

# 中国东部与中西部地区恶性肿瘤发病率的比较研究

陈万青<sup>1</sup>, 郑荣寿<sup>1</sup>, 王 宁<sup>2</sup>, 贺宇彤<sup>3</sup>, 王庆生<sup>4</sup>, 孙喜斌<sup>5</sup>, 赫 捷<sup>1</sup>

(1. 中国医学科学院肿瘤医院, 全国肿瘤防治研究办公室, 北京 100021; 2. 北京大学肿瘤医院暨北京市肿瘤防治研究所, 北京市肿瘤防治研究办公室, 北京 100142; 3. 河北省肿瘤医院, 河北 石家庄 050011; 4. 天津市肿瘤医院, 天津 300060; 5. 河南省肿瘤医院, 河南省肿瘤防治研究办公室, 河南 郑州 450008)

**摘要:** [目的] 描述中国东部和中西部肿瘤登记地区恶性肿瘤发病率水平, 比较分析东部与中西部发病率差异。[方法] 利用 2009 年中国 72 个肿瘤登记处(东部 44 个, 中西部 28 个)的恶性肿瘤发病及人口数据, 按地区、性别和城乡分别计算发病率、标化发病率。运用负二项回归模型, 以发病数为应变量, 地区分类为自变量(中西部为参照), 调整年龄、性别和城乡分类计算恶性肿瘤发病率比值及 95% 可信区间。[结果] 2009 年中国东部地区恶性肿瘤发病率、中标率与世标率分别为 306.07/10 万、149.22/10 万和 194.60/10 万。中西部地区的恶性肿瘤发病率、中标率与世标率分别为 231.53/10 万、139.64/10 万和 182.27/10 万。东部与中西部前 6 位主要恶性肿瘤相同, 分别为肺癌、胃癌、结直肠癌、肝癌、乳腺癌和食管癌, 但顺位略有不同。东部的结直肠癌和乳腺癌发病率和标化率均高于中西部地区, 肺癌、胃癌、肝癌和食管癌的发病率高于中西部, 标化率低于中西部地区。东部男性恶性肿瘤发病率是中西部的 1.13 倍, 发病率差异最大的前 3 位恶性肿瘤依次为甲状腺癌、前列腺癌和肾癌, 发病率比分别为 1.89(95% CI: 1.64~2.17)、1.66(95% CI: 1.52~1.80) 和 1.42(95% CI: 1.30~1.54)。东部女性恶性肿瘤发病率比为 1.19(95% CI: 1.08~1.31)。差异最大的前 3 位恶性肿瘤依次为甲状腺癌、肾癌和淋巴瘤, 发病率比分别为 1.98(95% CI: 1.83~2.15)、1.48(95% CI: 1.32~1.66) 和 1.47(95% CI: 1.33~1.62)。[结论] 中国东部与中西部地区恶性肿瘤发病率存在明显差异, 科学评估恶性肿瘤发病率的地域差异可为肿瘤防治研究提供有价值的信息。

**关键词:** 恶性肿瘤; 发病率; 东部; 中西部; 中国

**中图分类号:** R73 **文献标识码:** A **文章编号:** 1004-0242(2013)03-0161-07

## Comparing Study of Cancer Incidence Between East and Middle-west Region in China

CHEN Wan-qing<sup>1</sup>, ZHENG Rong-shou<sup>1</sup>, WANG Ning<sup>2</sup>, et al.

(1. Cancer Hospital, Chinese Academy of Medical Sciences, National Office for Cancer Prevention and Control, Beijing 100021, China; 2. Beijing Office for Cancer Prevention and Control, Peking University Cancer Hospital & Institute, Beijing 100142, China)

**Abstract:** [Purpose] To describe cancer incidence in east and middle-west regions and analyze the difference of the incidence between different regions in China. [Methods] Cancer incidence cases data from 72 registries, which were divided into 44 registries in east region and 28 registries in middle-west region, as well as the relevant population data in 2009 were used. Crude and age-standardized incidence rates were calculated in each region, stratified by sex and urban/rural. Negative binomial regression model was applied to estimate incidence rate ratio and 95% confidence interval with the reference of middle-west region, which incident cases were defined as dependent variable and the region as independent variable adjusted by age, sex and urban/rural. [Results] The crude incidence rate, age-standardized incidence rates by Chinese standard population (ASR China) and World standard population (ASR World) in east region of China were 306.07/10<sup>5</sup>, 149.22/10<sup>5</sup> and 194.60/10<sup>5</sup>, respectively. The rates in middle-west region of China were 231.53/10<sup>5</sup>, 139.64/10<sup>5</sup> and 182.27/10<sup>5</sup>, respectively. The top 6 cancer sites in east and middle-west regions were same, those were lung, stomach, colorectum, liver, breast and esophagus, but the rank of incidence in different regions was little different. Both crude incidence rate and ASR China of colorectal cancer and breast cancer in east region were higher than those in middle-west region. The crude incidence rates of lung cancer, stomach cancer, liver cancer and esophageal cancer were higher than those in middle-west region, but the ASR China were lower than the rates in middle-west region. The cancer incidence rate in male in east region was 1.13 times of the rate in middle-west region and the top 3 sites of difference of cancer incidence rate between east and middle-west were thyroid, prostate and kidney in sequence. The incidence rate ratios were 1.89(95% CI: 1.64~

