Abstracts of papers presented at the SAGES Congress, Wild Coast Sun, 30 June - 3 July 1986

South African Gastro-enterology Society

Comparison of famotidine 40 mg nocte with ranitidine 300 mg nocte in short-term duodenal ulcer healing — a South African multicentre study

I. N. MARKS AND J. P. WRIGHT. Gastrointestinal Clinic, Dept of Medicine, University of Cape Town and Groote Schuur Hospital, Observatory, Cape Town, South Africa

132 patients with endoscopically confirmed duodenal ulcers were entered into a 4 to 6 week double-blind trial of famotidine (Fm) and ranitidine (Rn). 70 patients were randomised to Fm 40 mg nocte and Rn placebo, and 62 to Rn 300 mg nocte and Fm placebo. Gelusil tablets were allowed for ulcer pain, and diary cards issued. Clinical evaluations were done on entry and at 2 and 4 weeks, and endoscopy was repeated at 4 weeks. Patients with an unhealed ulcer at 4 weeks were continued on the same treatment for another 2 weeks and a further endoscopy carried out at 6 weeks.

Ten patients were excluded because of protocol violation and a further 5 were excluded from the 4-week analysis because of inadvertent omission of the medication. Of the remaining 97 patients, 65 (67%) healed at 4 weeks with famotidine and 58 (59%) with ranitidine. The healing rates at the 2 treatment groups were almost identical.

6-week data

<table>
<thead>
<tr>
<th></th>
<th>Fm 40 mg nocte</th>
<th>Rn 300 mg nocte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healed at 6 weeks</td>
<td>62 (64%)</td>
<td>53 (55%)</td>
</tr>
<tr>
<td>Healed by 8 weeks</td>
<td>73 (75%)</td>
<td>67 (69%)</td>
</tr>
</tbody>
</table>

The results are as follows:

The recurrence rate at 6 months tended to be higher in the Rn1 than in the Rn2 group (33% and 16% respectively). The same trend was noted with respect to the post-treatment (53% and 35% respectively) overall 12 months (59% and 46% respectively). The results are as follows:

Comparison of two different maintenance regimens of ranitidine (Rn) in gastric ulcer disease

K. A. NEWTON, I. N. MARKS, J. P. WRIGHT, D. M. DENT, A. H. GIRDWOOD AND W. LUCKE. Gastrointestinal Clinic, Drps of Medicine and Surgery, University of Cape Town and Groote Schuur Hospital, Observatory, Cape Town, South Africa

35 patients with recently healed gastric ulcer were randomised to Rn 150 mg nocte (Rn1) and 34 to Rn 150 mg bd (Rn2) for 6 months. Treatment was then withdrawn and the patients followed for a further 6 months. Gastricoscopy and biopsy were carried out on entry and at 3, 6 and 12 months or on clinical relapse. Patients with symptomatic ulcers were withdrawn, as were those with asymptomatic ulcers (AU) at 6 months. Those with an AU at 3 months, however, remained on the allocated treatment for a further month, then gastroscoped and allowed to continue in the study if healing had occurred.

Ten patients were excluded because of default (Rn1-1, Rn2-2) or poor compliance (Rn1-4, Rn2-3) and 1 patient on Rn2 was withdrawn because of paroxysmal tachycardia. There were 3 further withdrawals in the Rn2 group — 1 with rheumatoid arthritis, another with acute lymphatic leukaemia and a third with biopsy evidence of gastric carcinoma away from the site of the initial ulcer. The groups were comparable with regard to age, sex, duration of history and smoking.

60 patients with endoscopically proven duodenal ulceration were entered into a double-blind study and randomised to treatment with misoprostol 400 mg twice daily or ranitidine 150 mg twice daily. Endoscopy was repeated at 4 weeks and if the ulcer was unhealed, a further endoscopy was done at 8 weeks.

The results are as follows:

The return rate at 6 months tended to be higher in the Rn1 than in the Rn2 group (33% and 16% respectively). The same trend was noted with respect to the post-treatment (53% and 35% respectively) overall 12 months (59% and 46% respectively). None of these differences attained statistical significance (p < 0.05).

The present study suggests that a double-dose maintenance Rn offers no clear advantage over the conventional dose of 150 mg nocte.

Comparison of cimetidine 400 mg twice daily, with cimetidine 800 mg in one evening dose in the treatment of gastric ulcer

R. RAMALHO, I. SEGAL, M. LERIOS. Gastrointestinal Unit, Baragwanath Hospital and University of the Witwatersrand, Johannesburg.

In a prospective double-blind study, 29 patients with endoscopically proven benign gastric ulcers were randomly allocated to treatment with cimetidine, either 400 mg twice daily or 800 mg as a single night-time dose for 4 weeks. Four patients were withdrawn from the study. Eight of 11 (73%) healed endoscopically on cimetidine 400 mg twice daily, and 11 out of 14 (79%) healed on 800 mg given at night. There were no side effects in either group. This indicates that cimetidine 800 mg given as one night-time dose is as safe and as effective as cimetidine 400 mg twice daily. Moreover, the administration of one daily dose of cimetidine should improve patient compliance.

Superficial lesions in the duodenal ulcer. Are they relevant?

J. M. SPITAEKS, K. E. PETTENGELL, G. L. MANION, A. E. SIMJEE. Gastrointestinal Unit, Dept of Medicine, University of Natal, King Edward VIII Hospital, Durban

Although the crater of a duodenal ulcer (DU) disappears after effective treatment, endoscopy may show the persistence of superficial mucosal breakdown or erythema in the duodenal bulb. We refer to these lesions as 'complete healing', while a DU may only be considered 'completely healed' at endoscopy when the duodenal bulb is normal or nearly so.

Whether the persistence of mucosal lesions in the absence of an actual ulcer crater shortens the period of remission (i.e. the period when there is no crater in the duodenal bulb) remains controversial.

Methods: We studied the natural history of DU in 70 patients healed after treatment. Thirty-one were considered completely healed, 39 near completely. Before being admitted in this follow-up study, some patients were given up to 3 months' treatment in an attempt to eradicate mucosal lesions.
intake and may also represent a reciprocal response to complications of acute phase reactant proteins. However, little is known about the role of anaesthetic agents in the pathogenesis of the reduced synthesis of this important liver protein. We have examined the effect of halothane, a widely used anaesthetic agent which occasionally causes an apparently idio-

syndrome. We have reviewed the published studies which considered serum albumin as a meaningful index of hepatic synthetic function of the liver, on albumin synthesis in vivo in the rat. Albumin synthesis was measured using the [14C]carbonate technique. Rats receiving halothane were divided into three groups; group 1 received halothane (in amounts calculated to produce a level of anaesthesia similar to that used in man) for one hour after which albumin synthesis was measured immediately, group 2 received halothane for 1 hour but synthesis was measured 24 hours later, and group 3 were exposed to halothane on two occasions, 24 hours apart, for period of 1 hour and 0.5 hour respectively. Albumin synthesis was measured immediately after the second anaesthetic. Control rats received ether (5% in oxygen) for 3-5 minutes while the isoelectric was being injected. Since halothane depresses the respiratory centre in rats it was administered by intermittent positive pressure. The partial pressures of oxygen and of carbon dioxide were maintained at physiologic levels throughout. The results of our studies are shown in Table 1.

### Table 1

<table>
<thead>
<tr>
<th>Status</th>
<th>No. of Animals</th>
<th>Albumin Synthesis (mg/hr)</th>
<th>Control (1)</th>
<th>Halothane 1 x 60 min</th>
<th>Halothane 2 x 30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthesis</td>
<td>10</td>
<td>0.9 ± 0.1</td>
<td>0.9 ± 0.2</td>
<td>0.9 ± 0.1</td>
<td>0.9 ± 0.1</td>
</tr>
<tr>
<td>Non-synthesis</td>
<td>10</td>
<td>0.9 ± 0.1</td>
<td>0.9 ± 0.2</td>
<td>0.9 ± 0.1</td>
<td>0.9 ± 0.1</td>
</tr>
</tbody>
</table>

**Study Group**

Alcoholism was significantly increased in rats receiving two halothane anaesthetics (p < 0.01 Student-Neumann-Keuls). A single exposure to halothane did not reduce albumin synthesis significantly either immediately or 24 hours later. Our data suggest that repeated exposure to halothane may result in depression of albumin synthesis and may add to those factors responsible for the decreased synthesis of this protein seen in patients after surgery.

### Serum Inhibitory Factors and Immune Dysfunction in Patients with Hepatic Portal Venous Obstruction

S. ROBSON, R. E. KIRSCH, MRC Liver Research Group, Department of Medicine, UCT

Cellular and humoral immune dysfunction are well recognized in chronic liver disease. Pertussis vaccine-induced shunting due to portal hypertension may be responsible for some of these abnormalities. We have investigated the immune status of 10 patients with idiopathic portal vein thrombosis who had no clinical or biochemical evidence of liver disease and who have normal histology on liver biopsy.

The results of the quantitative studies are shown in Table 1. Portal vein thrombosis patients had lymphopaenia, inverted IgA ratios and elevated IgM levels.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Median</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCC</td>
<td>4,100</td>
<td>2,500-7,900</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>832</td>
<td>25-1,040 (800-2,500)</td>
</tr>
<tr>
<td>Platelets</td>
<td>67,000</td>
<td>27-109,000 (200-400,000)</td>
</tr>
<tr>
<td>Ratio OKT/</td>
<td>0.92</td>
<td>0.2-1.0 (2.5-3.5)</td>
</tr>
<tr>
<td>IgG</td>
<td>1,700</td>
<td>2,120-3,460 (639-1,349)</td>
</tr>
<tr>
<td>IgM</td>
<td>226</td>
<td>101-403 (56-352)</td>
</tr>
<tr>
<td>IgA</td>
<td>226</td>
<td>101-403 (56-352)</td>
</tr>
</tbody>
</table>

Qualitative lymphocyte defects e.g. agglutination and transformation after mitogenic stimulation were rare, but not cytotoxic to the responsive cells. (For Con A 5 ug, p < 0.025; Con A 10 ug, p < 0.001; PHA 1 ug, NS; PHA 2 ug, p < 0.01 (Mann Whitney U test)) Dilution curves of patient serum indicated paradoxical stimulation of control lymphocytes in low dilution. These factors which appear to be glycoproteins may play an important role in lymphocyte hyporesponsiveness to mitogens and in lymphoid cell traffic.

