

intra-operative period. In many instances monitoring standards were below the accepted minimum. The study highlights the frequency of single operator/anaesthetists, the lack of proper anaesthetic record keeping and an extremely high incidence of critical incidents associated with anaesthesia. The deficiencies in equipment and staffing need to be brought to the attention of the relevant authorities so that they can be corrected. It

is suggested that the study be repeated as a means of audit of standard of care.

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## Endoscopic investigation for gastric cancer in a high-risk group

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### Summary

Early gastric cancer (EGC) was diagnosed in only a small percentage (< 1%) of gastric cancer cases seen at Tygerberg Hospital over a 10-year period (1976 - 1985).

This study, aimed at increasing the yield of EGC, was conducted in some high-incidence areas for gastric cancer. Coloured men, who are at high risk for gastric cancer, were identified by their medical practitioners and investigated. A total of 272 coloured males with nonspecific foregut symptoms underwent upper gastro-intestinal endoscopy and multiple biopsy specimens were obtained from all localised mucosal lesions.

Twelve gastric cancers were histologically verified, of which 11 were diagnosed in males over 40 years of age. Two EGCs were diagnosed in older males, resulting in a markedly higher proportion of EGC in this subgroup (18,2%) than the proportion of EGC in inpatients at our institution (0,9%).

Twenty-two per cent of males over 40 years of age had gastric ulcers compared with 9,2% of younger males. Chronic atrophic gastritis was present in 56,2% of older males but in only 24,6% of younger males. Those over 40 years of age emerged as a subgroup with a high prevalence of gastric cancer and EGC, and concomitant conditions.

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Despite the global decline in the incidence of gastric cancer,<sup>1</sup> this malignancy has a significant impact on certain countries which have high incidence rates, especially Japan.<sup>2</sup> A distinct pattern of intra-country variation in the mortality rate from gastric

cancer prevails within the RSA.<sup>3</sup> The highest mortality rate from this malignancy (42/100 000)<sup>4</sup> occurs in coloured males (i.e. those of racially mixed descent). South African coloured males have the fourth highest mortality rate from gastric cancer in the world.<sup>5</sup>

In the RSA gastric cancer is the most common gastro-intestinal malignancy found in coloured males and the second most common overall cause of cancer death in this group after bronchial carcinoma.<sup>6</sup> At Tygerberg Hospital (TBH) 47,6% of all gastric cancer cases are seen in coloured males. Between 62%<sup>7</sup> and 71%<sup>8</sup> of gastric cancer cases at Groote Schuur Hospital, Cape Town, and 63,4% of cases at TBH occurred in coloureds of both sexes.<sup>8</sup> Furthermore, a proportionate increase in coloured gastric cancer cases compared with whites has been perceived over a period of time at TBH.<sup>8</sup>

Regional mortality rates have been mapped out for the RSA.<sup>3</sup> In certain areas of the Cape Province, with access to major referral centres like TBH and Groote Schuur Hospital, mortality rates for coloureds and whites exceed the national average. The proportion of early gastric cancer (EGC) cases at TBH over a 10-year period (1976 - 1985) was less than 1% (4/435). The comparable proportion at Groote Schuur Hospital is 3,6%.<sup>9</sup> The very low prevalence of EGC at TBH, the impact of cancer of the stomach on a segment of our population in well-circumscribed areas of the country and the poor prognosis associated with this malignancy,<sup>9</sup> urged us to embark on the selective examination of individuals at high risk for gastric cancer in some high-incidence areas of the Cape Province. In order to delineate the target population even better, the individual at high risk was further defined as having nonspecific foregut symptoms.<sup>8</sup>

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### Patients and methods

The high-risk individual was defined as a coloured male over 40 years of age. This definition was decided upon as the majority of gastric cancer cases were coloured males in their 6th decade. Circulars were mailed to general practitioners practising in towns in some of the high-incidence areas we intended visiting, urging them to refer high-risk individuals with nonspecific foregut symptoms for upper gastro-intestinal endoscopy and biopsies. Selection of patients for endoscopy by physicians was subjective and not according to strict guidelines, save for the recommendations given in the circular.

As this was a feasibility study, the recruited patients

constituted a 'chunk' sample rather than a random one. Day visits were made to three rural hospitals situated within a 100 km radius of TBH, and a single visit was made to nine additional towns in the northern part of the Cape Province and on the West Coast. All venues were located in high-incidence areas and served rural or semi-rural communities.

