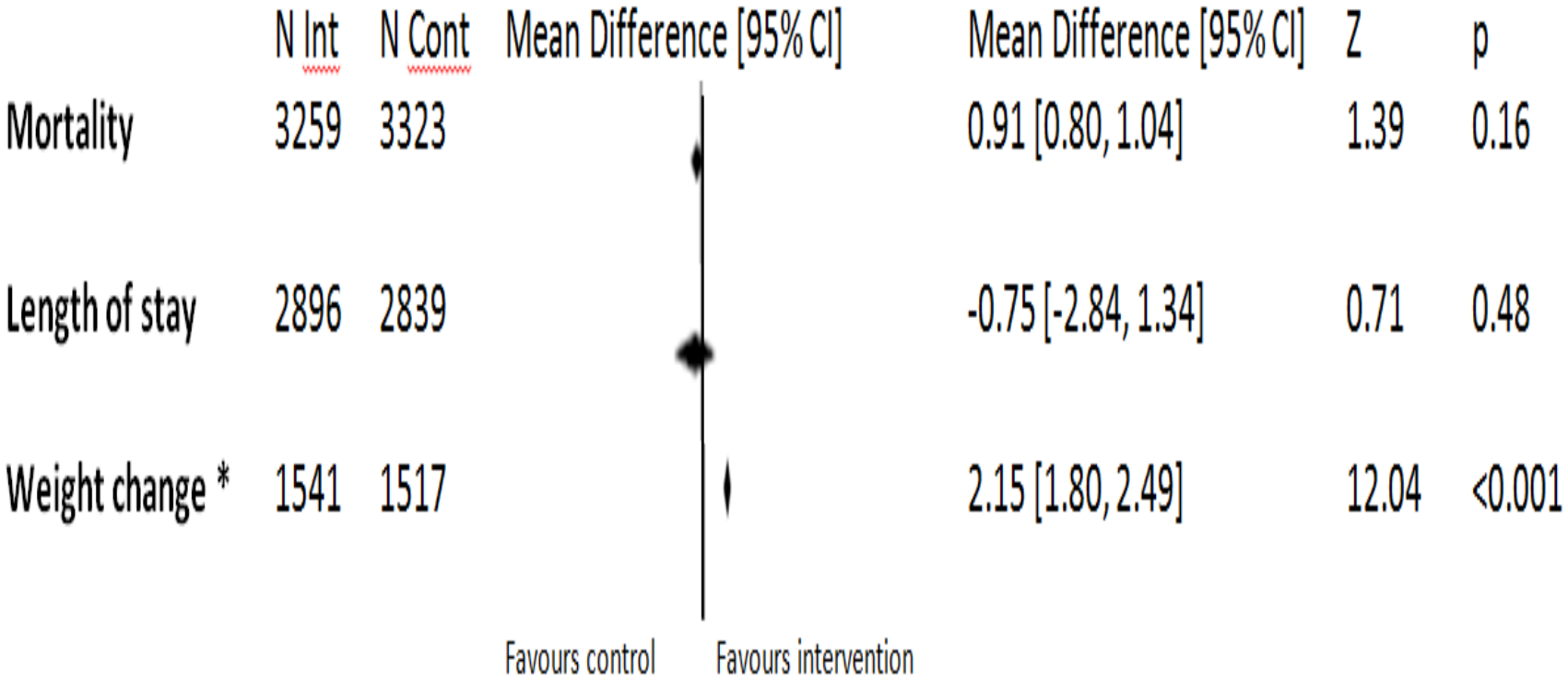

Micro-nutrient tablets
Fat or calorie shots
Snack rounds
Nutritional soups and mousses
Nutritional supplement drinks
Nutritional interventions
(Oral and Enteral Nutrition)
Fortified diet
Naso-gastric feeding
Cooked breakfast
Enhance food flavours
PEG feeding

Intervention	Beneficial ?	Evidence
Micro nutrient supplements	Improves micro-nutrient intake	Excellent
Calorie Shots	Improves calorie intake and weight gained	Fair
Oral Nutritional Supplements	Improves calorie, protein and micronutrient intake, small weight gain	Excellent
NG feeding	Improves calorie, protein and micronutrient intake and weight (poorly tolerated!)	Good
Enhancing food flavours	Disputed	(Conflicting)
Cooked breakfasts	Improves calorie and protein intake	Very Poor
Fortified diets	Improves calorie intake	Poor
Snack rounds	Improves calorie intake	Poor
Music whilst eating	Improves behaviour – no direct evidence for improved intake / outcomes	Very Poor
Communal dining	Improves intake (weight & QoL in NH)	Good
Coloured cutlery and crockery	Improves intake	Poor

