THE FACTOR OF COMMONNESS IN THE DIAGNOSIS OF CANCER.*

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It is a common mistake to speak of medicine as an "inexact science," and, like most mistakes, it entails a loss. Medicine is not a science. Medicine is an art and all the sciences are its helpers. One of these helpers is the science of probability. By dwelling too much on the uncertainties of our material and studying too little the laws that govern them we lose a source of help with which we are not in a position to dispense. Let me give three illustrations of the sort of help I mean.

A man of about 60 had a movable intra-abdominal tumour to the right of the umbilicus, and was thought to be suffering from a growth in the omentum. But between 55 and 65 cancer of the pylorus is immensely commoner than any growth in the omentum, and cancer of the pylorus was what the tumour turned out to be.

A man over 70 had a firm nodular lump midway between the umbilicus and the ensiform cartilage. It could be shown to be pyloric by flicking the abdominal wall in the left hypochondrium, when a swelling rose up, corresponding in shape and position to the stomach, with waves of peristalsis travelling over it from left to right and ending in the lump. When the stomach was inflated this swelling and its relations to the lump became even more conspicuous. Yet it was afterwards supposed that this was a cancer of the colon, and an operation was recommended. Under chloroform, however, it was found to be a cancer of the pylorus, and the operation was abandoned. At 70 the utmost care should have been taken before setting aside the former diagnosis, since, in men between 65 and 75, cancer of the pylorus is probably about thirty times commoner than cancer of the transverse colon.

An (11) lady of about 75 had a firm nodular mass in the left renal region, and the general features of the case suggested that it was malignant. Cancer of the kidney was diagnosed. But it was cancer of the colon. Here less help could have been derived from a consideration of probability, since, in women, at and over 75, cancer of the splenic flexure seems to be only about twice as common as cancer of either kidney.

I am using the word "cancer" as it is used by the public, instead of the term "malignant disease," which is generally used by the profession. "Malignant disease" is a clumsy expression which has no claim to precision; for the adjective "malignant" is by no means restricted to tumours, and is, in fact, very loosely used in medicine. "Cancer," on the other hand, formerly embraced all forms of malignant tumours, and is still made to do so by the laity; if restored to its former use by the profession it need cause no confusion.

I would guard myself against possible misconstruction by saying that probability cannot, of course, be a safe chief guide in diagnosis. It is only when certainty is not attainable that its consideration is permissible: it is only in such internal cancers as we cannot see or freely handle that we may turn to it with advantage. But where it is permissible to use it, it is, I suggest, too valuable to neglect.

I will first consider the relative commonness of cancers in different organs, and afterwards deal a little more fully with that of those growths in whose diagnosis probability is important.

In a comparison of the relative commonness of cancers in different organs hospital statistics cannot be a satisfactory guide. They deal, not with the population generally, but with the persons who go to hospital—a vastly different matter, since people generally go to hospital with a more or less definite object. Hospital patients form, in fact, in this respect a group of selected cases.

The fallacy of hospital statistics as regards the relative commonness of cancers of different organs becomes evident on perusal of Table I, taken from Mr. Roger Williams's valuable work on the *Natural History of Cancer* (pp. 372 and 379).

TABLE I.—*Localization of Malignant Epithelial Tumours, as shown by Statistics of four London Hospitals during Sixteen to Twenty-one Years—namely, Middlesex, University College, St. Bartholomew's, and St. Thomas's.*

Males (2,669 Cases).		Females (4,628 Cases).	
	Per cent.		Per cent.
Tongue and mouth ...	26.3	Breast ...	40.3
Lip ...	12.2	Uterus ...	34.0
Stomach ...	8.3	Rectum ...	4.3
Rectum ...	7.5	Stomach ...	2.8
External genitals ...	6.8	Liver ...	2.5
Oesophagus ...	5.3	Tongue and mouth ...	2.18
Liver ...	4.4	Intestines ...	1.06
Intestines ...	1.9	Oesophagus ...	0.7
Breast ...	0.6	Lip ...	0.06
Prostate ...	0.3		

Here the operable cancers are obviously excessively represented, whilst gastric cancer appears far below its true frequency. It needs no exceptionally wide experience of disease in general to be sure that, as an expression of the true relative commonness of these cancers, this table would be grotesque.