收稿日期: 2012-12-30

通讯作者: 赫 捷, E-mail: profhejie@263.net

2.17), 1.66 (95%CI:1.52~1.80) and 1.42 (95%CI:1.30~1.54), respectively. In female cancer incidence rate ratio was 1.19 (95%CI:1.08~1.31) between east and middle-west regions and the top 3 sites of difference of cancer incidence rate between east and middle-west were thyroid, kidney and lymphoma in sequence. The incidence rate ratios were 1.98 (95%CI:1.83~2.15), 1.48 (95%CI:1.32~1.66) and 1.47 (95%CI:1.33~1.62), respectively. [Conclusion] There has been distinctly difference of cancer incidence between east and middle-west regions in China and scientific evaluation for regional differences of the cancer incidence can provide valuable information for cancer prevention and control.

**Key words:** malignant neoplasms; incidence; east region; middle-west region; China

恶性肿瘤是危害人类健康的主要疾病之一, 2008 年全球估计发病人数 1 279 万, 死于癌症人数为 760 万<sup>[1]</sup>, 对各国的社会经济发展造成了巨大的疾病和经济负担。为了健全、完善我国癌症防治基础信息系统, 为癌症防治研究规划制定、执行与效果评价提供数据支撑, 国家卫生部于 2008 年在全国开展了肿瘤登记项目。国家癌症中心报告的 2009 年中国恶性肿瘤发病率为 285.91/10 万, 死亡率为 180.54/10 万<sup>[2]</sup>, 恶性肿瘤已成为我国社会的主要疾病负担。恶性肿瘤发病率存在较大的地域差异<sup>[3]</sup>, 比较研究发病率的地域差异可为病因学研究提供有价值的线索, 有助于针对性地优化肿瘤防治研究资源, 提高防治研究功效。本文利用我国 2009 年肿瘤登记数据, 比较分析中国东部与中西部地区恶性肿瘤发病率的差异。

## 1 资料与方法

### 1.1 数据来源与质量评估

数据来源于全国 104 个登记处上报的 2009 年肿瘤登记数据, 根据《中国肿瘤登记工作指导手册》<sup>[4]</sup>, 并参照《五大洲癌症发病率第 9 卷 (Cancer Incidence in Five Continents Volume IX)》<sup>[5]</sup> 和国际癌症研究中心 (IARC)/国际癌症登记协会 (IACR) <sup>[5]</sup> 对登记质量的有关要求, 使用数据库软件 MS-FoxPro、MS-Excel、SAS 以及 IARC/IACR 的 IARCrgTools 软件<sup>[7]</sup>, 对数据进行审核与评价。通过病理学诊断比例 (MV%)、仅有死亡医学证明书比例 (DCO%)、死亡/发病比 (M/I) 等主要指标, 评价资料的可靠性、完整性、有效性。经全面的质量审核, 104 个登记处数据中有 72 个登记处的数据被纳入分析数据库。分析数据的登记地区覆盖人口 85 470 522 人 (其中男性 43 231 544

人, 女性 42 238 968 人), 约占 2009 年全国年末人口总数的 6.40%。72 个登记地区全年新发恶性肿瘤病例 244 366 例, 其中病理学诊断比例为 67.23%, 仅有死亡医学证明书比例为 3.14%, 死亡/发病比为 0.63, 东部与中西部地区数据质量基本一致 (Table 1)。

### 1.2 统计学处理

按登记处所在的省 (自治区和直辖市) 将数据分为东部地区和中西部地区, 东部地区包括北京、天津、河北、辽宁、上海、江苏、浙江等 12 个省 (自治区和直辖市) 内的 44 个登记处, 覆盖人口 62 347 136 人, 占全部统计覆盖人口的 72.95%。中西部地区包括有山西、内蒙、吉林、河南、湖北、四川、甘肃、云南等 18 个省 (自治区和直辖市) 的 22 个登记处, 覆盖人口 23 123 386 人, 占全部统计覆盖人口的 27.05%。进一步按地级以上城市和县 (县级市) 划分城市和农村地区, 按东部与中西部地区分别计算发病率、年龄别发病率、标化发病率。中国人口标化发病率采用 1982 年全国普查标准人口年龄构成 (中标率), 世界人口标化发病率采用 Segi's 世界标准人口年龄构成 (世标率)。区域分类间的发病率差异比较应用广义线性模型, 年龄别发病数作为因变量, 以中西部地区为参照, 调整性别和城乡估计东部地区的发病率比值, 显著性检验水准  $\alpha=0.05$ , 统计分析使用软件 SAS 9.0 版的 GENMOD 模块完成。