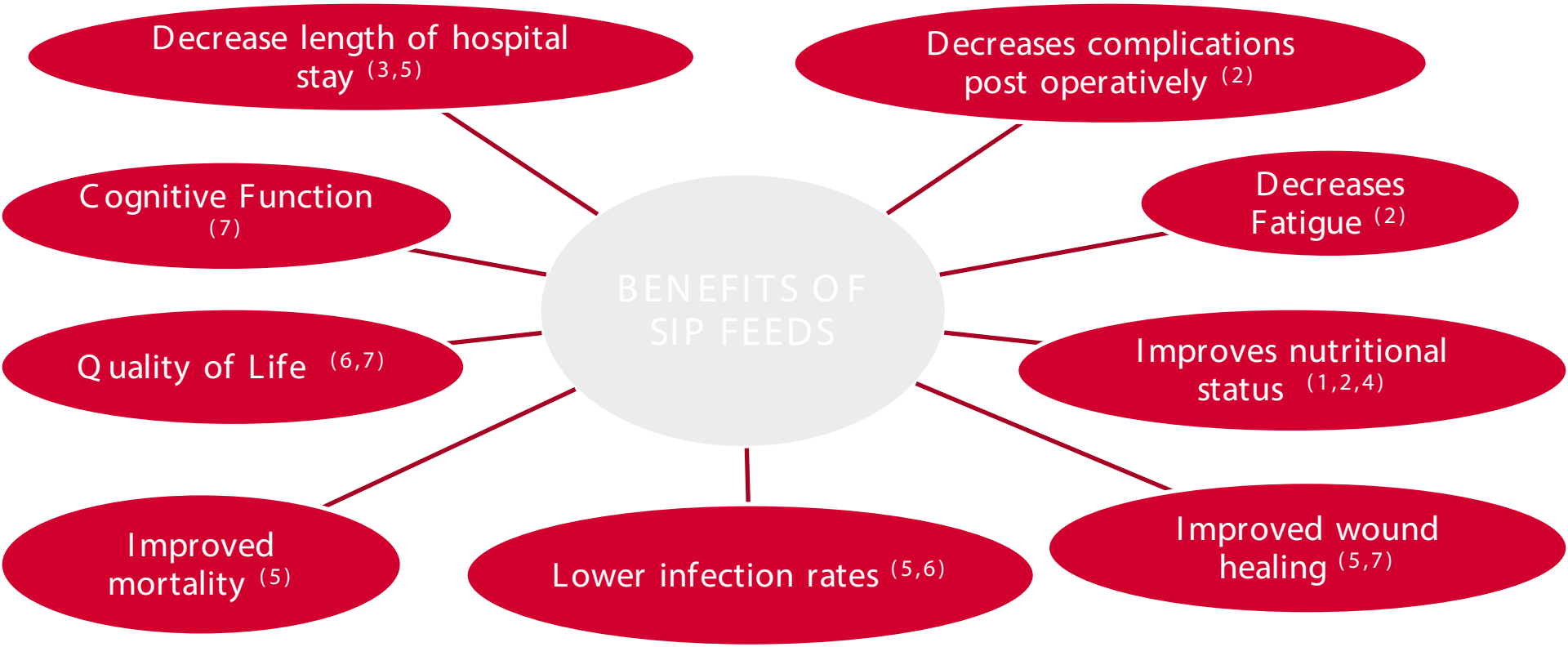
EVIDENCE FOR NUTRITIONALLY COMPLETE SUPPLEMENT DRINKS (SIP-FEEDS)

Oral protein and energy versus routine care :



Milne et al 2009 Cochrane Database Syst Rev 15;(2): CD003288.

THE ROLE AND BENEFITS OF ORAL NUTRITIONAL SUPPLEMENTS / SIP FEEDS



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2. Keele A. M., Bray M. J., et al. (1997). "Two phase randomised controlled clinical trial of postoperative oral dietary supplements in surgical patients." Gut **40(3): 393-399.**
3. Brown K. M. and Seabrook N. A. (1992). "Nutritional influences on recovery and length of hospital stay in elderly women following femoral fracture." Proceedings of the Nutrition Society **51: 132A**
4. Volkert D, Hubsch S., et al (1996) Nutritional support and functional status in undernourished geriatric patients during hospitalisation and 6 months follow up Aging **8 (6):386-95**
5. Lauque D., Arnaud-Battandier F, et al. et al (2004) Improvement of weight and fat free mass with oral supplement in patients with Alzheimers disease at risk of malnutrition: a prospective randomised study Journal of the American Geriatrics Society **52 (10): 1702-7**
6. Beattie,A. H., Prach A. T. , et al. (2000). "A randomised controlled trial evaluating the use of enteral nutritional supplements postoperatively in malnourished surgical patients " Gut **46(6): 813-818**
7. Collins, C. E., Kershaw J. , et al. (2005). "Effect of Nutritional supplements on wound healing in home-nursed elderly: a randomised trial." Nutrition **21(2): 147-155**

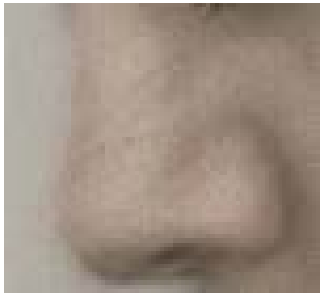
NUTRITIONAL SUPPLEMENTS IN OLDER PEOPLE WITH DEMENTIA

- 1076 in supplement group
- 748 in control group
- Up to 2012 were 12 articles
- Improvement in weight ($p<0.0001$)
- Improvement in BMI ($p<0.0001$)
- Cognition at 6.5+/- 3.9 months improved

- Allen V, Methven L & Gosney M 2013

SENSORY CHANGES WITH HEALTHY AGING

Olfactory Findings
Age-related decline -Odour threshold range 7-49 times higher in elderly people compared to young (1+2)
No age-related olfactory decline - similar regions of brain activity in young and elderly participants (4)
Taste Findings
Taste declines with age - thresholds increase at aged 70 (3)
No age-related decline - age increases taste experiences (5)



References:

