

## Time trends of incidence of digestive system cancers in Changle of China during 1988-2002

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### Abstract

**AIM:** To analyze the incidence of digestive system cancer in Changle of China over a 15-year period.

**METHODS:** The datasets were presented as time-series of China-standardized annual incidence during 1988-2002. Linear regression model was used to analyze the incidence of stomach, liver, esophagus and colorectal cancers.

**RESULTS:** Linear regression models for the time-series of stomach and esophagus cancer incidences for both men and women were statistically significant ( $P < 0.05$ ); Regression models for liver cancer and for colorectal cancer were statistically significant for men ( $P < 0.05$ ).

**CONCLUSION:** The incidence rates of stomach and esophagus cancers for both men and women had down tendencies. For men, liver cancer had a down trend of the incidence and colorectal cancer had an upward trend of the incidence rate.

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**Key words:** Stomach; Esophagus; Liver; Colorectum; Cancer; Incidence; Pattern; China

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### INTRODUCTION

Cancer is the first cause of death in Fujian Province of

China, and the proportion of cancer-related deaths is the highest. The mortalities of malignant digestive system tumors in Changle during 1988-1991 were the highest in Fujian Province and the incidence (per 100 000 persons) of stomach, liver, esophagus and colorectal cancers in Changle is 104.3%, 37.3%, 25.6% and 7.4%, respectively<sup>[1]</sup>. Since 1988, efforts have been made in prevention and treatment of tumors<sup>[2]</sup>. However, the patterns and incidence of malignant digestive system tumors in Changle are not available. Monitoring and studying the incidence of malignant tumors can provide important information for prevention and control of tumors. Therefore, the aims of the present study were to examine the pattern and time trends of stomach, liver, esophagus and colorectal cancers from 1988-2002 in Changle.

### MATERIALS AND METHODS

#### Cancer incidence data

Annual stomach, liver, esophagus and colorectal cancer cases were provided by the Tumor Registration Office of Changle. Data of the age- and sex-specific population in Changle were provided by the local police station. The incidence of these tumors was standardized with the age- and sex-specific population obtained from the National Population Overall Survey in 1983. The datasets were presented as time-series of China standardized annual incidence during 1988-2002.

#### Statistical analysis

Linear regression model was used to analyze the incidence of stomach, liver, esophagus and colorectal cancer. The SAS software package was used for all analyses<sup>[3]</sup>.

### RESULTS

Standard incidence of digestive system cancer in men and women of Changle is shown in Table 1. The incidence of stomach, liver and esophagus cancer in men decreased with fluctuation while that of colorectal cancer increased slowly from 1988 to 2002 (Figures 1A and 1B). On average, the incidence of stomach, liver and esophagus cancer in males decreased 3.44%, 3.16% and 6.07%, respectively. The incidence of these tumors except for stomach cancer in females was not significantly different (Figure 1C). The incidence of stomach, liver and esophagus cancer in women decreased 2.21%, 1.20% and 2.50%, respectively. The incidence of colorectal cancer in men increased 5.51% from 1998 to 2002.

Table 1 Standard incidence of digestive system cancer per 100 000 persons in 1988-2002 in Changle (%)

Yr	Stomach cancer		liver cancer		Esophagus cancer		Colorectal cancer	
	Male	Female	Male	Female	Male	Female	Male	Female
1988	106.63	28.54	32.62	10.48	20.22	6.36	3.1	6.3
1989	114.41	36.55	35.09	9.87	24.96	8.18	4.96	4.69
1990	109.09	29.59	51.86	10.76	28.81	12.48	5.93	4.56
1991	103.21	34.52	38.62	12.78	30.76	9.95	4.89	1.18
1992	100.81	26.1	32.47	7.66	25.52	7.45	2.44	4.11
1993	111.65	27.35	36.25	14.36	27.22	7.91	2.82	2.86
1994	98.73	24.9	44.54	11.09	22.38	7.92	4.04	2.16
1995	80.95	20.9	32.71	9.87	18.57	8.13	5.58	5.57
1996	85.42	19.52	32.87	7.63	18.7	4	6.24	4.43
1997	86.4	26.56	27.86	7.81	14.47	2.77	9.6	4.68
1998	81.81	21.82	35.48	16.29	12.96	4.07	5.86	5.33
1999	75.84	20.71	32.76	9.2	12.54	3.59	6.76	3.86
2000	83.96	25.63	32.81	10.99	15.15	2.63	5.39	3.82
2001	74.28	27.71	33.12	5.17	11.15	4.29	9.12	5.38
2002	65.33	20.88	20.81	8.85	8.41	4.46	6.57	8.03

Table 2 Incidence of four tumors both in men and women in Changle from 1988 to 2002 (%)

Disease	Men			Women		
	Regression coefficient	R <sup>2</sup>	P	Regression coefficient	R <sup>2</sup>	P
Stomach cancer	3.16	0.851	< 0.001	0.72	0.415	0.009
Liver cancer	0.83	0.286	0.04	0.16	0.061	0.374
Esophagus cancer	1.33	0.736	< 0.001	0.48	0.567	0.001
Colorectal cancer	0.29	0.391	0.013	0.12	0.1	0.251

The incidence of digestive system tumors both in men and in women was analyzed by linear regression models (Table 2). The regression coefficients for both men and women, except for colorectal cancer, were negative. The incidence of stomach and esophagus cancer in both men and women decreased ( $P < 0.05$ ). The incidence of liver cancer was decreased in men ( $P < 0.05$ ) but not in women. The incidence of colorectal cancer increased in men ( $P < 0.05$ ) but not in women.