## 2 结果

### 2.1 东部与中西部地区恶性肿瘤发病水平

2009 年中国 72 个登记处新发恶性肿瘤病例数为 244 366 例, 其中东部 190 828 例, 占 78.09%, 中西部 53 538 例, 占 21.91%。东部地区城乡男女合计的恶性肿瘤发病率、中标率与世标率分别为 306.07/10 万、

149.22/10 万和 194.60/10 万。中西部地区城乡男女合计的恶性肿瘤发病率、中标率与世标率分别为 231.53/10 万、139.64/10 万和 182.27/10 万。东部城市地区的恶性肿瘤发病率和标化率均高于中西部地区，东部农村地区的发病率高于中西部，标化率低于中西部地区 (Table 2)。

## 2.2 东部与中西部地区主要恶性肿瘤发病率

肺癌是东部与中西部地区发病均第 1 位的恶性肿瘤，发病率分别为 56.87/10 万和 44.66/10 万（中标率分别为 25.18/10 万和 25.74/10 万）。两地区恶性肿瘤发病的前 6 位癌种相同，顺位略有差别。甲状腺癌和淋巴瘤发病率排在东部地区的第 8、第 9 位，中西部地区则是宫颈癌和脑瘤排在癌症发病的第 7 和第 8 位，膀胱癌在两类地区中均处于第 10 位 (Table 3)。东部地区的前 10 位恶性肿瘤发病数占其全部恶性肿瘤发病数的 75.87%，发病率为 232.22/10 万，中西部的 10 位恶性肿瘤发病数占其发病总数的 79.77%，发病率为 184.69/10 万。

东部和中西部男性恶性肿瘤发病率的前 3 位癌种均为肺癌、胃癌和肝癌。东部地区的粗发病率高于中西部地区，标化率低于中西部地区。肾癌发病率在东部地区位于第 10 位，中西部地区的脑瘤发病率居第 8 位，其他的第 4 到 10 位的恶性肿瘤在两地区相同，位次稍有不同 (Table 4)。

**Table 1 Quality evaluation for cancer registration in east region and middle-west region in China, 2009**

| Site                  | M/I  |             | MV%   |             | DCO% |             |
|-----------------------|------|-------------|-------|-------------|------|-------------|
|                       | East | Middle-west | East  | Middle-west | East | Middle-west |
| Oral and Pharyngeal   | 0.42 | 0.40        | 81.87 | 82.97       | 1.78 | 2.51        |
| Nasopharynx           | 0.56 | 0.53        | 70.97 | 76.36       | 2.96 | 3.40        |
| Esophagus             | 0.77 | 0.71        | 74.37 | 77.94       | 2.42 | 3.19        |
| Stomach               | 0.72 | 0.69        | 76.46 | 75.24       | 2.95 | 2.95        |
| Colon and Rectum      | 0.49 | 0.47        | 80.56 | 78.96       | 1.65 | 3.61        |
| Liver                 | 0.92 | 0.86        | 31.02 | 42.99       | 6.26 | 4.09        |
| Gallbladder           | 0.81 | 0.71        | 46.23 | 54.39       | 4.03 | 6.11        |
| Pancreas              | 0.93 | 0.81        | 35.27 | 50.94       | 4.52 | 5.62        |
| Throat                | 0.53 | 0.50        | 76.99 | 75.88       | 3.04 | 2.63        |
| Lung                  | 0.87 | 0.79        | 49.35 | 55.60       | 4.78 | 4.93        |
| Other Organs in Chest | 0.55 | 0.46        | 59.29 | 58.79       | 2.65 | 3.30        |
| Bone                  | 0.74 | 0.68        | 53.74 | 54.18       | 6.28 | 7.07        |
| Skin Melanoma         | 0.48 | 0.69        | 84.52 | 97.40       | 0.76 | 0.00        |
| Breast                | 0.24 | 0.25        | 87.75 | 88.42       | 0.83 | 0.99        |
| Cervix                | 0.24 | 0.30        | 86.53 | 87.28       | 1.02 | 1.68        |
| Uterus                | 0.30 | 0.44        | 85.75 | 76.96       | 1.32 | 4.52        |
| Ovary                 | 0.45 | 0.38        | 79.20 | 80.13       | 1.57 | 1.47        |
| Prostate              | 0.42 | 0.47        | 72.28 | 63.65       | 1.45 | 3.44        |
| Testis                | 0.19 | 0.19        | 81.46 | 88.89       | 0.00 | 0.00        |
| Kidney                | 0.33 | 0.35        | 77.41 | 72.50       | 1.26 | 1.00        |
| Bladder               | 0.40 | 0.38        | 78.61 | 75.14       | 1.61 | 2.87        |
| Brain                 | 0.59 | 0.64        | 50.88 | 51.45       | 3.12 | 4.44        |
| Thyroid Gland         | 0.07 | 0.12        | 89.78 | 89.39       | 0.29 | 0.90        |
| Lymphoma              | 0.55 | 0.59        | 92.79 | 90.08       | 0.89 | 1.19        |
| Leukemia              | 0.77 | 0.70        | 94.35 | 91.15       | 1.26 | 2.50        |
| Other Cancers         | 0.50 | 0.47        | 65.78 | 69.07       | 3.05 | 4.63        |
| Total                 | 0.63 | 0.63        | 66.88 | 68.46       | 3.01 | 3.60        |