Our study reveals that many of immune defects found in patients with cirrhosis may be due to portal-systemic shunting.

### Indications for aspiration of amoebic liver abscess (ALA)

J. DELAREY NEL, A. E. SIMJEE, A. PATEL, Gastrointestinal Unit, Dept of Medicine and Radiology, University of Natal Edward Vlll Hospital and SA Medical Research Council, Natal

It is agreed that aspiration of ALA should be employed for the relief of persistent pain and all cases of diagnostic doubt. Its place in the prevention of complications is unclear. We have attempted to determine if aspiration can prevent complications and to identify those abscesses in which it is required.

**Methods:** 80 patients were studied. Those with (L) lobe cavities adjacent to the diaphragm were aspirated and those with (R) lobe cavities adjacent to the liver were aspirated either aspiration or no aspiration. All patients received metronidazole. All patients who had had complicated courses were interviewed to determine common factors and these were then used to formulate indications for aspiration. These indications were then "tested" on the remainder of the non-aspirated patients in this study. Furthermore, in a retrospective study, all patients diagnosed as having ALAs between July 1 and April 84 (n = 191) were reviewed and the indications tested on those with complicated courses.

### Results

**Complications (prospective):** 4 incorrect diagnosis, 7 persistent pain.

Formulated Indications: 1) Negative AGDT; 2) (L) lobe adjacent to diaphragm (AD); 3) (L) lobe superficial anterior, particularly if associated with swelling; 4) (R) lobe AD, particularly if associated with pleural effusion; 5) (R) lobe and (L) lobe > 10 cm.

**Tested Against:** (A) Prospective Study Patients: 1) satisfied indication 5, but tenderness took 11 days to resolve (2 SD's) > mean for group 2. (B) Retrospective Study: incorrect diagnosis 8, all -ve AGDT; Rupture into chest 6, indications for aspiration in 5; peri- cardiac effusions in 4; infection in both lobes in 3; Deaths 7, indications for aspiration in 3, 2 died of perforated colon and 2 exact cause is not known.

Conclusions: Formulated indications as formulated existed in the vast majority of complicated cases, and that all had occurred in patients that had not been aspirated is strong support for the belief that aspiration helps prevent complications as well as validation of the indications as formulated.

### Incidence and Management of Complications of Injection Sclerotherapy for Oesophageal Varices

D. KAHN, J. TERBLANCHE, P. C. BORNMAN, Department of Surgery, University of Cape Town

Injection sclerotherapy is associated with a low morbidity. In this study the incidence and management of the complications after injection sclerotherapy seen over a 10 year period are presented. Between August 1975 and August 1985, 269 patients were treated by injection sclerotherapy for oesophageal varices. There were 186 males and 83 females, with a mean age of 46 years. Alcohol was the most serious complication, rupture of the oesophagus, occurred in 4 patients.

**Conclusion:** The complications of injection sclerotherapy, with the exception of oesophageal rupture, are of a minor nature and can be treated conservatively.

### Morbid Implications of Oesophageal Devascularisation and Transsection

W. K. J. HUZINGA, G. E. DIMOPoulos, M. NAICKER, A. E. SIMJEE, Department of Surgery and Gastrointestinal Unit, Natal University Medical School, Durban

Gastro-oesophageal devascularisation with oesophago transection and splenectomy is increasingly practised in the management of bleeding oesophageal varices. Potential morbidity of this procedure relates to liver reserve, perioperative complications and subsequent gastro-oesophageal motility and sphincter continence. The results in 84 patients were analysed. Ascites formation was the main factor in early postoperative morbidity. Re-bleeding occurred in 3 patients (6%), 2 within the first 24 hours. Oesophageal manometry after one year demonstrated a short (< 2 cm) lower oesophageal sphincter in most patients studied, with sphincter paresis in 50%, but reflex oesophagitis was not a major clinical problem. Dysphagia was present initially in several patients but improved within a few weeks. Two patients required dilatation for a stricture. Long-term follow up extends to 5 years. Although small varices have recurred in some patients, endoscopic surveillance has demonstrated eradication of varices in the great majority.

### Endoscopic Bilioduodenal Stent Placement in Malignant Bile Duct Obstruction

M. D. DANIELWITZ, Medical Gastro Unit, Division of Medicine, University of the Witwatersrand and Johannesburg Hospital, York Rd., Parktown, Johannesburg

Decompression of the biliary tree is often necessary in patients with malignant obstructive jaundice. With the aid of a large channel (4.2 mm) duodenoscope, large diameter 10F stents can be passed through malignant common bile duct strictures to relieve jaundice.

A biliduodenal stent was passed endoscopically in 28 patients (16 females and 12 males) with a mean age of 68.2 years ranging from 24 to 92 years. Various malignancies caused the obstructive jaundice in these patients and included carcinoma of the pancreas (16), cholangiocarcinoma (6), porta hepatis nodes (2) and a Klatskin tumor.

Adequate drainage was achieved in 22 patients (78.6%) with a mean survival of 79.5 days ranging from 2 to 300 days.

In patients with malignant obstructive jaundice, endoscopic stent placement may be an effective means of palliation.

### Controlled Comparison of the Efficacy of Three Commercial Pancreatic Enzyme Supplements in Increasing Fat Absorption in Patients with Pancreatic Insufficiency

F. MAROTTA, J. DICKER, S. J. O'KEEFE, A. GIRWOOD, I. N. MARKS, Gastrointestinal Clinic, Dept of Medicine, Grootte Schuur Hospital and University of Cape Town, Observatory, S.A.

The 14C breath test was used to assess the relative efficacy of 3 commercial pancreatic enzyme prepara-
tions in improving fat absorption in 10 malnourished patients with chronic pancreatic insufficiency (CPI). The products varied in composition and presentation and were administered at the dosage recommended by the manufacturers. As one preparation (Drug A) was not enteric coated, it was tested again with gastric acid suppression (ranitidine) (Drug AR), Baseline gastric acid outputs, C14 breath tests and 72 hr stool fat excretions were measured and followed by daily repeat breath tests whilst receiving alternative enzyme supplements. Stool fat excretion was also repeated whilst receiving Drug B.

C14 breath tests (peak % dose excretion/hr).

<table>
<thead>
<tr>
<th>Drug</th>
<th>Test</th>
<th>Baseline</th>
<th>Drug A</th>
<th>Drug AR</th>
<th>P value</th>
<th>Severe**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>21.5 ± 6</td>
<td>20.7 ± 6</td>
<td>2.4 ± 2</td>
<td>2.6 ± 1</td>
<td>9.5 ± 2</td>
</tr>
</tbody>
</table>

*Stool fat excretion was < 10 g/d in the mild group (n = 3) and 59.15 ± 47.2 g/d in the severe group (n = 7).

An indirect correlation (r = 0.53) was shown between fat absorption (by breath test) and stool fat excretion and with Drug B, improvement in the one was associated with improvement in the other. Gastric acid outputs were variable.

All enzyme preparations significantly improved absorption in the severe group. However no significant improvement in fat absorption was detected in patients with mild steatorrhoea. No consistent benefit could be demonstrated for enteric coating or "protection" by gastric acid suppression although individual response was variable.

Our results also indicate that the C14 breath test is useful in determining the most appropriate form of enzyme supplementation in malnourished CPI patients.

Causes of acute pancreatitis and incidence and course of peripancreatic fluid collections


Method: Admissions for acute pancreatitis (AP) were studied prospectively for 45 weeks. Identifying causes of AP and incidence of peri-pancreatic fluid collections (FC) as detected by ultrasound (US) during admission and for 6 weeks. AP was diagnosed with serum amylase > 10000 Phadebas units and appropriate clinical features, or by operative or autopsy diagnosis.

Results: Aetiology and mortality (M): In 143 cases the causes were alcohol 59% (M = 2.4%), gallstone 10% (M = 0), trauma 3% (M = 0), other known causes 10% (M = 1.4%), "idiopathic" 13% (M = 26%) while 3% await investigation (M = 0).

FCs: US was technically adequate in 104/135 survivors and showed FCs in 14 (14%), 5 during initial hospital stay and 8 later: 1 was diagnosed at surgery, 7 FCs caused no symptoms during a median of 13 weeks (6 - 56 wks) while 7 FCs were associated with symptoms: 1 presented with bleeding as first sign of treatment, 1 needed elective surgical drainage, 1 had 2 failed aspirations with residual discomfort, 1 was suspected on US and proven by aspiration cytology to be due to pancreatic carcinoma, 2 have had further AP and 1 a transient painless mass.

Conclusions: Alcohol caused most AP but contributed few deaths; most deaths followed idiopathic AP. FCs occurred in 14% of cases studied: half were asymptomatic while most symptomatic FCs did not require surgery.

Pancreatic duct size in patients with uncomplicated chronic pancreatitis and intractable pain

J. H. M. NIEUWOUDT, A. H. GIRDWOOD, P. C. BORNMAN, I. N. MARKS. Surgical Gastro-enterology, Gastrointestinal Clinic and the Departments of Surgery, and serum albumin were monitored regularly.