The reports of the Registrar-General remain as a possible source from which to derive our information, and the question arises, How far are these reliable? No one will pretend that the figures presented in them are free from error, and they do not distinguish between primary and secondary growths. Yet, in spite of these drawbacks, I would submit that they present information of real value. If we consider the immense number of cases dealt with in them, the high average standard of medical knowledge now possessed by medical men in this country, the great frequency of consultation in doubtful cases, the fact that the diagnosis registered is made at the last possible moment of life, and, as regards the distinction between primary and secondary growths, that, in the majority of the most important organs, cancer is either almost always primary (as in the stomach), or almost always secondary (as in the liver), it will be, I think, apparent that the objections I have mentioned lose most of their force, and that, broadly speaking, these figures may be regarded as giving us a very fair idea of the relative frequency of cancers in different parts of the body.

The following table (Table II) is derived from Dr.

TABLE II.—*Relative Commonness of Cancer of Various Organs in England and Wales during the Seven Years 1901-1907, in Terms of Cancer of the Stomach in Males taken as 100. Calculated from the Registrar-General's Seventieth Annual Report.*

	Males.	Females.		Males.	Females.
Uterus ...	—	141	Ovary ...	—	12
Breast ...	1	105	Arm and leg ...	6	6
Stomach ...	100	88	Lung ...	6	4
Liver and gall bladder	59	85	Kidney and suprarenal	5	5
Rectum ...	47	37	Prostate ...	5	—
Intestines ...	37	45	Mediastinum ...	5	3
Oesophagus ...	29	9	Peritoneum ...	4.5	9
Tongue ...	25	3	Brain ...	4	3
Bladder and urethra	14	6	Pelvic bones ...	2.5	4
Jaw ...	13	4	Nose and ear ...	2	2
Lymph glands of neck	13	4	Thyroid ...	1.5	2
Pharynx and throat	10	3	Parotid ...	1	0.7
Larynx and trachea	9	3	Eye and orbit ...	1	1
Skin of face ...	9	5	Spinal column	1	0.9
Pancreas ...	8	7	Mesentery ...	1	1
Mouth ...	8	1	Pleura ...	0.3	0.3
Lip ...	7	0.5	Spinal cord ...	0.2	0.2
Testis and penis	7	—	Heart and pericardium	0.05	0.005

* A paper read before the Devon and Exeter Medico-Chirurgical Society.

Stevenson's valuable tables in the Registrar-General's seventieth annual report (pp. cx-cxiii). To simplify the comparisons afforded by it I have expressed the frequency of each cancer in terms of gastric cancer in males taken as 100. From this table we may safely draw the following conclusions:

- (a) That by far the commonest of all cancers are cancer of the stomach in both sexes and cancer of the uterus and breast in women.
- (b) That next commonest come cancer of the liver, rectum, and intestines in men and women.
- (c) That next come cancer of the oesophagus and tongue in men.
- (d) That all the rest are much less common.
- (e) That the rarest of all is cancer of the heart and pericardium.
- (f) That most organs are more often cancerous in men than in women.

When we ask ourselves, however, in which of these cancers we may legitimately consider the question of relative commonness, as a factor in diagnosis, we find ourselves limited to a minority. The most important cancers, in which relative commonness may be fairly considered a factor in the diagnosis, are those of the stomach, intestines, "liver and gall bladder," pancreas, lung, "kidney and suprarenal," prostate, "bladder and urethra," mediastinum, and peritoneum.

The sex incidence of these is worth bearing in mind. Cancer of the stomach, pancreas, and "kidney and suprarenal" are practically as common in men as in women; cancer of "liver and gall bladder," intestines and peritoneum are considerably commoner in women; whilst cancer of lung, mediastinum, and "bladder and urethra" are considerably commoner in men.

At different ages the relative commonness of the cancer of different organs also varies remarkably. Thus, under 5 years of age incomparably the most common cancer is cancer of the kidney, whilst between 5 and 15 the commonest is that of the brain; between 15 and 25 arm and leg (taken together), brain and rectum furnish the greatest number, whilst over 25 cancer of the stomach in both sexes and of breast and uterus in women become the most frequent.

At 35 the ages begin at which cancer is most commonly encountered, and here something may be gained from an examination of the relative frequency in each decade. Tables III and IV give for two small groups of growths in each sex the relative commonness in each decade.

TABLE III.—Relative Commonness of certain Cancers at Varying Ages. Calculated from the Registrar-General's Seventieth Annual Report.