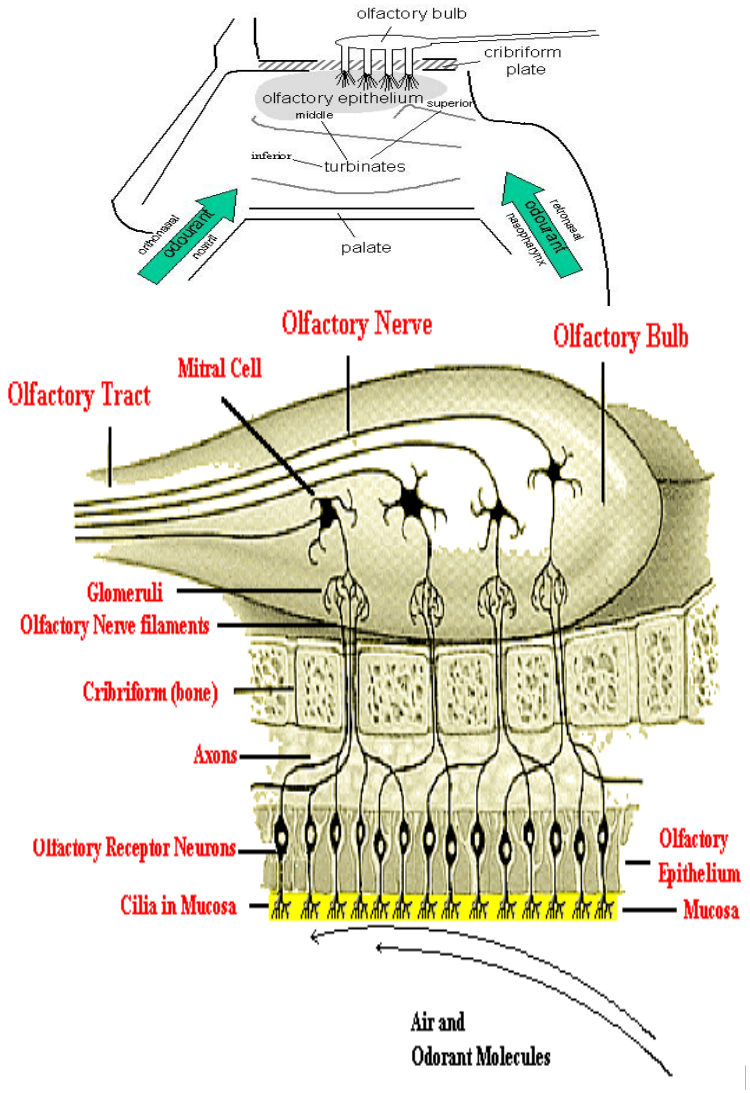
1) Stevens and Spencer, 1994
2) Cain et al., 1990
3) Ng et al., 2004
4) Cerf-Ducastel and Murphy, 2003
5) Drewnowski et al., 1996

TASTE

- Physical Stimulus = Dissolved Non-Volatiles
- Basic Tastes :
  - Salt
  - Sour / Acid } ionic
  - Sweet
  - Bitter } organic
  - Umami : savoury, mouth-drying, receptors identified in brain
  - (Metallic) : e.g. chemical response to ferrous sulfate, non-specific receptors
  - (Astringent) : chemical response, get drying & roughening effect on the tongue

ANATOMY OF OLFACTORY SYSTEM

- The stimuli for smell are airborne compounds of volatile substances
- An external and internal sensory system
- Odour (sensed orthonasally) and aroma (sensed retronasally)
- Receptors for odour are olfactory cells
- 6-10 M in human nose
- Located in olfactory epithelium (5cm^2 area)



ANATOMY OF OLFACTORY SYSTEM

- During inspiration (or retronasal air from the mouth), air goes to nasal cavity below level of the epithelium
- Compounds go into the olfactory mucosa
- Bind to olfactory receptor proteins
- Stimulate the cilia and provoke olfactory neural activity
- Signals sent directly to the olfactory bulb in the brain, where they are processed and then sent to olfactory cortex and orbitofrontal cortex

ELDERLY CARE PATIENTS AND ONS

- All 96 beds full
- 58% female
- 24 (25%) were receiving supplements on day of study
- Patients had been in for 1-9 days
- Cause of admission included acute MI, infection, PE, COPD, falls with cognitive impairment

RESULTS

- 16 of 24 (67%) were able to complete questionnaires
- 56% did not like the feeds
- 25% disliked the taste
- 19% disliked the texture
- 38% disliked the sweetness
- 19% felt sick or bloated after them

RESULTS

- On the day 10 flavours were dispensed
- 25% disliked the flavour
- Vanilla was favourite (14 of 24)
- Strawberry was the runner up!
- The greatest wastage was in those who disliked the taste (72%)

COMPLIANCE WITH SIP FEEDS

Compliance is poor (1,3,4,)

- Wastage was 63% of ONS prescribed over one 24hour period (3)
- Compliance with ONS decreased over time (2)

- Compliance of more than 80% of prescribed amount over study period

Study	% Patients with >80% compliance
Lad , Gott & Gariballa (2005)	43%
Lawson & Doshi et al (2000)	0%

1. Bruce, D., Laurance I., et al. (2003). "Nutritional supplements after hip fracture: poor compliance limits effectiveness." Clinical Nutrition **22(5): 497-500**
2. Cruz-Jentoft, A. J., Calvo . J.J , et al. (2008). "Compliance with an oral hyperproteic supplement with fibre in nursing home residence " The journal of nutrition, health & aging **12(9): 669-673**
3. Gosney, M. (2003). "Are we wasting our money on food supplements in elder care wards?" Journal of Advanced Nursing **43(3): 275-80.**
4. Lawson, R. M., Doshi M.K, et al. (2000). "Compliance of orthopaedic patients with postoperative oral nutritional supplementation " Clinical Nutrition **19(3): 171-175**
5. Lau H., Cobbold J., et al. (2005). "Elderly patients' compliance and ward nurses' and health professionals' views and attitudes towards prescribed sip-feed supplements." Journal of Nutrition, Health and Aging **9(5): 310-4**

Is their a link between compliance and liking?