Results: The mean in-hospital stay was 30 days. Precision LR was administered for a mean of 16 days. The serum albumin increased from a mean of 28.9 ± 4.3 g/L to 34 ± 3.9 g/L. Four patients required surgery. There was no mortality in this series. All 5 patients with fistula responded to conservative management. However after cessation of precision LR, 1 patient required surgery for rapid reaccumulation of a pleural effusion, and 12 patients developed cholestasis of their ascites at 6 months follow-up. The 8 patients with protracted pancreatitis responded well to precision with progressive relief of pain as a result of the increase in serum amylase, with only 1 patient requiring surgery for a pseudocyst. Four patients who defaulted on precision LR therapy, had an immediate relapse of pancreatitis with pain and a rapid rise in serum amylase. The relapse responded rapidly when precision LR was recommenced.

Conclusions: Precision LR may be used as an alternative to TPN for nutritional support in pancreatic disease. There was no morbidity associated with its use in this series and it was well tolerated. The low fat content and osmolality compared to other enteral formulae may have contributed to the efficacy of precision LR in this study.

Quality of life after resection of gastric cancer

N. H. GILINSKY, M. V. MADDEN+, I. KALVARIA*, AND D. M. DENT+. Gastroenterological Clinic*, Surgical Gastroenterology+ and Departments of Medicine and Surgery+, Groote Schuur Hospital and University of Cape Town

Method: 32 consecutive patients with gastric carcinoma were prospectively assessed before surgery and at 1, 3 and 6 months post-operatively by a gastroenterologist for "quality of life" using a system linear analogue self-assessment scale (LASA). The gastroenterologist was blinded as to extent of disease and resection. Mean values were compared between patients undergoing 15 curative (C) (T1-T3, NI, MO) and 17 palliative resections. Pre-operative LASA scores were higher (fewer symptoms) in patients before C resections. Postoperatively patients undergoing C resection had lower scores (more symptoms) after 6 months than patients undergoing palliative resections; scores after C resection only equalled their pre-operative level after 12 months. Scores after P resection exceeded their pre-operative level after 1 month.

Conclusion: Patients with curable gastric cancer had less severe pre-operative symptoms than those with resectable incurable tumours. After curative resection quality of life deteriorated; this was delayed after palliative resection exceeded their pre-operative level after 1 month.


Radiological features in Barrett's oesophagus

C. G. BREMMER. University of the Witwatersrand

Although the diagnosis of a columnar-lined oesophagus (CLO) can only be definitely made histologically, certain radiological features should alert the clinician and endoscopist to the possibility of the condition and prompt careful investigation and appropriate procedures. The documented presence of a hiatal hernia and reflux will help in the controversy of the pathogenesis of the CLOs and duodenal and gastric abnormalities may support the concept of 'alkaline' reflux as a cause for the complications. At the present time only gross radiological features of the complications of the CLO have mostly been reported, but more subtle mucosal changes have been recognised in some centres.
The radiology of intestinal tuberculosis

R. E. KOTTLER*, J. H. LOUW*, I. KALVARIA†, I. N. MARKS‡, Departments of Radiology* and Gastroenterology†, Groote Schuur Hospital and University of Cape Town

Three hundred and thirty-eight cases of abdominal tuberculosis (TB) were documented at Groote Schuur Hospital during the past 25 years of which 59% were predominantly peritoneal and 8% nodal. The remaining 37% had the intestinal form of the disease. The social incidence was constant throughout the study period, with black patients accounting for 54%, coloured 43% and white 3%. Only 50% of patients had pulmonary tuberculosis. The major site of involvement in intestinal TB was the ileum, ileocecal region and colon in roughly equal proportions.

The purpose of this paper is to describe the radiological features of intestinal TB and to discuss the various radiological techniques in the differential diagnosis, with special reference to Crohn's disease. The prognostic value of disproportionate caecal involvement in ileocaecal TB will be stressed.

However, seemingly pathognomonic features of Crohn's disease (e.g. aphthoid ulcers, gradient migration and barium in the colon) may be seen in the occasional patient with TB. Nevertheless, we feel that careful analysis of the radiological features as displayed by high quality small bowel enema and double contrast barium enema should permit improved distinction between tuberculosis and Crohn's disease.

Problems of a gastrointestinal survey

E. A. O'KEEFE, J. P. WRIGHT, J. FROGGATT, S. A. WATERMEYER. Gastroenterologic Clinic, Groote Schuur Hospital, Department of Medicine, University of Cape Town

An epidemiological survey of the greater Cape Town area was conducted to establish the incidence of Crohn's disease and ulcerative colitis in the population during the years 1980 to 1984 inclusive. A list of patients who had been referred to surgeons, physicians, dermatologists and general practitioners was compiled from the medical list in the 1984/85 Post Office telephone directory. A questionnaire was sent to these practitioners together with a business reply envelope to facilitate return of the questionnaire. At the same time the records of the 10 private gastroenterologists serving this area and of Groote Schuur Hospital, Somerset Hospital, Tygerberg Hospital and Cross Children's Hospital were also searched for further patients.

A total of 731 doctors were placed on the list. The response to the mailings was 22%, 11% and 47% on the first, second and third mailings respectively. Of the 386 doctors who did not respond to the mailing, 146 were deceased or could not be contacted. Of the 250 doctors who did respond, 134 patients with Crohn's disease and 179 with ulcerative colitis. Only 5 new patients with Crohn's disease and 13 patients with ulcerative colitis were identified in returns from the practitioners.

One thousand, seven hundred and fifty letters and 700 telephone calls produced a 97% response rate from the practitioners contacted in the greater Cape Town area and although postal surveys have a low return persistent follow up can produce satisfactory results.

Management of the child with encopresis

J. H. R. BECKER, Department of Paediatric Surgery, University of Pretoria

Persistent faecal soiling can result in the psychological upheaval of the school-going child. The problem brings ridicule and shame to the child, evokes feelings of anger, disgust and guilt in the parents, embarrasses the family members, annoys educators and confounds therapists.

During 1981 - 1986, 109 patients with anorectal or proctocoelia problems were treated in our unit:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirschsprung's disease</td>
<td>22</td>
</tr>
<tr>
<td>Anal anomalies</td>
<td>53</td>
</tr>
<tr>
<td>Idiopathic megacolon</td>
<td>11</td>
</tr>
<tr>
<td>Faecal impaction</td>
<td>17</td>
</tr>
<tr>
<td>Encopresis</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
</tr>
</tbody>
</table>

Hirschsprung's disease, anal anomalies and idiopathic megacolon each have their own treatment modality with variable degrees of success.

Encopresis and related disorders are the great "untalked about" topics and are therefore poorly managed in general. A thorough history, especially regarding the onset of symptoms and a complete clinical examination, including a rectal biopsy to exclude Hirschsprung's disease, is doubtful cases is essential. Saline enemas should be given until the bowel is cleaned, followed by a high residue diet in all cases. To establish a regular bowel regimen the following is necessary: Fleet enema 15 minutes after breakfast; once successful proceed to Peri lax suppository and once successful proceed to Glycerine suppository and once this is successful the child should have a normal stool after breakfast.

Despite the fact that all these patients were unsuccessfully treated for months to years for faecal incontinence, chronic diarrhea, recurrent abdominal pain or Hirschsprung disease before referral all cleared up on the above regimen.

Comparative evaluation of intravenous versus oral fluid therapy for acute dehydrating infantile diarrhoea

C. MOTALA, W. B. G. MCDONALD, I. D. HILL, M. D. MANN, M. D. BOWIE. Paediatric Gastro-enterology Unit, Institute of Child Health and Red Cross War Memorial Children's Hospital, Cape Town

The role of oral glucose-electrolyte solutions in the management of acute infantile diarrhoea after the development of dehydration and shock. The study compared the standard therapy with 2 glucose-electrolyte solutions of differing glucose concentration given by intragastic drip.

84 male infants, aged 6 weeks to 1 year, with acute dehydrating diarrhoea and matched for age and nutritional status, were randomly allocated to one of three groups, Group 1 received strength Darrow5% dextrose intravenously, Group 2 received the same solution by intragastic drip and Group 3 received half strength Darrow2.5% dextrose by intragastic drip. The groups were compared for daily stool weights, daily fluid intake, duration of diarrhoea and length of hospital stay.

There were 28 infants in each group. All infants in Group 1 were treated successfully according to the study protocol but there were 4 (14.3%) treatment failures in Group 2 and 3 (10.8%) in Group 3. In the 77 successfully treated infants there were no differences between the groups in stool weight, fluid intake, duration of diarrhoea and length of hospital stay.

It was concluded that in hospitalized infants with acute dehydrating diarrhoea rehydration by intragastic drip with an electrolyte solution containing 2.5% or 5% dextrose is as effective as intravenous fluid therapy in the majority of cases.

Phenylalanine metabolism and plasma protein synthesis rates during and after recovery from liver failure

S. J. O'KEEFE, J. OGDEN, J. DICKEY, R. KIRSCH. G.1 Clinic and MRC Liver Research Group, Dept Medicine, Groote Schuur Hospital and University of Cape Town

10 patients with liver failure, 7 due to alcohol toxicity (ALD), 2 due to anti TB drugs and 1 due to virus B infection were studied. All patients were encephalopathic; 5 of the ALD group Grade 1-III, 2 Grade IV, whilst the remaining 3 patients had acute fulminant disease/Grade IV coma.

Phenylalanine kinetics and plasma protein synthesis rates were calculated from a 12 hr constant infusion of U-C14 phenylalanine. A second infusion was conducted in the five patients (4 ALD, 1 TB drugs) who improved after 1 week's therapy including branch-chain amino acid enriched nutritional support.