Five hundred and thirty-four successful endoscopic examinations were performed between June 1987 and October 1988. Patients recruited comprised 458 coloureds, 49 whites, 25 Asians, 1 black and 1 patient of undetermined race. As the focus of the study was on coloured male patients over 40 years of age, analysis of results was confined to this group. Females and individuals of other races were also examined as a service to the community, but for the purpose of this study the results will not be included. The study sample therefore consisted of 130 males 40 years of age and older, and of 142 males younger than 40 years.

The mean age of males was 43,68 years (SD 14,63) and the majority (77,5%) were unskilled labourers. The mean duration of symptoms was 4,2 years (median 2,0 years). The prevalence of symptoms was as follows: epigastric pain (81%), heartburn (63%), dyspepsia (62%), loss of weight (60%), nausea (57%), loss of appetite (52%), vomiting (43%) and dysphagia (18%).

All patients admitted to the study had to fast overnight. They were informed of the purpose and method of the study and their consent was obtained in writing. Endoscopic examination of the oesophagus, stomach and first part of the duodenum was performed with an Olympus XQ-10 end-view endoscope after application of 1% lignocaine spray to the oropharynx. Intravenous sedation was rarely required. All examinations were performed by the same observer (H.D.L.), which excluded the possibility of interobserver variation. The only morbidity associated with endoscopy was severe abdominal cramps in 1 patient provoked by air in the intestine. Symptoms subsided after administration of an intravenous antispasmodic agent and a period of bed rest. There was no mortality due to endoscopic examination.

Eight biopsy specimens were taken from all mucosal lesions suggestive of types I - III EGC.<sup>10</sup> Additional specimens were taken from other predetermined sites to ascertain the prevalence of concomitant gastritis. Various lesions observed on endoscopic examination of the mucosal surface included ulcers, erosions, suspected cancer, polyps, suspected gastritis or scars. All tissue specimens were immediately fixed in 10% neutral formalin and later embedded in paraffin blocks. Semi-serial microtome sections were stained with haematoxylin and eosin, periodic acid-Schiff and alcian blue for neutral and acid mucins, and high-iron diamine for sialo- and sulphomucins.

Histological interpretation of all specimens was undertaken by one of the authors (K.J.). All patients with histologically confirmed adenocarcinoma of the stomach, including microscopically suggestive EGC, were admitted to hospital for gastrectomy when possible. EGC was diagnosed on resection specimens when malignant changes were restricted to the mucosa and submucosa. The chi-square test was employed to determine statistical significance in the case of categorical data.

TABLE II.  
Mucosal pathology of the duodenum and oesophagus

Age (yrs)	Duodenum						Oesophagus			
	Ulcer		Erosion		Polyp		Cancer		Oesophagitis	
	No.	%	No.	%	No.	%	No.	%	No.	%
≥ 40	48	36,9	4	3,1	0	0,0	1	0,8	86	66,2
< 40	37	26,1	0	0,0	4	2,8	0	0,0	43	30,3

## Results

A total of 12 histologically verified gastric cancers were diagnosed, of which 11 were found in males over 40 years of age. The mean age of the cancer patients was 56 years. Nine of the tumours were of the intestinal and 3 of the diffuse type. Two EGCs were diagnosed in males aged 42 and 65 years. The prevalence of EGC in older males (18,2% or 2/11) was markedly higher than the prevalence of EGC diagnosed at TBH over a 10-year period (0,9%).

Of the 12 patients with malignant changes on endoscopy, 2 had partial gastric resection for EGC, 4 underwent palliative surgery, 1 had extensive metastases at laparotomy, 2 were deemed inoperable due to liver metastases, 1 died before surgery, 1 refused surgery and 1 was lost to follow-up.

Endoscopically visible abnormalities (including all visible pathology) of the duodenal, gastric and oesophageal mucosa were detected in 69,1% of males. The prevalence of abnormal findings was not dissimilar in older males when compared with younger males (73,8% v. 64,8%;  $P > 0,10$ ). Particulars of abnormal findings of the gastric mucosa are given in Table I and Table II depicts mucosal lesions as encountered in the duodenum and oesophagus.

