activity; the latter being due to a contribution from the placental isoenzyme fraction. A study of Asian women attending an antenatal clinic was undertaken to observe the effect of pregnancy on calcium metabolism, and the incidence of biochemical and overt osteomalacia in such a population. Seventy-two Asian women of Indian and Pakistani origin were studied and compared with a control group of 20 Caucasian women and 15 coloured non-Asians mainly of negro origin. Random blood specimens which were collected at booking and after 34 weeks of gestation were analysed by routine methods for calcium, phosphate, alkaline phosphatase, total protein, and albumin. Each patient was questioned with regard to general health, dietary habits, and time spent out of doors. In the groups studied calcium values fell as pregnancy progressed and in the Asians this was not accounted for by the reduction in albumin concentration which is known to occur in pregnancy. The reduction in plasma calcium concentration in the Asians would appear to be mainly due to dietary factors combined with a reduction in endogenous cholecalciferol synthesis.

### Circannual Excretory Patterns in Man

A. G. Green (County Hospital, York) Using groups of at least 30, and where possible over 40, subjects and dividing the year arbitrarily into four seasons of winter (December-February), spring (March-May), summer (June-August), and autumn (September-November) has resulted in the demonstration of significant circannual or seasonal variations in the excretion of several substances. A total of 138 male controls divided into four groups gave the following mean values for urinary calcium excretion: winter 223 mg/24h, spring 256 mg/24h, summer 294 mg/24h, and autumn 261 mg/24 hours. A similar type of excretory pattern was found in 245 male post-partial gastrectomy patients where the extreme values were winter 123 mg/24h and summer 179 mg/24 hours. One hundred and seventy-four males suffering from duodenal ulcers exhibited a similar trend in calcium excretion although in these cases the differences were not statistically significant. These variations could not be accounted for on the basis of age, variation in dietary intake, or variations in analytical technique.

Similar circannual excretory patterns were found in the case of the cortisol metabolite tetrahydrocortisone (and also T4) and also for the adrenaline metabolites metadrenaline and normetadrenaline.

The implications of these findings are discussed in relation to investigations involving urine studies and in relation to the interpretation of clinical investigations.

### A Comparative Study of a Glycoprotein Isolated from Gastric Aspirates, Normal Gastric Mucosa, and Gastric Carcinomata

J. SCHRAGER (Royal Albert Edward Infirmary, Wigan) The isolation and partial characterization of glycoproteins isolated from normal gastric aspirates, from extracts of normal gastric mucosa, and from extracts of gastric carcinomata are reported. The carbohydrate and amino acid composition of the glycoproteins isolated from individual gastric aspirates and from extracts of individual gastric mucosa showed that a basic common carbohydrate composition, galactose/N-acetylgalactosamine/N-acetylgalactosamine, was 4:3:1. Superimposed on this basic structure were additional sugar residues associated with blood group specificity, an additional fucose residue with blood group H, a further galactose with B, and a further N-acetylgalactosamine with A activity. Threonine and serine constituted 40-50% and these, together with proline, alanine, and glycine, accounted for 80-85% of the total amino acid content.

Mass spectrometry, periodate oxidation, reduction by borohydride, and β-elimination results strongly suggest that the carbohydrate side chains are composed of repeating disaccharide units, each unit being made up of a galactose and N-acetyl hexosamine, the unit nearest to the protein core being N-acetyl-galactosamine, which links the side chain to threonine and serine, each remaining unit consisting of a galactose and an N-acetylgalactosamine.

The glycoproteins isolated from gastric carcinomata contained the same range of sugars but revealed significant differences. (a) The quantitative relationships of the carbohydrate components of the neoplastic glycoproteins showed variations dividing the samples investigated into four groups, each group with a distinctive and constant carbohydrate composition: group 1, galactose/glucosamine/galactosamine = 1:1:1 (1 case); group 2, galactose/glucosamine/galactosamine = 2:1:1 (1 case); group 3, galactose/glucosamine/galactosamine = 3:2:1 cases); group 4, galactose/glucosamine/galactosamine = 4:3:1 (9 cases). (b) The blood group specificity of 11 out of 15 gastric carcinomata investigated differed from that of the hosts' red cells.

### Renal Failure in Paraplegics

C. R. Tribe (Southmead Hospital, Bristol) Renal failure is by far the commonest cause of death in paraplegics who survive more than three months following their paralysis. Necropsies were performed on 179 chronic paraplegics who died at Stoke Mandeville Hospital between 1945 and 1973 from causes related to their paraplegia. In 135 (75.5%) patients, renal failure was considered to be the primary cause of death.

The renal sequelae of chronic paraplegia develop from two main causes. First, impairment of bladder function, followed by catheterisation leads to urinary sepsis and back pressure on the kidney; these, combined with stasis, caused by immobility, lead to calculous and chronic pyelonephritis. Second, muscular paralysis and loss of sensation lead to the development of pressure sores, osteomyelitis, and a high incidence of amyloidosis; 99 out of the 135 cases dying in renal failure showed amyloidosis disease. Secondary hypertension is often associated with the chronic disease.

A previously published detailed study of 220 necropsies performed on paraplegics between 1945 and 1965 forms the basis of this presentation. The relationships of the different factors leading to renal failure were discussed and descriptions of the types of pyelonephritis, amyloidosis, and hypertension in these patients were presented with tabulation of results and illustrations of the relevant renal pathology. As an indication of the 'mixed' renal pathology it was considered that of the 75 patients dying in renal failure in whom adequate renal histological tissue was available, pyelonephritis contributed to renal failure in 95% of cases, amyloidosis in 50%, and hypertension in 43%. The original literature should be studied to appreciate the plethora of renal disease which occurs in paraplegic patients.

Reference