Results:

<table>
<thead>
<tr>
<th>Phenylalanine</th>
<th>Concentration</th>
<th>Flux</th>
<th>Oxidation</th>
</tr>
</thead>
<tbody>
<tr>
<td>mmol/l</td>
<td>mmol/hr</td>
<td>mmol/hr</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>55 ± 10</td>
<td>1.8 ± 0.2</td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>99 ± 53</td>
<td>5.1 ± 2.3</td>
<td></td>
</tr>
<tr>
<td>Fulminant</td>
<td>290 ± 171</td>
<td>1.5 ± 0.7</td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>101 ± 29</td>
<td>6.9 ± 2.3</td>
<td></td>
</tr>
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</table>

Protein synthesis

<table>
<thead>
<tr>
<th>Total</th>
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637 ± 79 6.4 ± 3.5 5.0 ± 2.0
376 ± 182 3.8 ± 3.9 4.9 ± 0.7
113 ± 44 0.1 ± 1 0.4 ± 0.4
506 ± 175 7.9 ± 5 6.2 ± 2.8

In conclusion, suppression of phenylalanine flux, oxidation and incorporation into body proteins was associated with a poor prognosis whilst clinical improvement was associated with relative normalization of kinetic rates. Consequently measurement of phenylalanine flux and oxidation may be of prognostic value in the management of severe liver failure.

Halothane decreases albumin synthesis

J. FRANKS, A. P. BEECHY, G. G. HARRISON, D. MORRELL, R. E. KIRSCH. MRC Liver Research Group, Departments of Medicine and Anaesthesiology, and Department of Anaesthesiology, Vanderbilt University, Nashville, Tennessee

The synthesis of albumin is reduced after surgery. This reduction is due in part to reduced protein
Acute calcualous cholecystitis in critically ill patients

J. VAN MARLE. Department of Surgery, University of Pretoria and the H. F. Verwoerd Hospital

Ninety five percent of cases with acute cholecystitis are associated with cholecithiasis. The clinical picture of the 5% with acute acalculous cholecystitis differs in no way from the diagnosis of infection. However, acute acalculous cholecystitis superimposed on a major illness or post traumatic state is a treacherous condition difficult to diagnose and with a significant mortality.

Five cases presented to us demonstrated the circumstances under which a high index of suspicion should be maintained if the condition is to be diagnosed timely and treated optimally. Three cases occurred after trauma, 1 was a paraplegic with a perforated appendix and diffuse intra abdominal sepsis and 1 case occurred in a debilitated patient with cardiac failure, gastro-entersitis and severe dehydration. Four of the 5 patients were in the intensive care unit. The following factors known to be associated with the condition were present: Prolonged fasting, septicemia, total parenteral nutrition, dehydration, shock and ventilatory support. Suspicious clinical features in these patients were: Fever in all, pain in the right hypochondrium in 3 and a tender mass in 2, leucocytosis in all, and a raised bilirubinaemia and alkaline phosphatase in 4. A diagnosis of acute acalculous cholecystitis was confirmed by ultrasonography in 3. Two cases were explored for intra abdominal perforation without a definitive diagnosis. Gangrenous cholecystitis was present in all and 1 had perforated. Cholecystectomy was performed in 4 cases and patients died of multiple organ failure and sepsis.

The diagnosis of acute acalculous cholecystitis must be entertained in patients after trauma, debilitating disease with shock, dehydration and septicaemia who have been on parenteral nutrition and ventilatory support when the general condition deteriorates with fever leucocytosis, an elevated bilirubin and alkaline phosphatase and pain in the right hypochondrium. Sonography is the cornerstone in the diagnosis and should be performed serially in high risk patients.

Early cholecystectomy is mandatory.

Effect of somatostatin infusion on closure rate of enterocutaneous fistulas in patients receiving total parenteral nutrition

A. N. KINGSORTH, J. G. MOSS, W. I. P. SMALL. University Dept Clinical Surgery, Royal Infirmary, Edinburgh

Because somatostatin infusion can result in rapid (within 24 hours) closure of enterocutaneous fistula and improve the output in patients receiving total parenteral nutrition (TPN) in whom fistulas had persisted for a minimum of 2 weeks in spite of maximum TPN. Fistulas of high (>500 ml/day) or low-output type (<500 ml/day), were of suture-line origin and had not been closed surgically by a stoma or by aogram showing at least 2 views and excluding distal luminal obstruction. Patients had received a minimum of 2 weeks TPN prior to somatostatin treatment and were in positive nitrogen balance. Somatostatin in 5% dextrose solution was administered via a peripheral vein using a constant infusion pump for 4 days; the dosage was 250 ug/hr for 48 hours, followed by 125 ug/hr for the next 48 hours.

Although fistula output dropped in all patients after initiation of somatostatin, compared with pre-treatment volumes this drop was not significant except in Patient 5. Eventual fistula closure was achieved in 3 (Patient 7, 12 and 21) days respectively after somatostatin infusion was stopped. Patient 6 died less than 24 hours after treatment was begun as a result of respiratory arrest due to an acute gastric dilatation.


Delay of fluid perfusion through small bowel by cycloperistaltic loops (C-P loops)

C. HATZITHEOFILOU, H. H. LAWSON, R. A. HINDER. Department of Surgery, Baragwanath Hospital and the University of the Witwatersrand

Conditions such as the dumping syndrome and the short bowel syndrome have led to the use of surgical techniques aimed at delaying the passage of gastrointestinal contents. Patients and methods: The study comprised 7 pelagra patients and 36 patients admitted with an acute abdomen following an alcoholic binge of western spirits. Data assessed included sex, age and amount of alcohol consumed. All patients underwent endoscopy and biopsies of the oesophagus were performed.

Results: Pelagra. There were 5 women and 2 men. Mean age was 40 years. Mean daily consumption of alcohol (mainly home brew) was 8g/day. 5 of the 7 had dysphagia. At endoscopy all had oesophagitis - severe in 3, moderate in 2 and mild in 2. In each case the oesophageal stricture was a late complication of severe oesophagitis as reflected by the presence of inflammatory cells and increased height and numbers of

Paradoxical endotoxaemia in typhoid fever

G. K. PARKER, S. GAFFIN, M. WELLS, A. E. SIMJEE. Gastrointestinal Unit, Dept of Medicine/Physiology, University of Natal, King Edward VIII Hospital, Durban

Since very low concentrations of gram negative bacterial lipopolysaccharide (LPS) can induce fever in humans, it would be expected to be involved in the fever of salmonella typhi infections.

We have used the recently described chromogenic substrate modification of Limulus amebocyte lysate assay (LAL) to measure LPS in typhoid patients who were treated with either chloramphenicol (8 patients) or amoxycillin (10 patients). LPS was assayed before treatment and daily for 10 days thereafter. Temperature and clinical symptoms were monitored.

On admission, all patients were pyrexial but LPS was elevated. LPS concentrations decreased by 89% in patients treated with chloramphenicol and by 75% in those treated with amoxycillin.

The contrasting effects of pelagra and western-type alcohol on the oesophagus

I. SEGAL, A. DEMETRIOU,* J. POSEN,* M. HALE, M. LERIOS, R. RAMALHO. G.LT. Unit, Baragwanath Hospital, *School of Pathology, SAIMR and University of the Witwatersrand

Dietary deficiencies and alcohol are implicated in the etiology of oesophageal cancer, the commonest cancer in black men. The aim of this study was to delineate the different pathologic effects of niacin/tryptophan deficiency and alcohol on the oesophagus.

Patients and methods: The study comprised 7 pelagra patients and 36 patients admitted with an acute abdomen following an alcoholic binge of western spirits. Data assessed included sex, age and amount of alcohol consumed. All patients underwent endoscopy and biopsies of the oesophagus were performed.

Results: Pelagra. There were 5 women and 2 men. Mean age was 40 years. Mean daily consumption of alcohol (mainly home brew) was 8g/day. 5 of the 7 had dysphagia. At endoscopy all had oesophagitis - severe in 3, moderate in 2 and mild in 2. In each case the oesophageal stricture was a late complication of severe oesophagitis as reflected by the presence of inflammatory cells and increased height and numbers of
Oesophageal cancer case control study

I. SEGAL, *S. G. REINACH. Gastrointestinal Unit, Baragwanath Hospital, University of the Witwatersrand. *Institute for Biostatistics of the S.A.M.R.C. (Transvaal).

Cancer of the oesophagus (CaO) is the commonest cancer in black men and has reached epidemic proportions in some areas of South Africa. A case control study was carried out during 1984-5 to elucidate aetiological factors. 

Patients and methods: 201 CaO patients and 250 controls matched for sex and age were studied. Pulmonary function tests were done using a Jaeger analyser with a transfer screen.

Results: Oesophageal cancer Controls

| Age (mean) | 53 years | 55 years |
| Years in Soweto | 22.7 | 22.6 |
| Smoking | 86% smokers | 80% smokers |
| Cigarettes (Quantity) | 7.5 daily | 7 daily |
| Pipe Smokers | 9% | 0 |
| Respiratory symptoms | 48.6% | 10% |
| Lung Function | Tests: Normal 21% | 35% |
| Obstructive 24% | 40% |
| Restrictive 19% | 15% |
| Both Obstr. and Restrict. | 27% | 10% |
| Decreased diffusion capacity 8% | 0 |

Conclusion: Most (79%) of oesophageal cancer patients have abnormal pulmonary function (obstructive). A change in lifestyle and smoking cessation may be significant.

Oesophageal scintigraphy

G. ADAMS AND S. WYNCHANK. Tygerberg Hospital, Parowvallei

Oesophageal scintigraphy (O.S.) offers a rapid non-invasive way of assessing oesophageal motility. It essentially involves monitoring, with a gamma camera, the progress of an orally administered liquid radio-isotope (Technetium -99m) bolus through the oesophagus and recording and analyzing the events on a computer.

Oesophageal dysmotility appears to be the underlining mechanism in oesophageal 'angina' or spasm presenting with chest pain, and in some cases of dysphagia and heartburn.

A feasibility study, using O.S., was done which involved 17 patients and 3 controls. Of the 8 patients with persistent angina-like chest pain (despite negative coronary angiograms), 3 had evidence of dysmotility (a negative ergonovine provocative test was obtained in 1). Five of the patients with heartburn demonstrated dysmotility patterns. In the dysphagia group, mechanical obstruction (excluded) 1 patient demonstrated gross dysmotility associated with a mild-oesophageal diverticulum. Oesophageal scintigraphy is an insensitive method for detecting oesophageal cancer but it has previously been shown to have a high concordance rate (84%) with the more definitive manometry.

