

Control of food intake: neurobiological aspects

By B. Lebrun, B. Bariohay and A. Jean (*communication p.287*)

Feeding, a behaviour vital for survival, is subject to intense regulation by the brain to maintain energy homeostasis. Neural networks located in the hypothalamic nuclei and the dorsal vagal complex in the brainstem play a crucial role, as revealed by the integration of satiety and adiposity signalling. Contrary to the traditional view of a hierarchical model in which the hypothalamus plays the major role, recent results are consistent with a distributed model in the processing of energy balance regulation. Interestingly, network re-organisation and neurogenesis are potentially involved in food intake and body weight regulation, suggesting that neuroplasticity may provide important clues to the understanding of energy balance disorders such as obesity.

Key words: *food intake, body weight, hypothalamus, brainstem, neuroplasticity.*

Dietary behavior of dogs and cats

By H. Bourgeois, D. Elliott, Ph. Marniquet, Y. Soulard and H. Watson (*communication p.301*)

All pet food manufacturers claim their diets deliver exceptional palatability, but many companies offer limited support for that claim. Palatability is complex. Expertise, innovation and leadership in pet food palatability require an in-depth understanding of pet physiology and behavior, expertise in diet formulation and manufacturing, as well as the development of innovative tools and research methodologies for measuring diet palatability.

For veterinary therapeutic diets, palatability is essential. Pets are expected to eat veterinary diets exclusively and compliance is directly linked to palatability. Illness may reduce a pet's appetite, while the therapeutic diet's nutritional profile may make it inherently less palatable. Achieving exceptional palatability in diets which are restricted in protein, fat or sodium, or which contain protein hydrolysates (low molecular weight peptides which typically taste bitter), can be a significant challenge.

Royal Canin has always been at the forefront of palatability research. Years of study have led to an advanced understanding of the three essential components of palatability: the pet (species and individual), the environment (owner, home, lifestyle) and the food (smell, shape, texture, taste, nutritional composition).

Key words: *behavior, palatability, petfood.*

Leucine in age-associated sarcopenia

By I. Rieu, L. Mosoni, L. Combaret, C. Sornet, J. Grizard and D. Dardevet (*communication p.309*)

A progressive loss of muscle mass has been well described in both humans and rodents during ageing. This loss of proteins results from an imbalance between protein synthesis and degradation rates. Although some authors have shown a decrease of myofibrillar protein synthesis rates in human volunteers, this imbalance is not clearly apparent when basal rates of protein turnover are measured. A decrease in muscle protein synthesis stimulation has nevertheless been detected in ageing rats during the postprandial period, suggesting that the 'meal signal' is altered during ageing. Many results now suggest that aged muscle is less sensitive to the stimulatory effect of amino acids at physiological concentrations, but is still

able to respond if the increase in aminoacidaemia is sufficiently large. Indeed, amino acids play an important role in regulating muscle protein turnover both in vitro and in vivo. Of amino acids, leucine seems to play the key role in regulating the metabolic function. It inhibits proteolysis and stimulates muscle protein synthesis independently of insulin. Leucine has been shown to act as a mediator, by modulating specifically the activities of intracellular kinases linked to the translation of proteins such as phosphatidylinositol 3_ kinase and mammalian target of rapamycin – 70 kDa ribosomal protein S6 (p70S6K) kinases. We recently demonstrated in vitro that protein synthesis in ageing rat muscles becomes resistant to the stimulatory effect of leucine in its physiological concentration range. Protein synthesis was however stimulated normally when the leucine concentration was increased well above its postprandial level. We also studied the effect of meal leucine supplementation on in vivo protein synthesis in adult and ageing rats. Leucine supplementation had no additional effect on muscle protein synthesis in adults but totally restored its stimulation in ageing rats. Whether chronic oral leucine supplementation would be beneficial for maintaining muscle protein mass in elderly humans remains to be studied.

Key words: ageing, leucine, amino acids, sarcopenia.