SIP FEED STUDY IN READING

- 36 young individuals (18-33yrs)
- 48 free range elderly individuals (63-85)
- YM - vanilla
- EM - strawberry
- YF & EF - chocolate

Sensory Modifications for elderly people with medication and illness induced taste disturbances

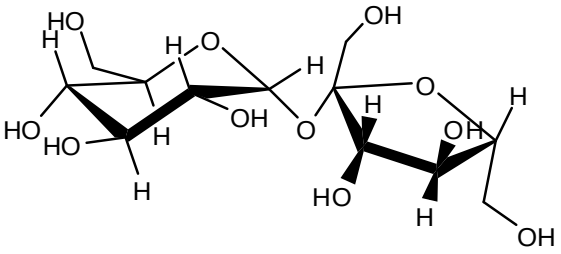
RECENT DATA ON THRESHOLDS :

	Sweet Threshold (sucrose) (g/L)
Sensory panel (n=12, mean age 42, range 33-59)	2.0
Older Volunteers (n= 32 , mean age 75, range 66-88)	3.0
66-77yrs (n=22)	2.6
78-88 years (n=11)	4.1
Patients (n=25, mean age 83, range 71-90)	5.5

Status :

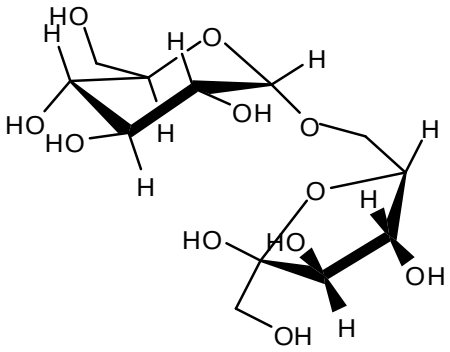
Relating blood Zn & Se, medication and taste thresholds

SACCHARIDE REPLACEMENT



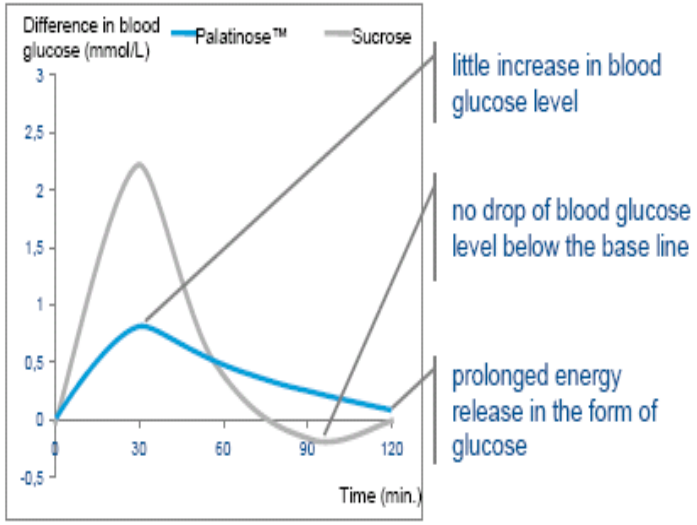
Sucrose : α1-2 linkage between glucose and fructose

Relative Sweetness : 1.0



Palatinose™ : α1-6 linkage between glucose and fructos

Relative Sweetness : 0.45



- Replaced all sucrose with palatinose
- Replaced 25 % of the glucose syrup with low dextrose maltodextrin (LDMD)
- Manufactured Products on Pilot Scale UHT Plant

Glucose Syrup in Typical Formulation : 22 DE, Relative Sweetness 0.2

Low DE Maltodextrin : 5DE, Relative Sweetness : 0.04

Results On Sipping 20 ml ….