It is quick, simple, non-invasive and can easily be included into the routine of most hospitals with radio-isotope facilities to assess non-cardiac chest pain and manage problems of non-structural dysphagia and heartburn.

Percutaneous transhepatic balloon dilatation of strictured hepaticojejunostomies

C. J. C. NEL, J. D. VISSER. Department of Surgery, U.O.F.S., Bloemfontein

Strictures in hepaticojejunostomies for bile duct injuries have a predictable recurrence rate of 20 to 40%. Repeated surgical management is often impeded by cirrhosis, the location of the stricture and the size of the proximal ducts. Percutaneous transhepatic balloon dilatation allows repeated therapeutic interventions with minimal discomfort for the patient. The objective of this study is to report on the 2.5 - 3 year follow-up of 3 patients in whom this procedure was performed.

Patients and methods: All 3 patients had bile duct injuries with 2 subsequent surgical procedures and presented with attacks of cholangitis. PTC demonstrated strictured hepatojejunostomies. A guide was placed transanatomically and repeated dilatations performed with Gruntzig catheters with the guide kept in place for 3 months. Radiologic control showed adequate dilatation in all patients before removal of the catheter. Patients were followed clinically and by repeated alkaline phosphatase and bilirubin values. PTC was obtained in 1.

Results: Immediate alleviation of biliary obstruction was obtained with accompanying improvement of biochemical parameters. One patient had cholangitis for 9 months following the procedure and it was repeated. At 2.5 - 3 year follow-up two patients are asymptomatic, one had a left hemi-hepatectomy for a cirrhotic left lobe but a good result of the right duct which was dilated.

Conclusions: Percutaneous transhepatic balloon dilatation offers a simple, non-invasive and successful alternative to surgery and should be considered in the high risk patient.


Groote Schuur Hospital experience of pneumatic dilatation in achalasia

R. TOBIAS AND P. C. BORNMAN. Gastrointestinal Clinic, Departments of Medicine and Surgery. University of Cape Town and Groote Schuur Hospital, Observatory, Cape Town, South Africa

Prior to 1985, patients presenting with achalasia were offered a modified Heller's myotomy as the only form of therapy. Subsequently, pneumatic dilatation has been introduced as an alternative in the management of this condition. Five females and 3 males have been subjected to this procedure, using a Russian pneumatic balloon of 9 mm dia and inflated to 300 mmHg for a period of 3 minutes. Their ages ranged from 24 to 77 years and 3 had previous myotomy, 8 and 6 years previously. Of the 5 patients presenting for the first time, symptoms...
had been present for 1 to 10 years. The diagnosis was made on the basis of a suggestive barium swallow and endoscopy and confirmed by manometric studies. The youngest of these (24-year old female aged 47) underwent 2 pneumatic dilatations, with relief for 2 - 3 weeks only on each occasion, prior to undergoing a Heller's Myotomy. The other 4 have had more than 15 years of symptom relief for a response period of 1 to 5 years. Of the 3 with a previous myotomy, I failed to respond and underwent further surgery, including an antireflux procedure; 1 had moderate improvement for 2 months and the third has remained well for one month. There were no complica-
tions related to the dilatation. Although the appearance of the patients at follow-up was good, 1 patient refused to have another operation and 1 required injection sclerotherapy on 3 occasions to control variceal bleeding.

We conclude that U-tube drainage with intra-operative balloon dilatation of strictures is beneficial in symptomatic and progressive jaundice in PSC.

The quantification of juxta-DU/sca r mucosal pathomorphology

M. A. GREGORY. Electron Microscope Unit, Dept Pathology, University of Natal, Durban

The severity of pre-treatment ulcerative duodenal mucosal pathology and the relative quality of mucosal healing after various types of curative drug therapy may reflect the duration of duodenal ulcer (DU) remission. Conventional histologic tech-
niques do not enable mucosal pathology to be accurately assessed or compared. This paper describes the rationale behind the formulation of a numerical index that accurately describes the mor-
phological appearance of the mucosa surrounding DU or scars.

Endoscopic biopsies were obtained from within 7 mm of the edge of DU and scars in 32 patients before and after curative therapy with one of 3 drugs (Sucralfate, Cimetidine and Misoprostol).

Additional biopsies, made at 3 month intervals for up to 1 year were taken from near the edge of scars in patients experiencing DU remission. All specimens were prepared for light and electron micro-
scopy.

Irrespective of the type of therapy, pre- and post- treatment ulcerative mucosa were comprised of 3 basic cell types: 1) absorptive; 2) goblet; 3) meta-
plastic gastric surface mucus secreting cells (GMC). Alterations in the distribution of cell types 1 and 2 and variations in the degree of differentiation of GMC were noted. By equating such cellular alterations to the duration of patient remission, it became apparent that both pre- and post-therapy mucosal metaplasia were positive and degenerative-metaplastic changes were positively associated with remis-
sion prognosis. Scores were awarded to important morphological features and biased to accommodate favourable (metaplastic-high) and non-favourable (non-metaplastic-low) prognostic criteria. The sum of scores (max 14; min 0), expressed as a % was termed the morphological index (MI). The MI has proved useful as a means of quantifying minor and multi-varied mucosal alterations within and between both pre- and post-therapy juxta-DU/scar mucosae. Statistical analysis of the MI data has shown that the morphological 'severity' of pre-treatment DU and the morphologic 'quality' of healing after curative therapy are indirect factors that influence the duration of DU remission.

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Endoscopic upper gastrointestinal disease at the 1 Military Hospital, Pretoria

G. P. BEINSTEIN and B. F. JACOBSON. 1 Military Hospital, Pretoria

From 1/1/84 to 31/3/86, 1217 gastroscopies were performed on 1030 patients without complication. Olympus forward viewing scopes were used with either intravenous sedation or patient cooperation and good technique. Biopsies and photographs were taken when indicated. Of these patients, the average age being 37.9 years (range 6 to 83).

15.5% had peptic ulcers: 99 duodenal (9.6%, average age 41.3); 13 M/F 69/24; 43 gastric (4.2%, 50.6%; M/F 23/21); 9 channel (0.87%; 53.7; M/F 5/4) and 8 combined (0.78%, 58.5, 6.2). Two gastric car-
cinomas were diagnosed (0.19% of all patients, one female aged 57; one male aged 61). Pathology of duodenal hermis, 58% of which were complicated by reflux oesophagitis. 4 had reflux strictures. One well differentiated squamous carcinoma of the oeso-
phagus was found and proved to be in situ and curative surgery was performed. 7 patients had oesophageal varices, 2 due to schistosomiasis. Oesophageal in the absence of histal hernia occurred in 47 (4.6%). There were 4 Mallory Weiss tears. 33 postoperative stenomata were evaluated: 33% were Biliorth 1 and 42% were Biliorth 2 (2 stokal ulcers were found). Gastritis (endoscopic and histologically confirmed) was seen in 177 (17.6%) and duodenitis was noted in 40 (3.9%).

A variety of other pathological processes were documented: gastric polyps, 3 vascular dilatations in the duodenum; and cases of achalasia, Menetrier's disease, nodular lymphoid hyperplasia, rollling hiatus hernia, and Coeliac's disease. 29.9% of examinations revealed no pathology. Further detailed percentages, average age and age distributions, range and statistical analysis are also presented.

The endoscopy unit is an active, efficient and accurate diagnostic unit. Typical Western type specimen of disease is noted with several other interesting entities.

Radiological appearance of the abdomen after upper GIT endoscopy

B. F. JACOBSON, G. BERNSTEIN, V. B. ANDRIJICH. Department of Surgery, University of Pretoria

Pneumoperitoneum and intramural air are docu-
mented complications of upper GIT endoscopy. Their incidence is purported to be increased by the presence of mucosal lesions, the use of endoscopic biopsies or failure to aspirate air at the end of the procedure. The study was undertaken to document the above complications and to determine if air aspiration was contributory to decreasing the incidence.

60 patients were entered into the survey. All patients underwent upper GIT endoscopy. 40 patients (Group A) had no air removed at the end of the procedure while 20 (Group B) had air aspirated. All patients had endoscopy performed on radiological indications, as well as supine abdominal X-rays within 15 minutes after the endoscopy. 16 of the cases had ulcers and/or endoscopy suspicious of ulcer. There was 19 females and 41 males. 2 patients had polyps which were biopsied, 8 patients had duodenal ulcers, 3 patients had prepyloric ulcers, 1 patient had a gastric ulcer, 1 patient had a stokal ulcer post Billiorth 1. 1 patient had bile gastritis.

There were no cases of intramural air or pneu-
morenomia. 40% of Group A had excessive air in the small bowel radiographically as compared to 25% of Group B.

We concluded that in our study pneumoperi-
toneum and intramural air were not present. Removal of air at the end of the procedure for this complication was not warranted. However the radio-
logical appearance of excessive air would seem to indicate that air should be removed.

1. Giubberman S. Radiographic survey for extra-
luminal air following GI endoscopy. GI endoscopy 22:3 1982 p 165-167.

2. Madura MJ. Unusual causes of pneu-

Is the hepatitis B virus transmitted by fiber-
optic upper gastrointestinal endoscopy (UGE)?

J. M. SPITAELS, G. L. MANION, A. E. SIMEIJ. Gastrointestinal Unit, Dept of Medicine, University of Natal, King Edward VIII Hospital, Durban

The possibility always exists of contaminating fiber-
optic instruments when using them on asymptomatic
carriers of hepatitis B virus. This has generated grave concern in the past in relation to the risk of them transmitting the disease to uninfected patients submitted to UGE with a contaminated instrument. Thorough cleaning of equipment and the use of glutaraldehyde as a preservative have, however, to reduce this risk considerably. We have attempted to define the extent of that risk in our GI Unit, catering for a mixed population of African and Indians, considering two adverse factors.

