4.8 ± 0.3 vs 5.8 ± 0.4 mM (CA) for glucose; 62 ± 13 vs 159 ± 29 µU/mL (PV) and 35 ± 6 vs 120 ± 25 µU/mL (CA) for insulin. In addition, whatever the time after the meal, the amount of glucose absorbed was significantly lower for the HVP supplemented diet. Over 8 h, glucose absorption balance was significantly lower ($P < 0.05$), accounting for 36 ± 4% (HVP) vs 71 ± 8% (CEL) of starch ingested (180 g). As demonstrated with other soluble viscous fibres (guar gum, pectins), this could be explained by a reduced gastric emptying of starch, or a modified glucose transport process in the small intestine.

Only the highly viscous fibre could modify the blood glucose and insulin response, and reduce glucose absorption balance across the intestine. We conclude that viscosity is a major factor controlling the effect of seaweed fibre added to a high carbohydrate diet.

Effects of sulfated polysaccharides from green seaweeds (ulvans) on the survival, proliferation and differentiation of tumoral colonic epithelial cells (HT-29 and Caco-2). C Bénard [1], B Kaeffer [1], M Lahaye [1], HM Blottière [1], JP Galmiche [2], C Cherbut [1] *(Centre de recherche en nutrition humaine, [1] Inra, BP 1627, 44316 Nantes; [2] Hôpital Laënnec, BP 1005, 44035 Nantes, France).*

Sulfated polysaccharides from edible seaweeds may influence the intestinal mucosa through their polysaccharide backbone, their mineral contents or their sulfate residues. We have studied the biological activity of a sulfated or desulfated xyloglucuronorhamnan, extracted from *Ulva lactuca,* in human cell culture.

Ulvans were characterized by chemical analysis of their components. Biological activities were tested on HT-29 cell survival (neutral red) and proliferation (enumeration) in a growth medium containing or not fetal calf serum, and on Caco-2 cell differentiation by measuring transepithelial resistance and intestinal enzymatic expression.

The desulfatation did not modify the molar ratios of the others components. The survival of HT-29 with 0.5 and 2 g/L of native ulvans for 24 h in media with 0 or 10% of fetal calf serum was studied by a two-way variance analysis. This analysis revealed a positive effect of native ulvans on HT-29 cell survival ($P < 0.0001$) and a negative interaction between ulvans and FCS concentrations ($P = 0.018$). Native and desulfated ulvans at 0.5 g/L improved the HT-29 cells survival (in both medium). The HT-29 cell numbers with native ulvans for 6 days ($7.18 \pm 0.49 \times 10^5$ cells/cm^2) and desulfated ulvans ($7.48 \pm 0.23 \times 10^5$) were superior ($P < 0.05$ by Student's test) to the controls ($5.39 \pm 0.44 \times 10^5$). The differentiation parameters were left unchanged.

In conclusion, ulvans could improve the HT-29 cell survival and stimulate the proliferation of these cells suggesting an effect of the polysaccharide backbone. Labelling of this polysaccharide back-bone, for instance by biotinylation, will help to identify putative binding sites of ulvans onto HT-29 cell membranes.

Involvement of β-elimination reactions in alginate fermentation by human intestinal bacteria. C Michel, JL Barry, M Lahaye *(Inra, BP 1627, 44316 Nantes cedex 03, France).*

Fermentation of alginate, a common food additive, by human intestinal bacteria is typified by a latency phase and by a discrepancy in substrate disappearance and its metabolism into short chain fatty acids (SCFA). To investigate this behaviour, the role of β-elimination reactions, which are generally involved in alginate degradation by marine bacteria, was investigated.

Na-alginate, and for comparative purposes, pectin were fed to faecal bacteria cultured in single-stage chemostats, with pH control (6.5). Substrate (10 $g.L^{-1}$) was supplied for 15 days, and samples were taken for determinations of β-eliminated products, bacterial counts, isolation of alginate-degrading populations, and measurements of polyuronate depolymerase activities in bacterial cell extracts.

β-eliminated products accumulated in alginate chemostats during the initial 4 days of culture enrichment. Pectine decreased *Fusobacterium* sp populations whereas alginate selected for aerobes microorganisms. Bifidobacterial numbers were increased by alginate and decreased by pectine, however, these effects were not significant.

All alginolytic bacteria isolated among anaerobes catalysed β-elimination reactions.

Bacteria from both cultures exhibited low pectin lyase activities (ca 0.5 µmol-β-eliminated-products $mg\text{-}protein^{-1}$). Conversely, high alginate lyase activity (ca 9 µmol-β-eliminated-products $mg\text{-}protein^{-1}$) was specifically detected in alginate chemostats, although it was not present on the first day of culture. Hydrolase activity was high in pectin chemostats (ca 20 µmol-reducing-ends $mg\text{-}protein^{-1}$), whereas reducing ends produced by cell extracts from alginate containing media corresponded only to bacterial lyase activities.

It is therefore concluded that alginate fermentation by human intestinal bacteria first requires substrate depolymerisation via β-elimination. Induction of alginate lyase and/or enrichment in alginate degrading bacterial populations may explain the latency phase observed prior to fermentation. Bacterial metabolism of β-eliminated products could also explain the lack of correlation between alginate utilization and SCFA formation.

Effect of dietary lipids on fatty acid composition and fertility of fowl semen. E Blesbois, M Lessire, D Hermier *(Inra, station de recherches avicoles, 37380 Nouzilly, France).*

Phospholipids are the major lipids (~ 80%) of spermatozoa (SPZ) and contain ~30% of *n*–6 polyunsaturated fatty acids (FA). The role of these FA on fertility has been investigated in 32 male fowls receiving isolipidic diets containing 5% of either salmon oil (salmon, *n*–6/*n*–3 = 1.1) or corn oil (corn, *n*–6/*n*–3 = 41.6). Analyses were performed on composition of spermatozoa (SPZ) and of seminal plasma (SP) and on fertilizing ability after artificial insemination. SP contained more saturated FA than SPZ, respectively 50% and 40%. SP and SPZ had high amounts of 20:4 *n*–6 (5–9%) and 22:4 *n*–6 (11–21%); these two FA were absent from the diets and partly replaced 18:2 *n*–6 in sperm (only 2–6% in sperm vs 15–46% in the diets). Moreover, when compared to the corn diet, the salmon diet increased significantly the amount of *n*–3 long-chain FA (6.7% vs 2.6%) and decreased the amount of *n*–6 long-chain FA (23.3% vs 33.3%). In parallel, the fertility rate was significantly higher with the salmon diet (96.0% vs 91.5% with the corn diet). Thus the nature of dietary FA may influence the fertilizing ability of fowl semen, probably by modifying the *n*–6/*n*–3 ratio of membrane lipids.

Additive effect of A→G (–3826) variant of the uncoupling protein gene and the Trp64Arg mutation of the β3-adrenergic receptor gene on weight gain in morbid obesity. K Clément [1,2], J Ruiz [2,4], AM Cassard-Doulcier [3], F Bouillaud [3], D Ricquier [3], A Basdevant [1], B Guy-Grand [1], P Froguel [2] *([1] Département de nutrition, Hôtel-Dieu, 75004 Paris; [2] CNRS EP 10, Institut Pasteur de Lille, 59000 Lille; [3] CNRS, 92000 Meudon, France; [4] Division d'endocrinologie et métabolisme, Lausanne, Switzerland).*