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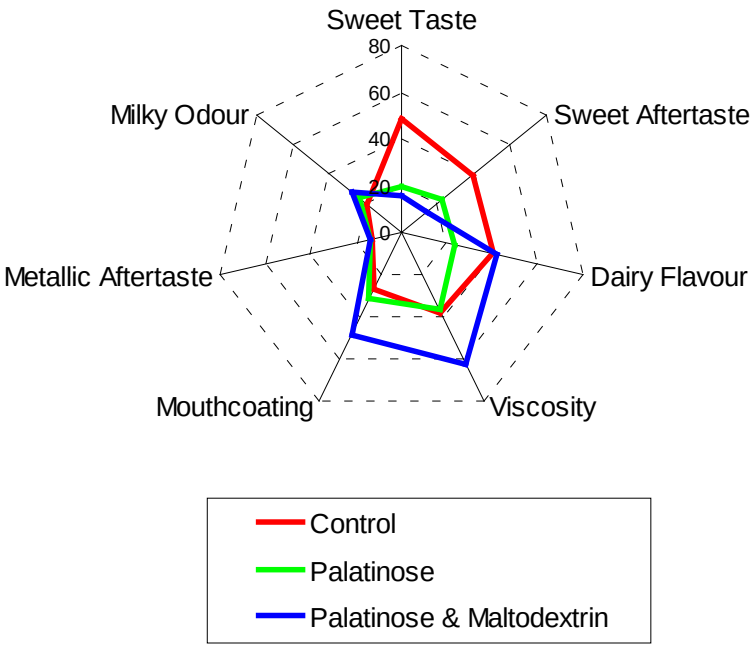
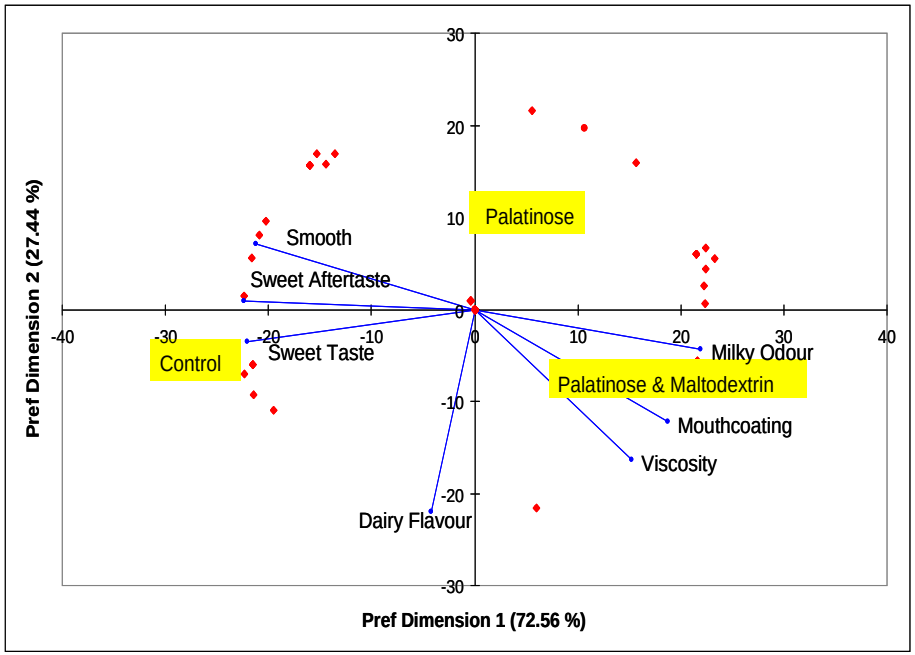
Sensory Profile Vanilla ONS :
Analytical Sensory Panel



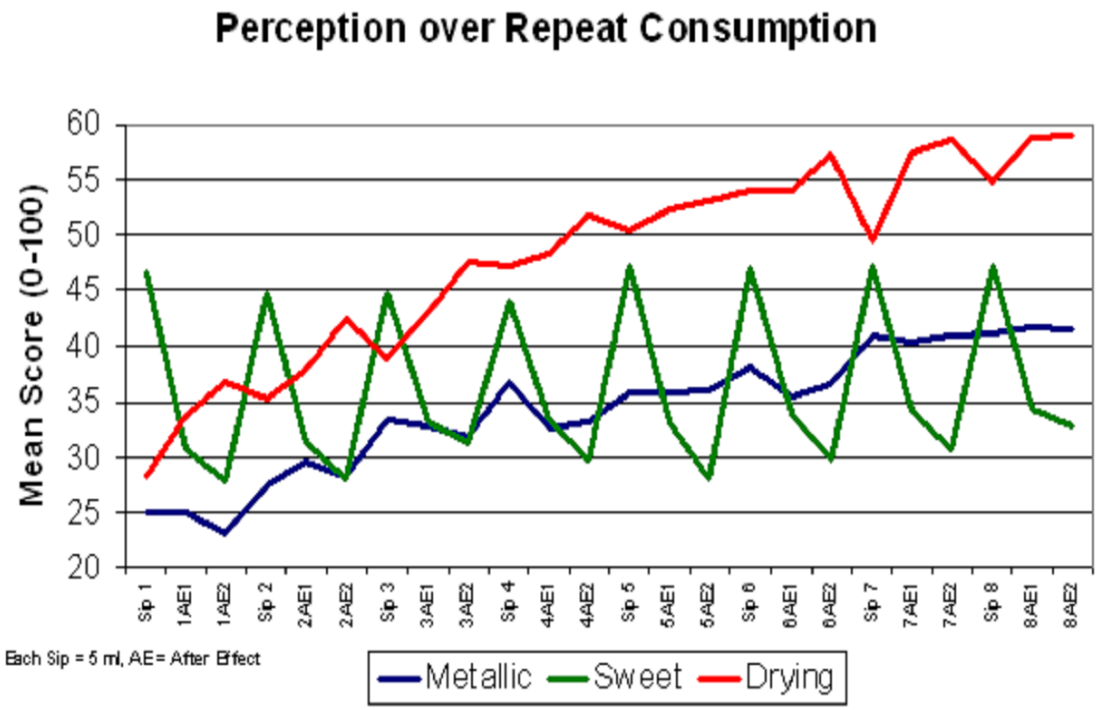
OLDER CONSUMERS PREFERENCE
(N=25, AGE RANGE 65-84)



Preference Map of ONS Vanilla Modifications

Red = Consumer Liking Position; Yellow Box = sample position; Line & attribute = Sensory Driver

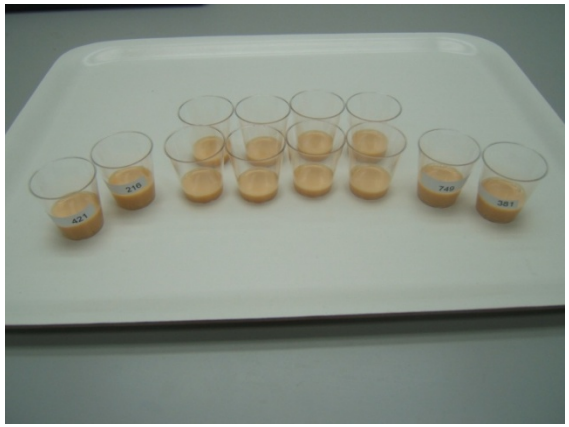
EFFECT OF REPEAT CONSUMPTION : SEQUENTIAL PROFILING (SENSORY PANEL)



- Sensory panel tasted 8 consecutive 5 ml shots
- Scored 5 attributes after each shot, and twice between shots as after effects
- Sweetness perception maintained over time.
- Metallic and Mouthdrying Perception build with time

The Drink makes you need a Drink !!