Cellular adaptation to amino acid availability: mechanisms involved in the regulation of gene expression

By A.-C. Maurin, C. Jousse, Y. Cherasse and P. Fafournoux ([communication p.319](#))

In mammals, the impact of nutrients on gene expression has become an important area of research. Nevertheless, the current understanding of amino acid-dependent control of gene expression is limited. Amino acids have multiple and important functions, so their homeostasis has to be finely maintained. However, the amino acidemia can be affected by certain nutritional conditions or various forms of aggression. It follows that mammals have to adjust several of their physiological functions involved in the adaptation to amino acid availability by regulating expression of numerous genes. The aim of this review is to examine the role of amino acids in regulating mammalian gene expression and physiological functions.

A limitation for several amino acids strongly increases the expression of target genes such as IGFBP-1, CHOP and asparagine synthetase (AS) genes. The molecular mechanisms involved in the regulation of CHOP and AS gene transcription in response to amino acid starvation have been partly identified. Particularly, a signalling pathway requiring the protein kinase GCN2 and the transcription factor ATF4 has been described to sense the amino acid limitation. In case of an amino acid imbalanced food source, this pathway has been shown to decrease food intake by activating a neuronal circuit. Taken together, the results discussed in this review demonstrate that amino acids by themselves can act as “signal” molecules with important roles in the control of gene expression and physiological functions.

Key words: amino acid, gene expression, signalling pathway, GCN2, ATF4, nutrition, protein.

Influence of size on the dog's digestive function

By M. Weber ([communication p.327](#))

Large-breed dogs – Giant Schnauzers and Great Danes – are predisposed to a greater frequency of soft stools compared with Standard Schnauzers and Miniature Poodles fed the same diet.

- Neither lower digestive efficiency nor upper gastrointestinal transit time appears to explain the poor fecal quality of these large-breed dogs.
- Nevertheless, a low electrolyte absorption and an increased fermentative activity could be two possible causes of their poor digestive tolerance.
- They could be explained, at least in part, by an increased intestinal permeability and a prolonged colonic transit time respectively.
- This work contributes to a better knowledge of a substantial number of parameters measuring gastrointestinal function based on size. It also supplies some nutritional answers to the problem of soft stools in large-breed dogs

Key words: dogs, breeds, digestive tolerance, digestive function.

Chronic inflammatory bowel diseases, etiopathogeny, diagnosis

By P. Lecoindre (*communication p.333*)

Chronic inflammatory bowel diseases (IBD) in domesticated carnivores are characterised by an infiltration of the lamina propria of the small bowel or colon by different populations of inflammatory cells. They are responsible for most digestive diseases in domesticated carnivores. The histopathological observations, the response to immunodepressive therapy, suggest the intervention of a dysimmune mechanism. Their diagnosis relies on the exclusion of diseases with a clinical presentation and the histological confirmation of an inflammation of the intestinal mucosa. The use of a clinical activity index and the recommendations of a committee for the clinical and histopathological standardisation of digestive diseases (WSAVA) should help the clinician improve daily management of the disease.

Key-words: dog, cat, bowel, inflammation.

Nutritional considerations for the gastrointestinal patient

By D. Elliott (*communication p.343*)

Nutrition is a fundamental component in the management of gastrointestinal disease. However, the diverse nature of gastrointestinal disease clearly indicates that different nutritional strategies need to be applied according to the pathophysiology of the underlying disease process. It is beneficial to approach the nutritional management of gastrointestinal disease by considering four approaches – diseases that respond to novel or hydrolyzed protein, diseases that respond to low dietary fat, diseases that respond to high energy, and diseases that respond to fiber. This review will address each of these key areas. In addition, emerging nutrients of interest to the management of gastrointestinal disease such as probiotics, long-chain omega-3 fatty acids and prebiotic fibers will be discussed.

Key words: nutrition, inflammatory bowel disease, fructooligosaccharides, hydrolyzed protein, gastrointestinal disease, fiber, protein, prebiotics, probiotics, glutamine, arginine.