**Table 2 Incidence of cancer in east and middle-west regions in China, 2009 (1/10<sup>5</sup>)**

| Area              | Gender | Population | No.cases | Crude rate | ASR China | ASR World |
|-------------------|--------|------------|----------|------------|-----------|-----------|
| East              | Both   | 62347136   | 190828   | 306.07     | 149.22    | 194.60    |
|                   | Male   | 31416734   | 106193   | 338.01     | 166.32    | 220.94    |
|                   | Female | 30930402   | 84635    | 273.63     | 133.87    | 171.35    |
| Middle-west       | Both   | 23123386   | 53538    | 231.53     | 139.64    | 182.27    |
|                   | Male   | 11814820   | 31269    | 264.66     | 164.48    | 217.58    |
|                   | Female | 11308566   | 22269    | 196.92     | 116.14    | 149.31    |
| East urban        | Both   | 42946837   | 139789   | 325.49     | 154.32    | 200.59    |
|                   | Male   | 21566866   | 75568    | 350.39     | 166.69    | 221.67    |
|                   | Female | 21379971   | 64421    | 300.38     | 143.74    | 183.09    |
| Middle-west urban | Both   | 14542172   | 34629    | 238.13     | 137.53    | 179.52    |
|                   | Male   | 7418219    | 20137    | 271.45     | 161.01    | 213.43    |
|                   | Female | 7123953    | 14492    | 203.43     | 115.44    | 147.97    |
| East rural        | Both   | 19402999   | 51039    | 263.08     | 137.71    | 180.62    |
|                   | Male   | 9849868    | 30625    | 310.92     | 164.90    | 218.77    |
|                   | Female | 9550431    | 20414    | 213.75     | 111.01    | 143.67    |
| Middle-west rural | Both   | 8581214    | 18909    | 220.35     | 144.14    | 188.02    |
|                   | Male   | 4396601    | 11132    | 253.20     | 171.23    | 225.52    |
|                   | Female | 4184613    | 7777     | 185.83     | 118.08    | 152.56    |

甲状腺癌发病率在东部女性位于第 8 位, 发病率为 11.85/10 万(中标率为 7.56/10 万), 脑瘤居中西部女性癌症发病的第 10 位, 发病率和中标率分别为 5.48/10 万和 3.61/10 万, 其余前 10 位中的恶性肿瘤在东部和中西部女性中相同, 发病率的位次也基本一致。前 10 位恶性肿瘤中, 东部女性的多数恶性肿

瘤发病率指标高于中西部女性, 而食管癌和宫颈癌的发病率和中标率及胃癌的中标率低于中西部女性 (Table 5)。

### 2.3 东部与中西部恶性肿瘤发病率差异

以中西部地区为参照, 调整年龄、城乡和性别后, 东部与中西部的恶性肿瘤发病率比为 1.16(95%

**Table 3 Incidence of the main cancer in east and middle-west regions in 2009 (both gender)**

| East region |                  |       |                                 |                                | Middle-west region |            |       |                                 |                                |
|-------------|------------------|-------|---------------------------------|--------------------------------|--------------------|------------|-------|---------------------------------|--------------------------------|
| Rank        | Site             | N     | Crude rate (1/10 <sup>5</sup> ) | ASR China (1/10 <sup>5</sup> ) | Rank               | Site       | N     | Crude rate (1/10 <sup>5</sup> ) | ASR China (1/10 <sup>5</sup> ) |
| 1           | Lung             | 35458 | 56.87                           | 25.18                          | 1                  | Lung       | 10326 | 44.66                           | 25.74                          |
| 2           | Stomach          | 22868 | 36.68                           | 16.96                          | 2                  | Stomach    | 8081  | 34.95                           | 20.64                          |
| 3           | Colon and Rectum | 20425 | 32.76                           | 14.89                          | 3                  | Liver      | 6329  | 27.37                           | 16.34                          |
| 4           | Liver            | 18207 | 29.20                           | 14.29                          | 4                  | Esophagus  | 4896  | 21.17                           | 12.47                          |
| 5           | Breast           | 14513 | 23.28                           | 12.33                          | 5                  | Colorectum | 4734  | 20.47                           | 11.91                          |
| 6           | Esophagus        | 14028 | 22.50                           | 10.37                          | 6                  | Breast     | 3619  | 15.65                           | 9.55                           |
| 7           | Pancreas         | 5152  | 8.26                            | 3.56                           | 7                  | Cervix     | 1368  | 5.92                            | 3.64                           |
| 8           | Thyroid Gland    | 4825  | 7.74                            | 4.91                           | 8                  | Brain      | 1240  | 5.36                            | 3.74                           |
| 9           | Lymphoma         | 4705  | 7.55                            | 4.08                           | 9                  | Pancreas   | 1068  | 4.62                            | 2.64                           |
| 10          | Bladder          | 4601  | 7.38                            | 3.18                           | 10                 | Bladder    | 1046  | 4.52                            | 2.55                           |

