A genetics basis for personalized obesity management

Body weight homeostasis is under the control of metabolic influences, which depend on genetically regulated processes and mechanisms narrowly related to body composition and energy homeostasis, such as physical activity, appetite, adipocyte differentiation, insulin signaling, mitochondrial functions, lipid turnover, thermogenesis and energy efficiency. A personalized nutritional approach, based not only on phenotypic traits but also on genetic make-up, may help to control body weight and obesity. Recent advances in nutrigenetics, bioinformatics and genome-wide association/metabolomic/metagenomic studies are set to unleash a revolution in personalized nutrition. On page 97, J. Alfredo Martınez and Fermin I. Milagro present a systematic review of nutrigenetic data concerning single nucleotide polymorphisms (SNPs) involved in weight loss that are considered polygenic. SNPs located in or near FTO, MC4R, MC3R, POMC, LEP, LEPR, PLIN1, APOA5, LIPC, FABP2, IN- SIG2, IRS1, GIPR, ADBR2, ADRB3, UCP1, RETN, ADIPOQ, IL6, PPARG, TCF7L2, and CLOCK, among others, are comprehensively reviewed. Although the identification of SNPs o GRS that could be useful as predictive biomarkers of weight loss is a short- or medium-term objective, the most demanding task in this field is the demonstration of robust gene–nutrient interactions. To circumvent this difficulty, new multicentre studies with large populations, subdividing each population into several groups following different hypocaloric diets (differing in their macronutrient composition but similar in caloric content) must be performed. Other aspects that are receiving attention are the role of the effect and sample sizes, the corrections for multiple comparison testing, the discriminating value of GRS, and others related to gene-diet statistical analysis, as well as the comparability of different designs and intervention types or genetic profiling tests. Of course, issues relating to consumer acceptance, privacy protection as well as marketing and distribution of personalized products need to be addressed before personalized nutrition can become commercially viable. Limitations concerning clinical, social and ethical issues require a critical approach before diet recommendations based on SNP-diet interactions are implemented. In summary, many of the positive associations reported in the literature are based on a relatively small number of subjects and not all findings have been replicated, meaning that, in most of the cases, the evidence is incomplete and only suggestive. However, multiple genes are probably involved in the success of obesity therapy and, in near future, new large, well-designed dietary interventions will help to robustly identify the gene variants that will allow to personalize nutrition with regard to weight loss.

Image acquisition techniques for assessment of legume quality

Legumes are the second most economically important crops after the Graminiae family and the third largest family of the flowering plants after sunflowers and orchids. The inspection and quality evaluation of food grains using machine vision can be achieved with greater speed, consistency and accuracy. Image acquisition is central to the success of any quality inspection system based on machine vision. Soybeans, peas, beans, lentils and chickpeas are the legumes, which form the staple food and hence have great ecological and economic importance. On page 116, Amitava Das and coworkers review different image acquisition techniques that have been employed for quality evaluation of leguminous seeds and have relevance for engineers, food scientists and other agricultural researchers. CCD camera with front lighting set-up has been used for acquisition of external physical characteristics such as shape, size, color and texture information. Camera systems are available in a wide range of resolutions. Other advantages of camera systems include real time 2-D and 3-D surface image acquisition. Several aspects that require careful design consideration are the type of the illumination and camera system, the nature of the imaging chamber, and the distance between the source, sample and camera system. Commonly occurring errors in camera based imaging systems include inter-reflections, color inconstancies, highlights, shadows of nearby objects, etc. Moreover, the CCD camera is not capable of extracting biochemical characteristics like oil content, protein content etc. that are also important quality parameters of seeds.

Flatbed scanners have also been widely reported for acquisition of external features such as shape, size, color and texture information of cereal grains and legume seeds. The main advantage of imaging systems based on scanner lies in its low cost, simplicity in operation and rapid acquisition of digitized images with good depth of field. However, some of the challenges of image acquisition based on CCD camera exist in scanner systems like non-linearities in intensity and spectral power distribution of the illumination, highlights and shadows. Additionally, scanners are not suitable for large sized seeds of spherical or irregular geometry. Internal characteristics can be retrieved using X-ray, NMR imaging, thermal imaging, and hyperspectral imaging. Hyperspectral imaging is a promising technique that has

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been used to detect internal insect infestations, to measure oil and moisture content, starch, protein and other chemical compositions without damaging the seeds. However, impediments like high costs, complexity in its operation and analysis, and poor availability have significantly contributed to low adoption of this technology by the seed research community.