## DISCUSSION

This report presents the time-series analysis of standardized annual incidence of digestive system cancers in Changle City of China from 1988 to 2002. The incidence of stomach and esophagus cancers in men and women decreased 3.44% and 2.21%, respectively. The incidence of liver cancer decreased 3.16% in men but not in women. The incidence of colorectal cancer increased 5.51% in men but not in women.

The incidence of stomach and esophagus cancers in men and women decreased in Changle of China from 1988 to 2002, suggesting that the decreased incidence of these tumors is due to the development of economy and effect of tumor prevention in Changle. Epidemiological studies have shown that economic level and dietary habits are

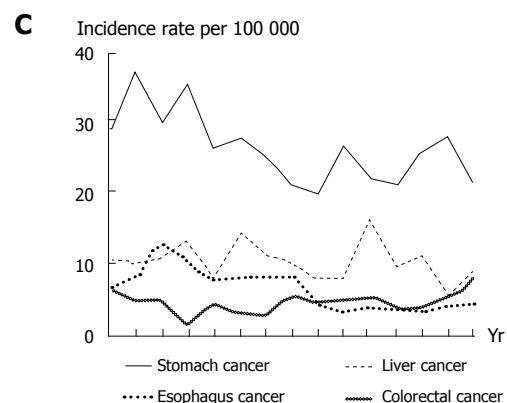
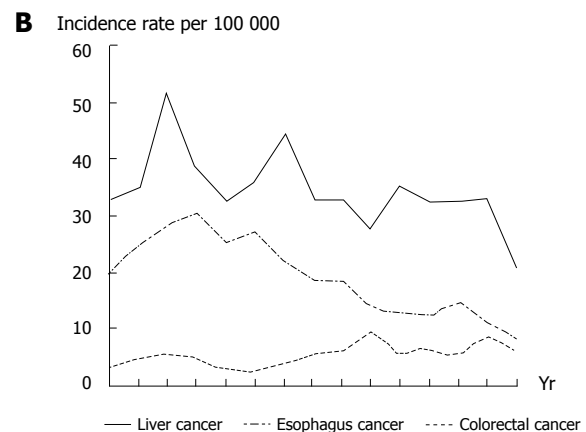
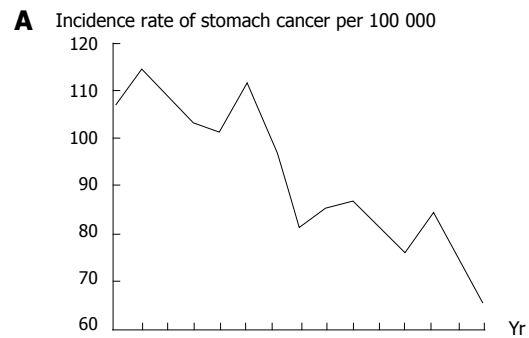


Figure 1 Incidence of stomach cancer (A) and liver, esophagus, colorectal cancer (B) in men, and four tumors (C) in women of Changle from 1988 to 2002.

associated with the incidence of stomach and esophagus cancer<sup>[2,5-7]</sup>. Stomach cancer is the most common cancer in Japan and the Japanese have the highest mortality and incidence of stomach cancer in the world. The incidence and mortality of stomach cancer have declined in Japan<sup>[4,8]</sup>. The incidence of stomach cancer in a region is related to both economic level and dietary habits. Before 1980s, people in Changle of China had a low living standard and were accustomed to eating salted food and low protein and vitamin C diet. As the economical level is raised and knowledge of tumor prevention is spread in Changle, the people have changed their dietary habits which plays an important role in decreasing the incidence of stomach and esophagus cancer. During 1988-2002, stomach cancer incidence decreased about 38.73% in males and 26.84% in females, and esophagus cancer incidence decreased about 58.41% in males and 29.87% in females in Changle of China. However, stomach cancer is still the most

common cancer in Changle and its incidence in males is still the highest in China although the disease incidence is declined. Therefore, research on preventive factors, such as eating habits, foods, additives, drug use, prevalence of *Helicobacter pylori* infection and environment pollution, is needed.

Our study showed that the digestive system cancer incidence was different in Changle. The incidence of stomach and esophagus cancer declined while colorectal cancer incidence increased in Changle, which is in accordance with the incidence in Japan<sup>[11]</sup>. Colorectal cancer incidence tends to increase in males of Changle, and the incidence of the disease in males in 2002 was 2.12 times higher than that in 1988. Colorectal cancer is common in many developed countries<sup>[12,13]</sup>. Countries where the people have a high fat intake also have high colorectal cancer incidence<sup>[14]</sup>. High fat intake is a risk factor for colon polyp which may progress to colorectal cancer<sup>[15]</sup>, and 15%-25% of colorectal cancer cases may be attributable to high fat intake<sup>[16]</sup>. Moreover, high vegetable and fruit consumption and less meat consumption are associated with a reduced incidence of colorectal cancer<sup>[17-19]</sup>. Therefore, a variety of dietary interventions may have a positive impact on dietary behaviors associated with cancer risk<sup>[20]</sup>.

During 1988-2002, the incidence of liver cancer in males and females were 34.66% and 10.19% in Changle, respectively. It was reported that the incidence of liver cancer is decreased<sup>[21]</sup> and liver cancer incidence is increased in China<sup>[22,23]</sup>.

The incidence of digestive system cancer is different in different areas of China. The reasons for the declined incidence remain unclear. Elimination of HBV-cofactors is likely to contribute to it. However, some risk factors for liver cancer, including smoking and alcohol consumption, are still highly prevalent in males in Changle of China. Therefore, our results might be affected by the lowest incidence in 2002. To confirm whether liver cancer incidence is decreased, further observations are required.

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