1. The high incidence of asymptomatic carriers in our African patients (8.8% HBsAg and 25% HBsAb in males compared to the low incidence in Indians (0.9 and 6).

2. The overused endoscopy slates result in shorter cleaning periods (2 ± 2 mins soaking in gluteraldehyde).

Patients and methods: 100 Indian male patients were interviewed re previous illness or operations and signs of liver disease looked for. The following measurements were obtained: plasma albumin, globulin, total bilirubin, ALK Phos, AST, ALT, Hepatitis B markers: sAg, sAb, cAb, eAg, eAb. 50 had never had UGE (Gr. 1), 50 had endoscopy at least 6 months previously (Gr. 2). Results in the 2 groups were compared using a Student t test.

Results 10 patients who never had UGE had some of the hepatitis B markers (3 sAg, 6 sAb, 1 both), mostly weakly positive. 5 patients with previous endoscopy had them (4 sAb, 1 cAb) also weakly positive. No patient had clinical evidence of liver disease. The significant differences between the two groups were: black patients had 10 for 1, 39 for 2 and the level of ALT (12 ± 4 for 1, 16 ± 9 for 2). Blood measurements were otherwise identical. In Gr. 2, patients who had Hep B markers had had the same number of UGE in the past as patients negative for Hep B.

Conclusion: The incidence was found of a significant increase in the incidence of Hep B markers in a group of patients 6 months or more after UGE. The unexpected high incidence of markers, although weakly positive, in the control group is unexplained.

Bile gastritis and the irritable bowel syndrome

J. GARISCH. Gastrointestinal Physician, Provincial Hospital, Port Elizabeth

A series of 10 patients with food induced pain and dyspepsia unresponsive to standard medication but no previous gastric surgery were reviewed, and criteria for the diagnosis of BILE REFUX GASTRITIS. In addition the endoscopic features of a bile pool in the gastric antrum, gastritis with or without erosions, a raised intragastric pH and an "alimentary perigastritis test" were also required. These patients were also required to have colonic symptoms of flatulence, pain and distension and an irregular bowel habit. All patients had had either a colonoscopy or fibre (as Fybogel Orange). Symptomatic and endoscopic improvement was documented and the results suggest that symptomatic bile gastritis in the unselected patient may be a diffuse motility disturbance requiring a different therapeutic approach.

A study to compare the therapeutic efficacy of two regimens of De-nol swallow tablets in the treatment of duodenal ulceration: two tablets given twice daily against the usual 4 times daily regimen

M. D. DANIWEITZ, L. BANK. Medical Gastro Unit, Division of Medicine, University of the Witwatersrand and Johannesburg Hospital, York Rd, Parktown

A total of 41 patients suffering from duodenal ulceration were randomly allocated to treatment with two De-nol swallow tablets twice daily (bd) or to the usual regimen (qs) of De-nol for 28 days and, in the event of non-healing, for a further 28 days therapy. Clinical and endoscopic assessments were undertaken before and after 4, and necessarily, 8 weeks of therapy.

There were a total of 6 patients who failed to return for follow up. In the remaining 17 patients in the bd and 18 patients in the qs treatment group no significant differences in healing rate emerged from the data with respect to endoscopic picture or clinician's evaluation of healing. Both regimens induced a significant reduction in symptomatology without any differences emerging between the treatment groups with respect to dyspepsia score distribution nor in the number of patients experiencing complete relief of pain.

No side-effects were reported.

The effect of the microsphere (MS)-technique on blood flow in dogs

C. VON RITTER, P. BAUERFEIND, S. HUNTER, A. L. BLUM AND R. A. HINDER. Dept of Surgery, University of the Witwatersrand, Johannesburg

The MS-technique is the standard method for measuring organ blood flow in animals. It is assumed that the MS does not affect blood flow. In order to test this hypothesis, serial MS injections were performed in 30 dogs. (1) 4 consecutive MS of 1 million (m) MS were given at 0, 30, 90 and 120 min in conscious dogs. (2) The effect of anesthesia was evaluated by inducing N-pentobarbitone anesthesia. (3) Influence of the number of MS was tested by an additional 3 injections of 5 (3 x 3 m MS). (4) In order to test the influence of blood loss, due to reference sampling, volume replacement was performed and finally (5) the effect of the duration of the experiment was assessed with 4 MS injections at only 15 min intervals. In (1) - (5) gastric mucosal blood flow (GMBF) decreased from the first to the fourth MS injection (p < .05). With 4 x 1 m MS no such decrease could be found in other organs. With the additional 3 x 3 m MS a decrease of blood flow to all organs was seen (p < .05) together with a more pronounced decrease in GMBF (p < .002). Anesthesia doubled the heart rate, but blood flow values were unchanged compared to conscious dogs. Volume substitution blunted the decrease in GMBF and during the experiments of only 45 min GMBF remained stable. In conclusion, in both conscious and anesthetized dogs the MS-technique leads to a decrease of GMBF. Volume loss and the duration of the experiment are causative factors. In other organs such a decrease was only observed with a much higher number of MS (13 m) suggesting a high sensitivity of the gastric mucosa.

Defining proximal and distal margins of gastric carcinoma by barium meal: a pilot study

J. LOUW,* M. V. MADDEN+ , S. K. PRICE+ , D. M. DENT+ . Departments of Radiology, Surgery and Pathology. Groote Schuur Hospital and University of Cape Town

The extent and safety of resections for gastric carcinoma (GC) depend largely on the extent of intra­mural spread. If barium meal can define this accurately it may allow selection of patients for surgery or prediction of extent of resection (subtotal/total/total/oesophago-gastro-duodenectomy). Results: 10 patients who never had UGE had some of the hepatitis B markers (3 sAg, 6 sAb, 1 both), mostly weakly positive. 5 patients with previous endoscopy had them (4 sAb, 1 cAb) also weakly positive. No patient had clinical evidence of liver disease. The significant differences between the two groups were: black patients had 10 for 1, 39 for 2 and the level of ALT (12 ± 4 for 1, 16 ± 9 for 2). Blood measurements were otherwise identical. In Gr. 2, patients who had Hep B markers had had the same number of UGE in the past as patients negative for Hep B.

Conclusion: The incidence was found of a significant increase in the incidence of Hep B markers in a group of patients 6 months or more after UGE. The unexpected high incidence of markers, although weakly positive, in the control group is unexplained.

Gastroduodenal pathology in patients referred for upper gastrointestinal examination at Tygerberg Hospital

P. J. VAN EEDEN, D. J. J. BEZUIDENHOUT: Dept of Internal Medicine and Chemical Pathology, Gastro-intestinal Clinic, University of Stellenbosch and Tygerberg Hospital, Tygerberg, Cape

Bradshaw et al.1 reported a high incidence of gastric carcinoma in coloured men; a retrospective study was therefore carried out to review the clinical picture of gastric carcinoma at the Gastro-intestinal Clinic at Tygerberg Hospital. Patients and methods: In a retrospective study of the 5-year period 1979 - 1983 we reviewed 245 patients who had been referred to the Gastro-intestinal Clinic at Tygerberg Hospital with the presumptive diagnosis of gastric carcinoma. The four criteria used to confirm the diagnosis were: clinical, radiological, gastroscopic and histological findings.

In this study only histologically proven cases are included. The available data from the clinic files on these cases were processed by computer.

The purpose of the study was to review: i) the race, age and sex of the patients; ii) the main presenting symptoms; iii) the main clinical findings; iv) results of appropriate special investigations; v) the histological spectrum.

Results: Fifty per cent of patients were coloured men. The overall median age was 65 years but the coloured patients were significantly younger than the white. The main symptoms were loss of appetite and weight, abdominal pain and vomiting. The median duration of symptoms in all patients was 3 months. An abdominal mass, anaemia and obvious weight loss was the most important physical signs. A normocytic normochromic anaemia and elevated erythrocyte sedimentation rate, raised liver enzyme levels and hypo-albuminemia were the most important laboratory findings. In 96% of the 149 patients gatroscopy yielded a positive diagnosis of gastric carcinoma and barium meal examination showed abnormalities in 87%. In the majority of cases carcinoma was poorly differentiated. 1. Bradshaw E, Harington JS, McEachern BD. Geographical distribution of lung and stomach cancers in South Africa, 1968 - 1972. S Afr Med J 1983; 56: 655-663.

Defining proximal and distal margins of gastric carcinoma by barium meal: a pilot study

L. C. J. VAN RENSBURG, D. J. J. BEZUIDENHOUT, P. VAN EEDEN AND R. ROBSON. Departments of Surgery, Veterinary Microbiology and Microchemistry, Tygerberg Hospital

The purpose of this study was to correlate gastric pH and microorganisms in gastric aspirates taken at endoscopy. The endoscope, suction tubing and collecting specimens bottles were sterilized. The collected specimens were sent for culture and sensitivity. The pH was measured with Panphea strips.

Results: The Number of patients was 15, chronic gastritis 19, GU 23, DU 7, post gastrctomy 9, normal 3 and other 3. The pH range was: Ca 2.5 -4.0, chronic gastritis; 1.9 - 3.0, GU 1, 0.0 - 3.0, post gastrctomy 4.0 - 7.2, DU 1.0 - 5.0, normal 6.0 - 8.0, other 1.5 - 7.0. The pH range and positive culture correlations were: pH 0.2 - 3.7, 2.1 - 4.0: 71%, 4.1 - 6.0: 100%, 6.1 - 8.0: 94%, 8.1 - 100%. Positive cultures were found in 13 of 15 Ca stomachs, 16 of 19 chronic gastritis, 15 of 23 GU, 8 of 9 post
gastrectomy, 3 of 7 DU and none of 3 normal patients. 8 of the 23 DU patients had negative cultures. All except 1 had pH measurements of 3 or below. 8 of the 15 positive cultures had pH measurements of 3 or below. 3 of the 7 DU patients had positive cultures with pH figures below 2 and those patients with pH figures below 2 had negative cultures. The commonest organisms were: Klebsiella pneumoniae, haemophilus influenzae, Proteus vulgaris, Escherichia coli, Candida albicans and Pseudomonas aerugino-

Measurement of gastric pH is not helpful in deciding which patients should receive antibiotics as there is no correlation from this study between the presence of polymicrobes and a low pH.