Stomach Cancer taken as 100.									
		Organ.			Ages.				
					35-	45-	55-	65-	75-
MALES	...	Stomach	...	...	100	100	100	100	100
	...	Intestines	...	...	35	31	32	36	42
	...	Pancreas	...	...	12	9	8	7	5
FEMALES	...	Stomach	...	...	100	100	100	100	100
	...	Intestines	...	...	47	47	48	51	59
	...	Pancreas	...	...	9	8	9	7	6

TABLE IV.—Relative Commonness of certain Cancers at Various Ages. Calculated from the Registrar-General's Seventieth Annual Report.

Cancer of Bladder and Urethra taken as 100.						
Organ.		Ages.				
		35-	45-	55-	65-	75-
MALES ...	(Bladder and urethra ...	100	100	100	100	100
	Kidney and suprarenal ...	76	44	32	18	14
	Prostate	10	18	37	45	46
FEMALES...	(Bladder and urethra ...	100	100	100	100	100
	Kidney and suprarenal ...	105	110	74	48	35

From Table III we may conclude that where an abdominal tumour exists which may be gastric, pancreatic, or intestinal, and seems malignant:

- (a) The older the patient from 45 onwards the greater the relative chance of its being intestinal.
- (b) The older the patient from 35 onwards the less the relative chance of its being pancreatic.

From Table IV we may conclude that, where symptoms are present (such as hæmaturia) suggesting a malignant growth in some part of the urinary tract:

- (a) The older the patient the less the relative chance of this being renal as compared with the chance of its being vesical (primary cancer of the urethra is extremely rare).
- (b) That in women the chances of renal and vesical cancers are more nearly balanced than in men.
- (c) That in men the older the patient the greater the relative frequency of prostatic cancer.

But hospital statistics are far from being without value to us when we leave the question of the relative commonness in different organs and come to deal with the different proclivities of different parts of the same organ to cancer, or with the relative frequency in each organ of carcinoma and sarcoma or of primary and secondary growths. For it is difficult to see why differences should exist in the desire for hospital treatment amongst patients suffering, for example, from growths in different parts of the stomach, or in different parts of the colon, or in one or other kidney; or, again, in a case of a primary or secondary growth of an organ causing symptoms—such, for instance, as of the liver (where nothing short of a most careful search *post mortem* for a primary cancer justifies the diagnosis of primary cancer), or where in the same organ a cancer may be carcinomatous or sarcomatous (a distinction sometimes only possible to draw with the microscope)—one cannot see why one or other should be more likely to go to hospital. In such considerations of relative commonness hospital statistics are probably reasonably safe guides—and fortunately so, for they are our only available guides.

Taking, therefore, such statistics as seem thoroughly reliable, Fenwick gives about 60 per cent. as the proportion of gastric cancers which occur close to the pylorus, 10 per cent. close to the cardiac orifice, and altogether about 80 per cent. in the "comparatively small slip of tissue which extends from one orifice to the other along the upper margin of the stomach."

In the intestines, excluding the rectum (where in men more than half and where in women nearly half the growths of the intestines occur), according to Barnard nearly half the cancers are found in the sigmoid, about 20 per cent. in the caecal and ileo-caecal region, about 8.5 per cent. in the transverse colon, 6 per cent. in the splenic flexure, 1.5 per cent. in the hepatic flexure, and 3 per cent. each in the ascending and descending colon. (These figures, however, must not be taken too absolutely, for only about 203 cases were available.) Only 7.5 per cent. were found in the small intestine, and Rolleston states that about half the growths there occur in the duodenum.

According to the late Sir William Roberts the two kidneys are equally liable to cancer.

Lastly, turning to relative frequency of primary and secondary growths and to numerical distinction between carcinoma and sarcoma amongst the group of cancers we are considering, clinically evident growths in stomach, intestines, kidney, and prostate are almost always primary. A discoverable tumour of the pancreas is primary, says Newton Pitt, in six cases out of seven, whilst, on the other hand, cancers in liver and peritoneum are seldom primary, and cancers of suprarenal, lung, and mediastinum may easily be either.

As to the relative frequency of sarcomata—kidney, lung, and mediastinum suffer more often from sarcoma than from carcinoma; in the other organs sarcomata are rare.

This is a very fragmentary sketch of a considerable subject which I have placed before you. I have only brought it forward to call attention to its common neglect. We must hope that the day is approaching when the diagnosis of internal cancers will be so much more precise that probabilities will cease to serve us. But until that happy moment arrives we make, I would submit, a serious error in overlooking the help which a study of these probabilities holds out.