**Table 4 Cancer incidence of the main site in east and middle-west regions in 2009 (male)**

| East region |                  |       |                                 |                                | Middle-west region |            |      |                                 |                                |
|-------------|------------------|-------|---------------------------------|--------------------------------|--------------------|------------|------|---------------------------------|--------------------------------|
| Rank        | Site             | N     | Crude rate (1/10 <sup>5</sup> ) | ASR China (1/10 <sup>5</sup> ) | Rank               | Site       | N    | Crude rate (1/10 <sup>5</sup> ) | ASR China (1/10 <sup>5</sup> ) |
| 1           | Lung             | 23297 | 74.15                           | 34.19                          | 1                  | Lung       | 7138 | 60.42                           | 36.41                          |
| 2           | Stomach          | 15676 | 49.90                           | 23.88                          | 2                  | Stomach    | 5771 | 48.85                           | 29.98                          |
| 3           | Liver            | 13474 | 42.89                           | 21.86                          | 3                  | Liver      | 4681 | 39.62                           | 24.49                          |
| 4           | Colon and Rectum | 11309 | 36.00                           | 16.98                          | 4                  | Esophagus  | 3343 | 28.29                           | 17.33                          |
| 5           | Esophagus        | 9818  | 31.25                           | 15.08                          | 5                  | Colorectum | 2691 | 22.78                           | 13.77                          |
| 6           | Prostate         | 3734  | 11.89                           | 4.83                           | 6                  | Bladder    | 777  | 6.58                            | 3.91                           |
| 7           | Bladder          | 3453  | 10.99                           | 4.95                           | 7                  | Pancreas   | 632  | 5.35                            | 3.18                           |
| 8           | Pancreas         | 2930  | 9.33                            | 4.26                           | 8                  | Brain      | 620  | 5.25                            | 3.86                           |
| 9           | Lymphoma         | 2715  | 8.64                            | 4.82                           | 9                  | Lymphoma   | 617  | 5.22                            | 3.45                           |
| 10          | Kidney           | 2551  | 8.12                            | 4.15                           | 10                 | Prostate   | 553  | 4.68                            | 2.63                           |

**Table 5 Cancer incidence of the main site in east and middle-west regions in 2009 (female)**

| East region |                  |       |                                 |                                | Middle-west region |            |      |                                 |                                |
|-------------|------------------|-------|---------------------------------|--------------------------------|--------------------|------------|------|---------------------------------|--------------------------------|
| Rank        | Site             | N     | Crude rate (1/10 <sup>5</sup> ) | ASR China (1/10 <sup>5</sup> ) | Rank               | Site       | N    | Crude rate (1/10 <sup>5</sup> ) | ASR China (1/10 <sup>5</sup> ) |
| 1           | Breast           | 14402 | 46.56                           | 24.54                          | 1                  | Breast     | 3569 | 31.56                           | 18.90                          |
| 2           | Lung             | 12161 | 39.32                           | 16.66                          | 2                  | Lung       | 3188 | 28.19                           | 15.51                          |
| 3           | Colon and Rectum | 9116  | 29.47                           | 12.93                          | 3                  | Stomach    | 2310 | 20.43                           | 11.53                          |
| 4           | Stomach          | 7192  | 23.25                           | 10.33                          | 4                  | Colorectum | 2043 | 18.07                           | 10.13                          |
| 5           | Liver            | 4733  | 15.30                           | 6.75                           | 5                  | Liver      | 1648 | 14.57                           | 8.25                           |
| 6           | Esophagus        | 4210  | 13.61                           | 5.80                           | 6                  | Esophagus  | 1553 | 13.73                           | 7.73                           |
| 7           | Cervix           | 4105  | 13.27                           | 7.47                           | 7                  | Cervix     | 1368 | 12.10                           | 7.33                           |
| 8           | Thyroid Gland    | 3664  | 11.85                           | 7.56                           | 8                  | Ovary      | 750  | 6.63                            | 4.16                           |
| 9           | Uterus           | 3039  | 9.83                            | 5.07                           | 9                  | Uterus     | 664  | 5.87                            | 3.52                           |
| 10          | Ovary            | 2610  | 8.44                            | 4.66                           | 10                 | Brain      | 620  | 5.48                            | 3.61                           |