Giant duodenal ulcers (GDU) — 3 year review of the Baragwanath experience

D. PAREKH, R. RAMALHO, I. SEGAL, H. H. LAWSON. Dept of Surgery and GIT Unit, Baragwanath Hospital

Early surgery has been recommended for GDU due to the reported high morbidity and mortality asso-
ciated with this disease. The role of modern medical therapy for GDU is controversial and the natural history following the healing of the ulcer is not known. We have reviewed our 3 year experience with GDU.

Patients and methods: The records of all patients from Jan. 1983 to Jan. 86 have been reviewed. Tagamet and Ramididine were used for medical therapy.

Results: Records for 34 cases were available for review. There were 24 males and 10 females. The mean age was 48 years. Twenty (59%) patients presented with haemorrhage 3(9%) with perforation, 4 (12%) with obstruction, and 7 (21%) with an uncomplicated ulcer. Significant history of smoking was present in 6 cases (18%), alcohol in 13 (38%), and anaglymeic abuse in 10 patients (29%). The mean length of history of dyspepsia was 1.1 year. Of the 20 patients who presented with haemorrhage 12 (65%) had an acute bleed and 8 (45%) had urgent surgery. All cases had endoscopic or clinical criteria for urgent surgery. The 12 patients treated conservatively responded to intensive medical therapy. Five of these cases developed ulcer recurrences (none GDU) on follow-up for which 3 required surgery.

Sixteen patients (47%) in this series had surgery. Eleven patients had gastric resection, 4 vagotomy and drainage (VD) and 1 HSV. Two patients with gangrene of the ulcer (1 death unrelated to surgery) and 1 patient developed a subphrenic abscess. One patient with VD developed a leak. An important finding was that 6 of the patients who presented with acute haemorrhage, inadvertent interruption of their intensive medical therapy for 48 hours resulted in a second major haemorrhage in 5 patients, and perforation in 1 patient.

Conclusion: The indications for urgent surgery in GDU should be similar to those used for ordinary duodenal ulcers. Intensive medical modern therapy will probably heal the GDU, however on long-term follow-up surgery will be required. Gastricometry in experienced hands is a safe operation for GDU.

Pancreatitis caused by surgically correctable congenital pancreatico-biliary anomalies

A. H. GIRDWOOD, I. KALVARIA, P. C. BORNMAN, R. TOBIAS AND J. N. MARKS. Gastrointestinal Clinic, Departments of Medicine and Surgery, University of Cape Town and Groote Schuur Hospital, Observatory, Cape Town, South Africa

Whereas pancreas divisum as a cause of apparent acute pancreatitis and the surgical treatment thereof remains controversial, we wish to report 4 cases who presented with apparent attacks of pancreatitis due to a congenital pancreatico-biliary anomaly. All patients underwent surgery and to date have had no further attacks of pancreatitis.

The first case was an 11-year old girl with an intra-panillary pancreatic diverticulum. The second and third cases, aged 50 and 60, had peri-ampullar pseudocysts and the 4th patient had a cholecystocele. A fifth patient, aged 30, had a cholecystocele and abdominal pain, but no pancreatitis.

Conclusion: Patients, particularly if young, with unexplained pancreatitis, need to be investigated by ERCP to rule out surgically correctable pancreatico-biliary anomalies.


Why is pancreatitis a milder disease in black patients?

M. L. VAN NIEKERK, E. U. SCHMIDT AND C. J. MIENY. Department of Surgery, University of Pretoria; H. F. Verwoerd and Kalafong Hospitals, Pretoria

The difference in the reported mortality of acute pancreatitis in black patients at Baragwanath Hospi-
tal (14%) and white patients at the Johannesburg Hospital (8,1%;) stimulated us to analyse our experi-
ence of the disease in black and white patients in Pretoria. Seventy four black and 59 white patients were seen during a 3 year period. Alcohol was the etiological factor in all but 1 of the black patients. In white patients alcohol was the etiological factor in 63%, gallstones in 25% and no cause was found in 12%. Six white patients developed pseudocysts, 4 in alcoholic pancreatitis and 2 in gallstone pancreatitis. Two black patients developed pseudocysts, both in alcoholic pancreatitis. Three white patients developed chronic inflammatory pancreatic abscesses. The etiology of the pancreatitis was unknown in 2 and alcohol in 1. Only one black patient developed a pancreatic abscess. Eight white patients died (13%). The etiology of the pancreatitis was unknown in 3, gallstones in 3 and alcohol in 2. Four black patients died (5%). All had alcoholic pancreatitis. All the deaths occurred in patients with at least 3 positive Ranson criteria. The morbidity and mortality were significantly higher in white patients (p < 0.001). If only the alcoholic cohort of white patients is compared to blacks the mortality is identical (5%). We conclude that the etiology of acute pancreatitis in blacks is almost exclusively alcoholic and that this explains the difference in mortality.


Tobramycin penetration of pig pancreatic tissue and juice

D. H. BASS*, M. V. MADDEN*, P. C. BORN-
MAN*, K. P. PRATT† and R. HICKMAN*, Surgical Gastroenterology* and Deps of Surgery† and Bacteriology*, Groote Schuur Hospital and University of Cape Town

Pancreatic sepsis occasionally follows endoscopic pancreatography (EP) and might be avoided by using antibiotic prophylaxis.

Method: The pancreas of 8 pigs was stimulated with pancreaticase or pancreozymin during intravenous infusion of tobramycin (T). T levels in serum (S), with pancreozymin and secretin during intravenous pancreatography (EP) and might be avoided by using antibiotic prophylaxis.

Results: There were no differences in bowel motility between the cisapride and placebo treated groups. The motility between the cisapride and placebo treated groups. The motility between the cisapride and placebo treated groups.

Conclusions: Peak levels in PT and PJ occurred 15 minutes after infusion. Therapeutic (5-8 mg/L) levels in PT required toxic S levels (> 10) but even these did not achieve therapeutic levels in PJ. However, sepsis after EP affects parenchyma more than the duct system so low T levels in PJ do not mitigate against its prophylactic use.

Radiation colitis and ulceration

G. B. LEE, J. OOSTERLEE AND M. NISSEN-
BAUM. Hillbrow Hospital and University of the Witwatersrand, Medical School, York Rd., Park-
town, Johannesburg

A very large number of patients with carcinoma cervix are treated by the Radiotherapy Department at Hillbrow Hospital with the inevitable consequence of radiation induced bowel damage to some. A rational approach to treating the latter patients has been attempted.

Thirty-five patients with radiation induced colitis have been seen over the last 18 month period as well as 12 patients with radiation ulcers. In both groups most patients had had Ca cervix stage IIIb. The average age was 49 years. The patients with colitis presented 3-7 days after a mean of 29 months and those with ulcers were seen during a mean of 41 months although most patients with ulcers had colitis as well. The vast majority of the colitis was confined to the rectums whilst all the ulcers were in the rectums. Twenty-eight percent of the patients with colitis developed neoplastic recurrences or metastases during this period whilst 2 needed opera-

colicom junctional pull-throughs because of severe rectal bleeding. The rest have remained reasonably well on conservative treatment. Despite a basically conserva-
tive approach to the patients with radiation ulcers 6 required operative pull-throughs whilst 2 developed recrrectal fistulae before pull-throughs were performed.

In conclusion a conservative approach is war-
ranteed in both sets of patients although many more patients with ulceration will require operative inter-

Cisapride has no effect on postoperative paralytic ileus

C. VAN RITTER, S. HUNTER AND R. A. HINTER. Dept of the disease of abdomen in Surgery, University of the Witwatersrand, Johannesburg

Background: Postoperative paralytic ileus is one of the most frequent sequae of abdominal surgery. We tested the efficacy of cisapride, a new gastric and intestinal prokinetic, in restoring bowel motility after laparotomy.

Methods: In a double blind, placebo controlled, randomized clinical trial the effect of postoperative cisapride was assessed in 32 patients undergoing abdominal surgery. The patients were divided into two groups receiving either placebo or cisapride (10mg) according to the following schedule: I.M. 6 hrly for a maximum of 2 days beginning with a single I.V. injection at 7. a.m. on the first postope-

rative day. Each study was ended as soon as flatus had been passed, indicating restored intestinal passage. To determine bowel motility, colour and flow of gastric aspirate, barium, flatus and stools were recorded during the entire period of the study.

Results: There were no differences in bowel mobility between the cisapride and placebo treated groups. Onset and intensity of barium, flatus, stools and stools as well as the flow of gastric aspirate were similar in both groups. In the great majority of patients of both groups the aspirate was greenish indicating duodenogastric reflux.

Conclusion: In the present study cisapride failed to improve the intestinal passage during postopa-

terative ileus.
The identification of a glutathione S-transferase iso-enzyme in fetal rat livers which is not apparent in adult rat livers

T. R. SCOTT, P. I. FOLB AND R. E. KIRSCH.
MRC Liver Research Group, Department of Medicine, University of Cape Town

The glutathione S-transferases (GSH S-T's) are an important family of drug metabolising enzymes. GSH S-T iso-enzymes are dimeric proteins made up of different combinations of a series of subunits. Iso-enzymes are characterised by their affinity. We have investigated the subunit expression of GSH S-T iso-enzymes in fetal rat livers since differences in expression of the subunits are strongly related to the teratological implications. The GSH S-T subunit composition of fetal rat livers and adult rat livers were investigated by means of affinity chromatography followed by polyacrylamide gel electrophoresis in sodium dodasyl sulphate (SDS-PAGE).