Thermal imaging is a non-contact imaging technique that is portable and allows real-time imaging. It is used for sub-surface imaging and mainly for detection of insect infestation and damaged seeds without the use of any harmful radiations. Poor resolution and sensitivity to environmental conditions are some of the limitations of this technique. Cur-rent research data clearly shows the numerous opportunities that exist for its application in seed testing industry. The combination of thermal imaging and hyperspectral imaging would provide a more complete description of the seeds under investigation. With the development of such integrated imaging systems, fast, robust and efficient leguminous seed quality evaluation may be achieved. X-ray imaging is a non-contact type subsurface imaging technique. However, X-rays can ionize and thus damage the living cells and tissue, which is one of the major risk factors to be considered while using this technique. Additionally, X-ray imaging systems have limited spatial resolution and are unable to image different parts of objects having similar density. NMR imaging systems produce high-resolution *in vivo* images of internal structures in two or three dimensions. The researchers have demonstrated the potential of NMR imaging to investigate physical, biological and biochemical properties of seeds that are vital quality parameters. It does not involve any harmful radiation and thus, can be used in routine seed quality analysis. However, the NMR imaging systems are quite costly, complex in operation and maintenance, and require trained personnel as operators.

The imaging techniques as discussed in this paper are non-contact and non-destructive in nature. Hence, these techniques may be employed for quality evaluation of seeds based on machine vision instead of the subjective, tedious, costly and inconsistent manual methods. Most of the quality evaluation applications discussed in this survey are still in the experimental stages; additional research work is required for the industrial adoption of these techniques in large-scale agricultural industries.

Clean recovery of antioxidant compounds from plant foods, by-products and algae assisted by ultrasounds processing

Over the last decades, the food, pharmaceutical and nutraceutical processing industry have increased their interest in novel non-thermal processing technologies to improve or replace largely heat-based conventional processes. Ultrasound treatment is an alternative affordable, effective and reproducible method for the improved recovery of bioactive compounds from various processing streams. On page 134, Francisco J. Barba and coworkers provide a critical review of the impact of ultrasound-assisted extraction on the recovery of polyphenols, carotenoids and chlorophylls from vegetal and algae matters. Optimization strategies will need to focus on appropriate equipment design and configuration of ultrasonic components, and extrinsic and intrinsic control parameters including ultrasonic power, temperature and extraction time to maximize the yield and biological activity of the extract. Modeling strategies to characterize and optimize ultrasound processes are also highlighted. The results on the effects of ultrasound assisted extraction (UAE) on antioxidant recovery, it can be concluded that this treatment has the potential to be used by food industry to extract polyphenols and carotenoids from plant foods and algae. Moreover, the results demonstrated the high suitability of UAE for the recovery of antioxidant-rich plant extracts. Overall, UAE implied a significant decrease in solvent consumption, extraction time and temperature for extracting antioxidant compounds in comparison to conventional extraction. In contrast, the recovery of pigments such as carotenoids and chlorophylls from microalgae has been referred to be more efficient with other technologies (i.e. microwaves or supercritical fluids), when UAE was applied in insufficient extraction power. Besides, UAE has been referred to be not as efficient in carotenoids and chlorophylls recovery from microalgae compared to other advanced techniques and it should be carefully used in the extraction of unstable compounds. For example, UAE can degrade astaxanthin to unidentified colorless compounds, if it is not properly moderated. The non-standardized methodologies and control parameters are the main reasons why UAE cannot be widely applied yet. Thus, the future challenge will be the establishment of a universal techno-economical optimization of the conditions, i.e. energy density, probe types and sample volumes. Besides, the requirements for high air generation capacity, control and sterilization are the major barriers to overcome prior confronting the US-induced extraction yield against the overall manufacturer needs, which will be encountered during the development of any industrial process.

Bioactive compounds in olive leaves: profile, dehydration & extraction

Olive (*Olea europaea* L.) tree leaves have been primarily used as feed for