

Genetics of food intake in CoLaus

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Background information

- Dietary intake is modulated by physiological, educational and sociological factors.
- Genetic polymorphisms of the taste buds (but not only) make subjects more or less sensitive to hedonic factors and influence dietary behaviours.

Taste	Chromosome	Gene	Influence on ingestive behavior	Reference
Sweet	1p36	TAS1R2, TAS1R3	Unknown	Nie et al. (2005), ⁴¹ Nie et al. (2006), ⁴⁰ Scott et al. (2005) ³¹
Umami	1p36	TAS1R1, TAS1R3	Unknown	Scott et al. (2005) ³¹
Bitter	12p13, 7q34, 5p15.31	TAS2Rs: TAS2R38, TAS2R5, TAS2R16	Vegetable avoidance, increased fat and sweet intake, disinhibited eating behavior among women Alcohol dependence	Kim et al. (2003) ³² Drewnowski et al. (1997) ²¹ Mennella et al. (2005) ³³ Timpson et al. (2005) ³⁴ Dotson et al. (2008) ⁴⁶ Lin (2005), ³⁸ Hinrichs (2006) ³⁹

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Hormone	Gene variants	Physiologic effect of gene product	Contribution to eating behavior	References
CCK	rs6809785, rs7611677, rs6801844	Rapid post-prandial satiety	Extreme meal size	de Krom et al. (2007) ⁵⁵
Leptin	rs4577902, rs2060736, rs4731413	Promotes satiety	Extreme snacking behavior	de Krom et al. (2007) ⁵⁵
Ghrelin	Leu72Met, 51GLN	Promotes meal intake and hunger Metabolic syndrome Obesity	Binge eating	Monteleone et al. (2007) ⁵³ Hinney et al. (2002) ⁵¹ Korbonits et al. (2002) ⁵⁰ Steinle et al. (2005) ⁵²
FTO	rs9939609	Downregulates leptin, suppresses satiety	Reduced post-prandial satiety, increased caloric intake	den Hoed et al. (2009) ⁵⁶ Cecil et al. (2008) ⁵⁸ Tanofsky-Kraff et al. (2009) ⁵⁹
GAD	rs7908975, rs992990	Promotes GABA, regulates food intake	Increased carbohydrate intake	Choquette et al. (1998) ¹⁸

Food intake

Food intake can be assessed at different levels

- Individual macro (protein, carbohydrates,...) and micro (vitamins, minerals,...) nutrients.
- Individual food types (fruit, meat, dairy,...) and portions.
- Food patterns: « global picture » of dietary intake (healthy, fast-food, cafeteria,...).
- Food behaviours: orthorexia, anorexia, bulimia,...

Each level requires different mathematical and statistical methods (no « one size fits all »)

Aims of this project

- To assess food patterns among the CoLaus participants, using dimension reduction techniques (PCA,...)
- To conduct a GWAS on the resulting food patterns, adjusting for several covariates.
- Eventually focus on selected food types, depending on the literature.