LIKING ON LARGER CONSUMPTION VOLUME : ADAPTION OF THE KÖSTER “BOREDOM T



For older volunteers :

- Initial liking, 2 samples, 9-point hedonic scale
- 8 shots (5ml) of one sample (balanced)
- Final liking, 2 samples, 9-point hedonic scale

For older patients :

- Initial liking, 2 samples, 9-point hedonic scale
- One 40 ml sample (balanced)
- Final liking, 2 samples, 9-point hedonic scale

LIKING FOLLOWING REPEAT CONSUMPTION

- Volunteers (n = 31, mean age 75)
- Patients (n = 28, mean age 84)

		Liking	
Volunteers		**Initial**	**End**
Vanilla	Commercial	6.3	5.0
	Less Sweet	5.2	5.5
Patients		**Initial**	**End**
Vanilla	Commercial	6.8	6.7
	Less Sweet	6.1	5.2

For patients :

- No correlation with normal consumption of sugar in tea / coffee
- No correlations with Sweetness Thresholds
- Recognised Control as sweeter (p=<0.0001 , 26 out of 28 patients)

CAN WE INCREASE LIKING AND / OR CONSUMPTION OF SIP FEEDS BY ALTERING SERVING TEMPERATURE?

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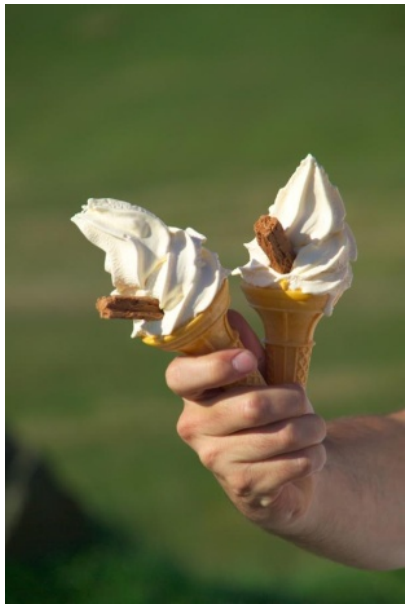
Background :

- Serving temperature may affect the acceptability of ONS
- Reducing temperature reduces taste, and flavour perception



Methods

- Commercial ONS served at room temperature (21°C), chilled (6°C) and as ice cream (-13 °C)
- Problem : Too Much Air ➔ Lower Calorie / Volume

RESULTS

- Lowering temperature reduced odours & sweet taste
- Clusters of consumers preferred chilled & ice cream products

CONSUMER DATA FROM HEALTHY OLDER VOLUNTEERS

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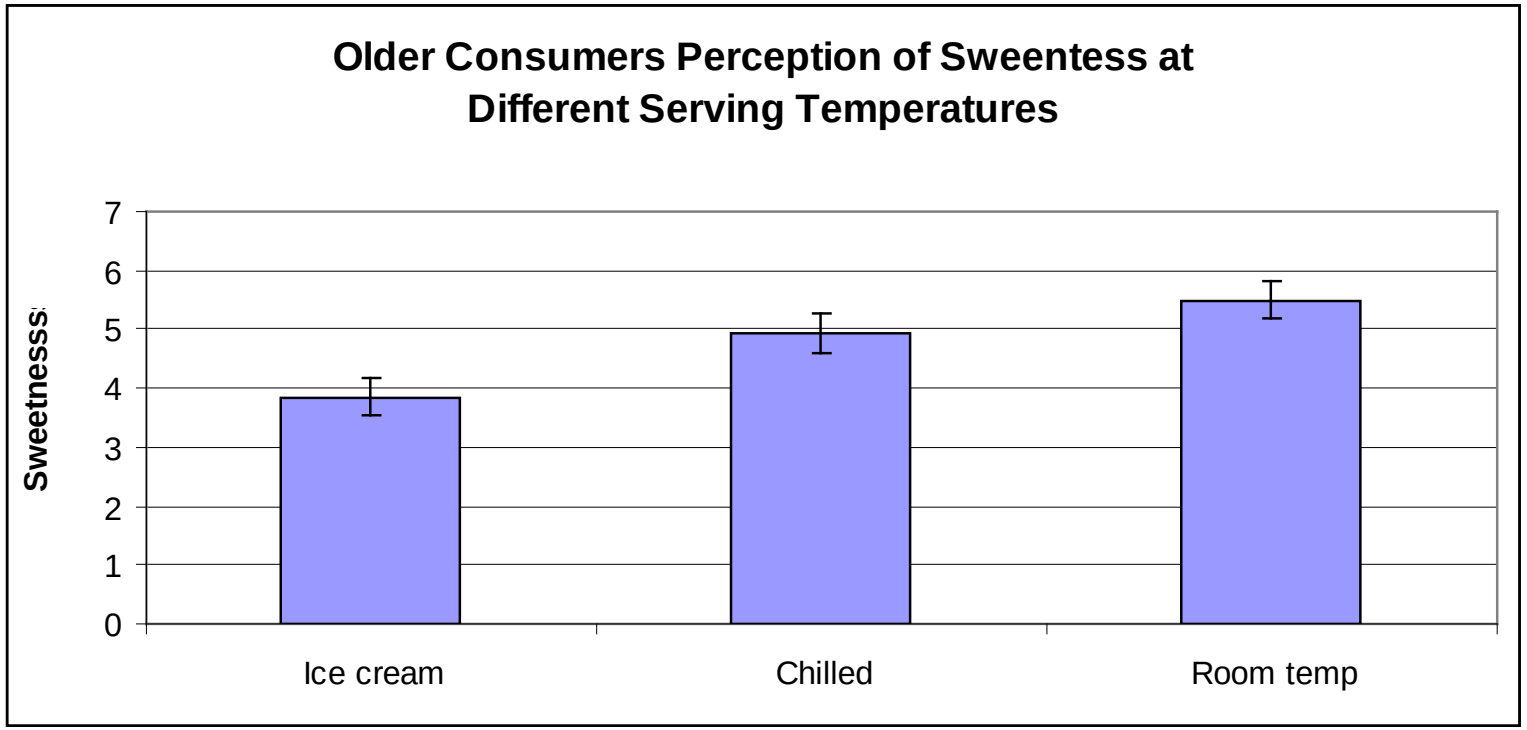