CI:1.08~1.25)。差异最大的前3位恶性肿瘤依次为甲状腺癌、肾癌和淋巴瘤,相应的发病率比分别为1.95(95%CI:1.75~2.17)、1.47(95%CI:1.34~1.61)和1.41(95%CI:1.30~1.52)。其他发病率高于(发病率比>1,  $P<0.01$ )中西部地区的恶性肿瘤分别是鼻咽癌、胰腺癌、口腔癌、白血病、膀胱癌等。发病率低于中西部的恶性肿瘤有食管癌和肝癌,发病率比均为0.88( $P<0.05$ )。肺癌和胃癌的发病率差别在两地区间无统计学意义(Table 6)。

东部与中西部男性恶性肿瘤发病率比为1.13(95%CI:1.02~1.25)。两地区发病率差异最大的前3位恶性肿瘤依次为甲状腺癌、前列腺癌和肾癌,发病率比分别为1.89(95%CI:1.64~2.17)、1.66(95%CI:1.52~1.80)和1.42(95%CI:1.30~1.54)。东部与中西部的恶性肿瘤发病率比大于1且有统计学差异的还有胰腺癌、白血病、鼻咽癌、口腔癌、结直肠癌和乳腺癌等。发病率低于中西部的癌症有食管癌、肝癌和胃癌,发病率比分别为0.93(95%CI:0.87~0.99)、0.89(95%CI:0.84~0.94)和0.85(95%CI:0.78~0.91)。东部与中西部的脑瘤和肺癌发病率差异无统计学意义(Table 7)。

东部与中西部女性恶性肿瘤发病率比为1.19(95%CI:1.08~1.31)。差异最大的前3位恶性肿瘤依次为甲状腺癌、肾癌和淋巴瘤,发病率比分别为1.98(95%CI:1.83~2.15)、1.48(95%CI:1.32~1.66)和1.47(95%CI:1.33~1.62)。其他东部地区发病率高于(发病率比>1,  $P<0.01$ )中西部地区的恶性肿瘤还有鼻咽癌、胰腺癌、口腔癌、淋巴瘤、白血病、膀胱癌等,发病率低于中西部的恶性肿瘤有肝癌和食管癌,发病率比分别为0.87(95%CI:0.80~0.95)和0.82(95%CI:0.72~0.94)。东部与中西部的膀胱癌、肺癌、胃癌和宫颈癌发病率差异比无统计学意义(Table 8)。

**Table 6 Incidence rate ratio of cancer in both gender between east and middle-west regions in 2009\***

| Site                | Rate Ratio | 95%LCI | 95%UCI | Chi-Sq | P      |
|---------------------|------------|--------|--------|--------|--------|
| Thyroid Gland       | 1.95       | 1.75   | 2.17   | 149.26 | <0.001 |
| Kidney              | 1.47       | 1.34   | 1.61   | 69.69  | <0.001 |
| Lymphoma            | 1.41       | 1.30   | 1.52   | 76.53  | <0.001 |
| Nasopharynx         | 1.37       | 1.26   | 1.49   | 57.83  | <0.001 |
| Pancreas            | 1.35       | 1.25   | 1.46   | 56.00  | <0.001 |
| Leukemia            | 1.32       | 1.20   | 1.44   | 34.89  | <0.001 |
| Oral and Pharyngeal | 1.20       | 1.08   | 1.34   | 10.62  | 0.001  |
| Bladder             | 1.20       | 1.12   | 1.30   | 22.75  | <0.001 |
| Colon and Rectum    | 1.18       | 1.11   | 1.25   | 28.62  | <0.001 |
| Brain               | 1.10       | 1.03   | 1.18   | 7.13   | 0.008  |
| Lung                | 1.00       | 0.94   | 1.07   | 0.01   | 0.921  |
| Stomach             | 0.92       | 0.84   | 1.01   | 3.13   | 0.077  |
| Esophagus           | 0.88       | 0.79   | 0.99   | 4.53   | 0.033  |
| Liver               | 0.88       | 0.80   | 0.97   | 7.22   | 0.007  |
| Total               | 1.16       | 1.08   | 1.25   | 14.93  | <0.001 |

\* Reference to middle-west region and adjusted by age, gender and urban-rural.