In normal adult rat liver there are four major subunits. In the rat fetal liver we identified a fifth subunit and hence iso-enzyme's not apparent in the adult liver. The fetal subunit had an approximate molecular mass of 25,000 daltons, gave two bands of pI 8.0 and 8.5 on isoelectric focusing and a densitometric scan of the subunits on SDS-PAGE gel revealed that it accounted for approximately 26% of fetal liver GSH S-T. 'Western blots' revealed that the subunit reacted to antibodies raised in rabbits against adult rat liver GSH S-T's 1 - 2 (Yαc) and 2 - 2 (Yγc). Immuno-diffusion of adult and fetal GSH S-T's and two antisera suggested that this identity was not complete.

The subunit differed from that found in placenta and was not produced when unipurified adult rat liver cytosol was subjected to conditions favouring hydrolysis. Our studies suggest that the additional band seen on SDS-PAGE analysis of GSH S-T's from fetal livers represents a fetal iso-enzyme bearing antigens shared with the known subunits. This is of considerable interest in view of the significant restriction in the capacity of the fetus to metabolise certain xenobiotics.

Purification of human lung and kidney angiotensin converting enzyme (ACE) by a novel affinity technique

MRC Liver Research Group, Department of Medicine and University of Cape Town

Sarcoidosis and tuberculosis accounted for 68% of 116 ante-mortem liver biopsies with hepatic granulomatous involvement at Groote Schuur Hospital. The differential diagnosis of granulomatous disease is a difficult problem and in certain cases special stains or other techniques are required to establish the diagnosis of tuberculosis. We have been able to demonstrate the presence of acid-fast bacilli in 61 of the 116 cases examined.

Enzyme studies in dual porphyria

E. D. STURROCK, P. N. MEISSNER, D. L. MAEDER, R. E. KIRSCH.
MRC Liver Research Group, Department of Medicine, University of Cape Town

Dual porphyria is a rare disorder in the haem biosynthetic pathway characterised by the superimposition of the porphyria excretory profiles of quinences variegate porphyria on the profiles normally associated with porphyrina cutanea tarda. Urinary uroporphyrinogen decarboxylase and porphyrinogen oxidase activities were measured in haemolysates and in Epstein-Barr virus transformed lymphoblasts of patients with dual porphyria as well as control subjects.

Tissue distribution of human basic and near-neutral glutathione S-transferases

A. V. CORRIGALL, D. L. MAEDER, R. E. KIRSCH.
MRC Liver Research Group, Department of Medicine, University of Cape Town

The glutathione S-transferases (GSH S-T's) play an important role in the metabolism of xenobiotics. Three groups of human GSH S-T's, basic (pI > 7.5), near-neutral (pI 6.5 < pI < 7.5) and near-neutral (pI < 6.5) have been identified. The organ concentration and cellular distribution of the basic GSH S-T's (lignand) are well documented but less is known about the concentration and distribution of neutral and acidic transferases. Our previous work suggested that GSH S-T's were subject to interorgan and interindividual variation. This may explain inter-individual and organ differences in susceptibility to drug toxicity and in the clinical manifestations of liver disease.

The concentrations of basic and near-neutral transferases were measured by radial immunodiffusion in 18 organs from 8 victims of motor vehicle accidents. Basal GSH S-T's were present in all 8 individuals. Neutral transferase was present only in 3 of the 8. Table 1 lists the concentration of basic transferases (mean ± SD) and that, where present, of the near-neutral transferase (mean and range). Concentrations are expressed as micrograms of transferase per milligram cytosol protein.
The spectrum of radiological appearances in Crohn's disease

R. E. KOTTLE*, J. H. LOUW* AND J. P. WRIGHT+. Departments of Radiology* and Gastroenterology+, Groote Schuur Hospital and University of Cape Town

The use of modern radiological techniques (small bowel enema and double contrast barium enema) permitted demonstration of the pathological changes in the bowel. There is good correlation between the radiological findings, the endoscopic appearances and the macroscopic findings in the resected specimen.

The advantage of the demonstration of subtle lesions is that it permits earlier detection of abnormality and better delineation of the extent of the disease.

Although the basic appearances of Crohn's disease in the small bowel and colon are similar, the characteristic morphological and topographical features are usually better demonstrated in the colon.

Crohn's disease most commonly involves the terminal ileum (73%) and involves the right colon as well in 37% of all cases. Isolated Crohn's colitis (27%) is becoming increasingly commonly recognized.

In the early stages of Crohn's disease the signs are subtle and nonspecific, i.e. fold thickening and/or aphthoid ulceration. With time, the transmural nature of the disease becomes apparent, as evidenced by deeper discrete ulcers, 'cobblestone' pattern and luminal narrowing. In the later stages sinuses, fistulae, stenoses and bowel wall thickening develop.

However, it is very common for superficial lesions to occur at all stages of the disease.

Certain topographic features are typical of Crohn's disease, namely a gradient phenomenon as the lesion towards the proximal pole of the lesion, asymmetrical involvement of the bowel wall in its transverse (axial) plane, pleomorphism of the appearances of the ulcerations and the presence of 'skip' lesions.

The highest concentration of both GSH S-T's was found in liver and testis. However no near-neutral GSH S-T was detected in any of the organs of some individuals.

These findings confirm our previous hypothesis of interorgan and interindividual variation and provide data on the concentration of the near neutral transferase in human tissue.

Tissue Basic Near-neutral GSH S-T GSH S-T
Liver 20.0 ± 5.6 10.4 (0 - 11.1)
Testis 18.3 ± 3.4 4.9 (0 - 6.3)
Kidney 14.9 ± 5.6 0.8 (0 - 1.1)
Adrenal 9.2 ± 1.0 2.1 (0 - 2.1)
Jejunum 4.7 ± 2.0 1.0 (0 - 1.1)
Pancreas 2.9 ± 1.5 1.0 (0 - 1.3)
Duodenum 1.9 ± 0.9 0.7 (0 - 0.7)
Ileum 1.7 ± 0.4 1.4 (0 - 2.0)
Stomach 0.9 ± 0.5 0.7 (0 - 1.0)
Brain 0.6 ± 0.4 2.0 (0 - 2.3)
Lung 0.4 ± 0.2 0.6 (0 - 0.6)
Colon 0.4 ± 0.1 1.4 (0 - 1.9)
Heart 0.3 ± 0.2 0.7 (0 - 1.0)
Salivary gland 0.2 ± 0.1 0.8 (0 - 1.0)
Spleen 0.2 ± 0.1 1.4 (0 - 2.0)
Bladder 0.1 ± 0.01 1.7 (0 - 2.2)
Thyroid 0.1 ± 0.02 0.1 (0 - 0.1)

Patients and methods: Unstimulated whole saliva was collected from 20 adults (mean age 32 years) and stored in tubes containing sodium azide. IgA, IgG and IgM levels were measured using LC-Partigen Immunodiffusion plates (Behring). A modification of Hobb's technique (1970) was used.

Results: (Normal values of western populations in parenthesis). IgA, 4 IU/ml (3.74); IgM 2.7 IU/ml (0.45); IgG 0.3 IU/ml (0.09).

Conclusions: Salivary IgA levels are similar to western populations. Reasons for the higher IgG and IgM levels in blacks and the relationship of salivary immunoglobulins to the paucity of chronic digestive diseases in blacks are unknown and require further investigation.

Defecography: description of the procedure, results in normal patients, brief presentation of defecation disorders

M. FRESON, L. DJOA, M. OSTEAUX. Akademisch Ziekenhuis, V.U.B., Brussel, Belgium

A simplified method of dynamic defecography using a newly developed radiopaque substance is described. This technique has been developed in order to solve frequent clinical problems of the anorectal area.

Five criteria of normality are defined, i.e.:

- increased anorectal angulation
- obliteration of the impression of the pubococcygeus sling
- wide opening of the anal canal
- total evacuation of rectal contents
- normal resistance of the pelvic floor

A short survey of common defecation disorders, i.e.:

- rectal intussusception
- intra-anal rectal intussusception
- rectal prolapses
- accentuated impression of the pubococcygeus sling are presented.

In case of difficult clinical and endoscopic evaluation of defecation disorders, this technique offers a useful objective alternative to evaluate them and, in our opinion, should be systematically performed.

Salivary immunoglobulin levels in black adults

L. A. ANTONI, I. SEGAL, *J. HATTINGH, *M. GANHAO, D. PAREKH. G.I.T. Unit, Baragwanath Hospital, *Department of General Physiology, Dental School, University of the Witwatersrand

Studies have indicated that salivary immunoglobulin levels vary in a number of diseases e.g.

Crohn's disease and coeliac disease. These diseases are rare or unknown in blacks.

Aim: The aim of this study was to establish the salivary immunoglobulin levels in healthy black adults.

Basic
Near-neutral
Liver 20.0 ± 5.6 10.4 (0 - 11.1)
Testis 18.3 ± 3.4 4.9 (0 - 6.3)
Kidney 14.9 ± 5.6 0.8 (0 - 1.1)
Adrenal 9.2 ± 1.0 2.1 (0 - 2.1)
Jejunum 4.7 ± 2.0 1.0 (0 - 1.1)
Pancreas 2.9 ± 1.5 1.0 (0 - 1.3)
Duodenum 1.9 ± 0.9 0.7 (0 - 0.7)
Ileum 1.7 ± 0.4 1.4 (0 - 2.0)
Stomach 0.9 ± 0.5 0.7 (0 - 1.0)
Brain 0.6 ± 0.4 2.0 (0 - 2.3)
Lung 0.4 ± 0.2 0.6 (0 - 0.6)
Colon 0.4 ± 0.1 1.4 (0 - 1.9)
Heart 0.3 ± 0.2 0.7 (0 - 1.0)
Salivary gland 0.2 ± 0.1 0.8 (0 - 1.0)
Spleen 0.2 ± 0.1 1.4 (0 - 2.0)
Bladder 0.1 ± 0.01 1.7 (0 - 2.2)
Thyroid 0.1 ± 0.02 0.1 (0 - 0.1)