Older volunteers could detect significant decrease in sweetness with serving temperature

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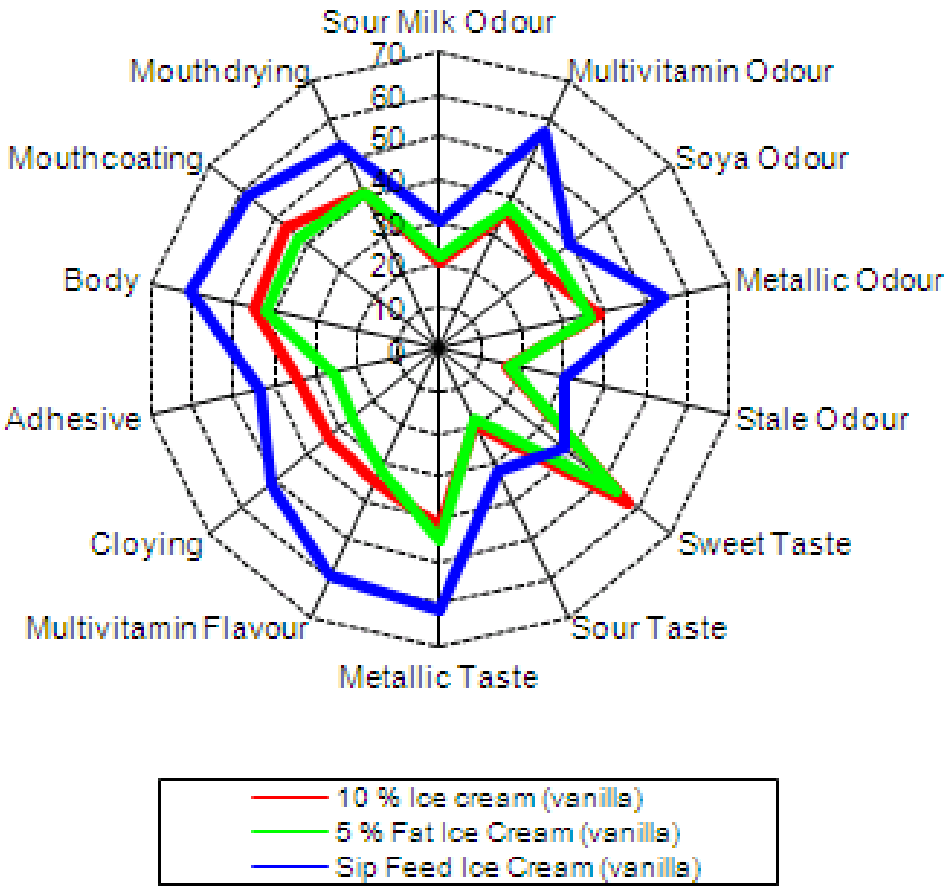
Patients with Different Ice Creams

Sensory Profile :



Patient Liking (n=24) :

	20% fat	10 % fat	ONS Ice cream	Sig.
Mean Patient Liking	5.7	6.3	5.0	p = 0.03

Conclusions :

- 10 % Fat Ice Cream preferred to ONS ice cream
- Calorie Content approx 169kcal/100ml

WHAT WE NEED

- A drink that is yummy when you first taste it
- Makes you want to drink more
- Does not stop you eating your food
- Tastes the same every time you drink it
- Tastes as good at the end of the glass, as the beginning
- You do not get bored with it
- Lots of people like it
- Cheap to make
- Easy and safe to store
- Provides calories and “essential” other substances