**Table 7 Incidence rate ratio of cancer in male between east and middle-west regions in 2009\***

| Site                | Rate Ratio | 95%LCI | 95%UCI | Chi-Sq | P      |
|---------------------|------------|--------|--------|--------|--------|
| Thyroid Gland       | 1.89       | 1.64   | 2.17   | 77.99  | <0.001 |
| Prostate            | 1.66       | 1.52   | 1.80   | 137.68 | <0.001 |
| Kidney              | 1.42       | 1.30   | 1.54   | 68.73  | <0.001 |
| Nasopharynx         | 1.34       | 1.22   | 1.48   | 37.45  | <0.001 |
| Pancreas            | 1.32       | 1.19   | 1.47   | 28.57  | <0.001 |
| Lymphoma            | 1.32       | 1.22   | 1.43   | 48.34  | <0.001 |
| Leukemia            | 1.30       | 1.16   | 1.45   | 21.3   | <0.001 |
| Bladder             | 1.23       | 1.13   | 1.34   | 22.08  | <0.001 |
| Oral and pharyngeal | 1.16       | 1.05   | 1.28   | 8.12   | 0.004  |
| Colon and Rectum    | 1.16       | 1.06   | 1.27   | 10.22  | 0.001  |
| Brain               | 1.03       | 0.96   | 1.12   | 0.74   | 0.389  |
| Lung                | 0.95       | 0.89   | 1.01   | 2.67   | 0.102  |
| Esophagus           | 0.93       | 0.87   | 0.99   | 4.53   | 0.033  |
| Liver               | 0.89       | 0.84   | 0.94   | 15.54  | <0.001 |
| Stomach             | 0.85       | 0.78   | 0.91   | 17.78  | <0.001 |
| Total               | 1.13       | 1.02   | 1.25   | 5.35   | 0.021  |

\* Reference to middle-west region and adjusted by age and urban-rural.

### 3 讨论

利用中国肿瘤登记地区的癌症发病数据,本文首次对我国东部与中西部地区的癌症发病率差异进行了比较分析。东部地区癌症发生的整体水平高于中西部地区,前10位的恶性肿瘤部位和发病率位次在东部和中西部地区基本一致。东部城市的癌症发病率和标化率均高于中西部地区,而其农村地区的

**Table 8 Incidence rate ratio of cancer in female between east and middle-west regions in 2009\***

| Site                | Rate Ratio | 95%LCI | 95%UCI | Chi-Sq | P      |
|---------------------|------------|--------|--------|--------|--------|
| Thyroid Gland       | 1.98       | 1.83   | 2.15   | 293.35 | <0.001 |
| Kidney              | 1.48       | 1.32   | 1.66   | 46.80  | <0.001 |
| Lymphoma            | 1.47       | 1.33   | 1.62   | 57.74  | <0.001 |
| Pancreas            | 1.39       | 1.26   | 1.52   | 45.31  | <0.001 |
| Leukemia            | 1.35       | 1.19   | 1.52   | 22.39  | <0.001 |
| Nasopharynx         | 1.31       | 1.13   | 1.52   | 12.99  | <0.001 |
| Oral and Pharyngeal | 1.22       | 1.04   | 1.44   | 5.73   | 0.017  |
| Colon and Rectum    | 1.22       | 1.14   | 1.31   | 34.71  | <0.001 |
| Breast              | 1.14       | 1.02   | 1.28   | 5.74   | 0.017  |
| Bladder             | 1.12       | 0.99   | 1.26   | 3.18   | 0.075  |
| Brain               | 1.11       | 1.02   | 1.20   | 6.61   | 0.010  |
| Ovary               | 1.10       | 1.03   | 1.18   | 7.06   | 0.008  |
| Lung                | 1.07       | 0.99   | 1.15   | 3.30   | 0.069  |
| Stomach             | 0.97       | 0.88   | 1.06   | 0.58   | 0.448  |
| Cervix              | 0.96       | 0.83   | 1.10   | 0.37   | 0.543  |
| Liver               | 0.87       | 0.80   | 0.95   | 10.61  | 0.001  |
| Esophagus           | 0.82       | 0.72   | 0.94   | 8.39   | 0.004  |
| Total               | 1.19       | 1.08   | 1.31   | 11.48  | <0.001 |

\* Reference to middle-west region and adjusted by age and urban-rural.

标化率则低于中西部地区。地区间的恶性肿瘤发病率差异与生活习惯、环境因素及社会经济发展水平存在显著关联<sup>[8]</sup>。

我国东部地区的甲状腺癌、男性前列腺癌、结直肠癌、女性乳腺癌及淋巴瘤等恶性肿瘤的发病率明显高于中西部地区，一方面反映了我国东部发达地区的致癌危险因素暴露大于西部地区，同时地区间医疗资源配置与诊断水平的不均衡也会导致地区间发病率的差别。医疗资源与诊断水平在前列腺癌、甲状腺癌、淋巴瘤及膀胱癌发生率尤为明显。加强体育活动,维持健康体重,减少肉类食品和酒精消费,戒烟及增加水果与蔬菜消费以及开展乳腺癌和前列腺癌筛查可以明显减轻前列腺癌、结直肠癌和乳腺癌的疾病负担<sup>[9,10]</sup>。中西部地区的食管癌、胃癌和肝癌发病率高于东部地区,表明在我国经济欠发达地区的生活环境、饮食中的致癌危险因素以及生物感染的暴露机会高于经济较发达区域,改善膳食习惯及生活化境,控制感染因素,预防霉菌污染开展筛查是预防控制消化道恶性肿瘤的有效措施<sup>[11]</sup>。