## Discussion

The publication by Saeki<sup>11</sup> in 1938, in which he describes the relationship between postoperative survival and depth of tumour infiltration, prompted interest in gastric cancer confined to the superficial layers of the stomach. Five-year survival has since been widely reported in more than 90% of patients with EGC after partial gastrectomy.<sup>12</sup> The survival rate of patients with gastric cancer has remained unchanged in most countries,<sup>13</sup> but a marked improvement has been reported in Japan. This improvement was due to a large percentage of patients with EGC (up to 60%)<sup>14</sup> having been detected in mass screening programmes.

In the RSA coloureds, particularly coloured males, have emerged as the subgroup most afflicted by gastric carcinoma. This study was undertaken to ascertain whether a selective survey would assist in increasing the yield of EGC in a particular subgroup of people. Mass screening is not indicated in this country as gastric cancer is not a major cause of death among South Africans.

Our recruited patients were on average 10 years younger than the mean age of gastric cancer cases at our

TABLE I.  
Prevalence of gastric mucosal lesions other than cancer

Lesion	< 40 years		≥ 40 years	
	No.	%	No.	%
Gastric ulcer	13	9,2	29	22,3
Superficial gastritis	38	26,8	39	30,0
Chronic atrophic gastritis	35	24,9	73	56,2
Erosion	4	2,8	4	3,1
Scar	3	2,1	6	4,6
Polyp	3	2,1	9	6,9

institution (45,4 v. 56,5 years). An age difference of 10 years has been observed between patients with EGC and those with advanced stomach cancer.<sup>15</sup> Our study sample was therefore, as regards age, ideal for screening for EGC. The majority of patients were from the lower income group, as is usually the case with gastric cancer cases.<sup>16</sup>

The yield of gastric cancer in coloured males over 40 years of age (11/130 or 8,5%) was remarkably high. The high prevalence is obviously partly due to targeted patient selection and is not a true reflection of the prevalence of gastric cancer in the general population. The high yield of cases does, however, justify the search for gastric cancer in this high-risk group. It is also noteworthy that both EGCs were diagnosed in older coloured males.

Success in identifying a higher incidence of EGC, diagnosed endoscopically and by placing special emphasis on patients with certain risk factors, has also been achieved in a separate study.<sup>17</sup> Our study has also revealed a substantial proportion of older males suffering from gastric or duodenal ulcers, chronic atrophic gastritis and oesophagitis. We suggest that coloured males over 40 years of age and of lower socio-economic status who present with nonspecific foregut symptoms deserve carefully executed endoscopy with multiple biopsies of all suspicious mucosal lesions with the specific intention of diagnosing EGC.

Some forms of bias, however, are obviously inherent in our patient recruitment. As only a small proportion of the coloured population with foregut symptoms was investigated, the study sample was not necessarily representative. The duration of symptoms was prolonged, which may be indicative of patients with chronic illness and may also indicate selection bias by the referring physicians, who could have selected those with recalcitrant symptoms for further investigation.

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## Age at menarche and the weight-for-height index

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### Summary

The use of nominal and adjusted weight-for-height values using Tanner-Whitehouse standards and US National Center for Health Statistics (NCHS) standards was evaluated in a sample of 800 black rural primary schoolchildren aged 12 - 17 years. The study showed that nominal weight-for-height values for adolescents need adjusting to control for pubertal physiological developments when using Tanner-Whitehouse standards or NCHS reference series. It is suggested that in nutritional studies involving adolescents, espe-

cially in developing countries, the age at menarche be determined to ensure accurate calculation of the weight-for-height index and correct classification of children by the index, and that researchers should mention in their methodology whether the weight-for-height values presented are nominal values or adjusted values.

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Weight for height has been recognised as an accurate index of acute malnutrition<sup>1-3</sup> that is largely independent of sex, race and age. However, when measuring the nutritional status of older children (9 - 13 years for girls and 11 - 15 years for boys), using US National Center for Health Statistics (NCHS) or Tanner-Whitehouse standards, it is required that weight-for-height values be adjusted slightly because of considerable differences in the age at onset of puberty in different populations.<sup>4-6</sup>

Several studies<sup>1-3,7,8</sup> have evaluated the nutritional status of schoolchildren in developing countries and compared findings with NCHS or Tanner-Whitehouse