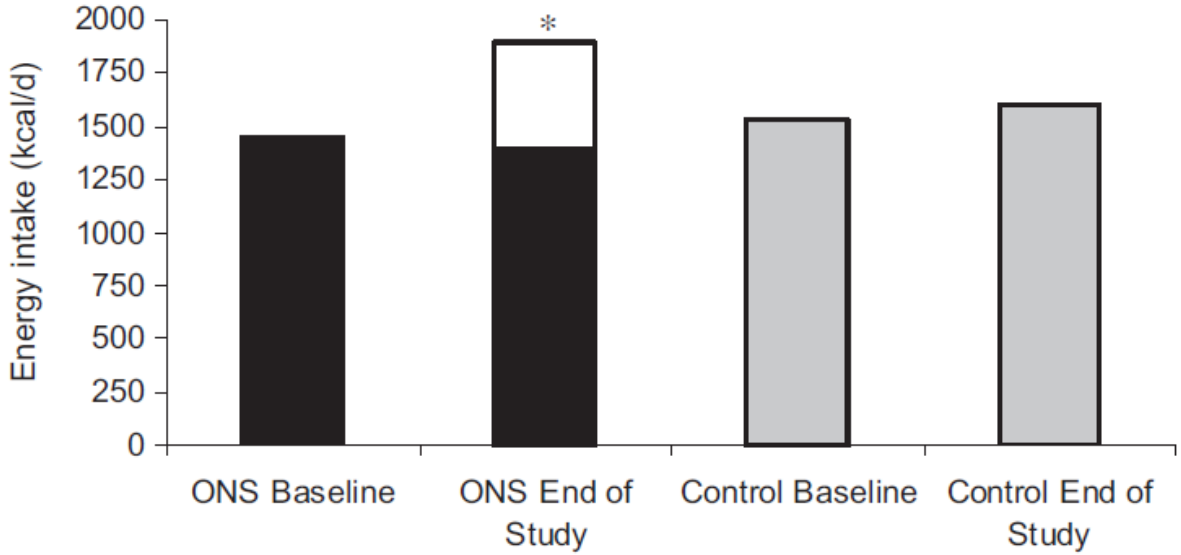
Qualitative Focus Group Data

(n=22, age 66-88, healthy, groups of 6 to 8)

Discussions followed a semi-structured interview guide

Question	Comment	G	Age
General Comment	“I’ve found as I’ve got older things taste more bland and I need more flavour in things”	F	80
General ONS Comment	“I had a friend who had cancer and was prescribed these, she hated them, she used to lace them with something”	F	88
“How would you describe the taste of the sip feed products ?”	“Left nasty taste all day, horrible”	F	74
	“ All too sweet and taste left I could not get rid of, like a strong evaporated milk”	F	77
	“Awful, really horrible taste”	F	69
	“I know we need extra sugar for energy, but this is distasteful”	F	81
	“I like the sweet ones” and “I did not find them too sweet”	M, F	73, 70
	“If that’s what cures malnutrition, I’ll die of malnutrition”	M	62
	“At one time I took the supplements and quite liked them”	M	70
“How did you thoughts on the products change when you were asked to consume more?”	“The more you drink the more cloying it is”	F	69
	“If drinking these, I’d need more water”	F	69
	“Could not drink more of the too sweet ones”	F	65
	“The more I drank, the more unpleasant it became”	F	73

- Perception habitual food intake will decrease.



Hubbard et al (2012) Clin Nutr 31 : p293.

However, our advice is to give between meals..

Why?

- In controlled enviroments milk given 30min before food effect oral intake at meal times (Rolls 1998, AJCN 67 : p1170),
- Current methods used in clinical enviroments is poor

INFLUENCE OF NUTRITIONAL SUPPLEMENT DRINKS ON ORAL INTAKE

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- Do ONS help supply calories to older Nursing Home and Hospitalised individuals with dementia?
- 26 participants aged 83.9+/- 8.4 years
- MMSE 13.08 +/- 8.13
- ONS three times per day on research days
- ONS removed 1 hour pre meal
- Most individuals achieved protein and energy requirements on research days with no significant impact on food consumption
- Allen V, Methven L & Gosney M 2013

CHOICE – LIKING AND/OR CONSUMPTION

- Particularly important for patients with cognitive impairment
- Issues are liking/choice and consumption
- Effect on other intakes
- Variability by day of week, time of day and previous exposure
- Variability by temperature/presentation etc

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HIGH PROTEIN VS NORMAL ONS?

	High protein ONS only	All types of ONS drinks
Number of studies	36 (n = 3,790)	62 (n = 10,187)
Weight	Increased 1.7 kg (95% CI 0.8–2.7) p < 0.05,	Increased 2.2% (1.8 to 2.5) p<0.05
Length of Stay	Decreased by −2.65 days (95% CI −6.22 to 0.94) p = NS	Decreased by -0.8 days (-2.8 to 1.3) p = NS
	Cawood et al 2012 Ageing Res Rev.11 :p 278	Milne et al 2009 Cochrane Database Syst Rev 15;(2): CD003288.

High protein ONS drinks may result in better function….

But, more direct comparison research required

BARRIERS TO SUCCESS

- Compliance!

  Average compliance in elderly inpatients = 75% (range 38-90%).

  Correlation between age and consumption (r^2 = - 0.148, p = 0.01)
  Hubbard et al (2012) Clin Nutr 31 : p293.

  – *How can this be improved?*
    - *Serving temperature (*Methven et al 2009 PNS, 68 :E37)

      *Serving method (*Allen et al 2011 PNS, 70 :E304)

Glass / Beaker	Straw
81 +/- 29 % [B]	62 +/- 40 % [A]

CONCLUSIONS AND FURTHER WORK

- Altering saccharide : viable route to decrease sweetness, may not change mean preference
- Altering serving temperature : may be a simple and effective strategy to increase consumption
- Ice cream with high fat + mineral and vitamin supplementation should be further explored
- Liking may change following repeat consumption
- Repeat consumption increased mouth-drying and metallic perception
- High mineral levels in the ONS are likely to be the source of mouth-drying and metallic properties
- Explore free mineral levels, casein micelle-mineral complexes, anionic inhibition, metal chelation

THANK YOU