肺癌、宫颈癌及女性胃癌发病率在东部和中西部间差别不明显,胃癌发病率高于中西部地区,但标化率则低于中西部地区。调整年龄、性别和城乡因素

后,东部与中西部这三种恶性肿瘤发病率比值在 1.00 左右,差别无统计学意义。针对这三种我国人群中常见恶性肿瘤在东部与中西部地区应采取一致的预防控制措施诸如控制烟草危害,改善环境与室内空气环境,增加水果与新鲜蔬菜的摄入,减少幽门螺旋杆菌和人乳头状病毒等生物因子感染以及人群中胃癌和宫颈筛查项目实施<sup>[12-14]</sup>。

尽管东部与中西部地区肿瘤登记总体质量基本一致,但在一些部位的恶性肿瘤中还存在差别。总体上东部地区的登记质量要高于中西部地区,东部地区的一些登记处如北京市、上海市、哈尔滨市、嘉善县、中山市等地的登记数据符合国际癌症研究中心 (IARC)/国际癌症登记协会(IACR)的通过质量标准审核,被《五大洲癌症发病率第 9 卷》收录<sup>[6]</sup>,而中

西部地区的登记处大部分是 2008 年后新建立的,无一个登记处的数据通过审核。登记数据质量高低也会对地区间恶性肿瘤发病率的差异产生影响。

进一步健全完善我国肿瘤登记系统,改善提高登记质量,尤其在中西部地区是我国肿瘤登记下一阶段的工作重点。质量控制是肿瘤登记的核心,只有在质量保证的基础上登记系统收集的恶性肿瘤发生、死亡及生存数据方可为我国肿瘤控制与研究提供准确的有价值的信息。

(致谢:中国肿瘤登记数据是全国各肿瘤登记处辛勤工作的积累,谨对各登记处的全体工作人员在资料收集、整理、审核、查重、补漏、建立数据库等方面所做的努力表示诚挚的谢意!)

## 参考文献:

- [1] Jemal A, Bray F, Center MM, et al. Global cancer statistics[J]. CA Cancer J Clin, 2011,61(2):134.
- [2] Chen WQ, Zhang SW, Zheng RS, et al. Report of cancer incidence and mortality in China,2009 [J]. China Cancer, 2013, 22(1):2-12. [陈万青,张思维,郑荣寿,等. 中国 2009 年恶性肿瘤发病和死亡分析[J].中国肿瘤,2013,22(1):2-12.]
- [3] Kamangar F, Dores GM,Anderson WF. Patterns of can-

- cancer incidence, mortality, and prevalence across five continents: defining priorities to reduce cancer disparities in different geographic regions of the world [J]. *J Clin Oncol*, 2006, 24(14):2137–2150.
- [4] The National Central Cancer Registry.Guideline for Chinese cancer registration [M].Beijing:Peking Union Medical College Press,2004.48–50.[全国肿瘤登记中心.中国肿瘤全国肿瘤防治研究办公室,卫生部卫生统计信息中心.中国肿瘤登记工作指导手册[M].北京:中国协和医科大学出版社,2004, 48–50.]
  - [5] Bray F,Parkin DM. Evaluation of data quality in the cancer registry: principles and methods. Part I : comparability validity and timeliness [J]. *Eur J Cancer*,2009,45(5):747–755.
  - [6] Curado MPEB, Shin HR, Storm H, et al. Cancer incidence in five continents Vol.IX[M]. Lyon: IARC Scientific Publications,2008.
  - [7] Ferlay J, Burkhard C, Whelan S, et al. Check and conversion programs for cancer registries (IARC/IACR Tools for Cancer Registries) IARC technical report No.42 [M]. Lyon: IARC,2005.
  - [8] Jemal A, Center MM, De Santis C, et al. Global patterns of cancer incidence and mortality rates and trends [J]. *Cancer Epidemiol Biomarkers Prev*, 2010, 19 (8):1893–1907.
  - [9] World Health Organization. World cancer report 2008[M]. Lyon (France): IARC, 2008.
  - [10] Anderson BO, Yip CH, Smith RA, et al. Guideline implementation for breast healthcare in low-income and middle-income countries: overview of the Breast Health Global Initiative Global Summit 2007 [J]. *Cancer*, 2008,113(8 Suppl):2221–2243.
  - [11] World Health Organization. 2008–2013 action plan for the global strategy for the prevention and control of noncommunicable diseases: prevent and control cardiovascular diseases, cancers, chronic respiratory diseases and diabetes[M]. Geneva: WHO, 2009.
  - [12] Warner KE,Mackay J. The global tobacco disease pandemic: nature, causes, and cures [J]. *Glob Public Health*,2006, 1 (1):65–86.
  - [13] Boffetta P,Nyberg F. Contribution of environmental factors to cancer risk[J]. *Br Med Bull*, 2003, 68(1):71–94.
  - [14] Parkin DM. The global health burden of infection-associated cancers in the year 2002[J]. *Int J Cancer*, 2006, 118 (12):3030–3044.
  - [15] Boyle P, Anderson BO, Andersson LC, et al. Need for global action for cancer control [J]. *Ann Oncol*,2008, 19 (9):1519–1521.