

# 2016—2018 年沈阳市城市居民肝癌 高危风险评估及筛查效果分析

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**摘要:** [目的] 评估沈阳城市地区肝癌筛查效果,为肝癌疾病防治提供依据和建议。[方法] 收集 2016—2018 年沈阳城市 24 个社区 40~74 岁常住人口的基本情况,通过防癌风险评估问卷进行初筛,临床筛查方案为甲胎蛋白(AFP)检测联合腹部超声检查。对进行高危评估的人群进行随访,随访截止时间为 2019 年 10 月 30 日,分析肝癌筛查参与情况、肝癌筛查技术诊断效果及不同人群肝癌患者生存情况。[结果] 2016—2018 年评估出肝癌高危人群 19 606 人,其中 7052 人进行临床筛查,参与率为 35.97%。女性高于男性( $P<0.05$ ),50~59 岁年龄组高于其他年龄组( $P<0.05$ )。HBsAg 阳性率、肝硬化、肝占位性病变检出率男性均高于女性(5.95% vs 4.44%, $P<0.01$ ;1.19% vs 0.20%, $P<0.01$ ;0.75% vs 0.38%, $P<0.05$ )。且肝硬化检出率随着年龄的增加而升高。肝癌高危评估模型的敏感性为 25.00%,特异性为 81.00%,AFP 联合超声检查的敏感性为 33.33%,特异性为 98.84%。肝癌高危风险组和一般风险组肝癌生存率差异无统计学意义( $\chi^2=0.03$ , $P=0.87$ ),临床筛查组和未筛查组发生肝癌生存率差异无统计学意义( $\chi^2=0.37$ , $P=0.55$ )。[结论] 肝癌高危评估模型、临床早筛技术的敏感性有待提高,应加快早期标志物的研发与应用。

**关键词:** 肝癌;筛查;高危评估;生存率;辽宁

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## High-risk Assessment and Screening of Hepatocellular Carcinoma in Shenyang, 2016—2018

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**Abstract:** [Purpose] To evaluate the effectiveness of hepatocellular carcinoma (HCC) screening in Shenyang City. [Methods] The primary screening of HCC was carried out with cancer risk assessment questionnaire among resident aged 40~74 years in 24 communities in Shenyang from 2016 to 2018. The identified high risk population of HCC were recommended for clinical screening with Alpha-fetoprotein(AFP) detection combined with abdominal ultrasound examination. All the participants were followed up until October 30, 2019. [Results] From 2016 to 2018, 19 606 subjects were identified as high risk of HCC by primary screening, of which 7052 were screened clinically with a participation rate of 35.97%, among whom females were more than males ( $P<0.05$ ) and the people in age group 50~59 were more than people in other age groups( $P<0.05$ ). The detection rates of positive HBsAg, cirrhosis and liver occupying lesions in males were higher than those in females (5.95% vs 4.44%,  $P<0.01$ ; 1.19% vs 0.20%,  $P<0.01$ ; 0.75% vs 0.38%,  $P<0.05$ ). The detection rate of cirrhosis and liver occupying lesions increased with age. The sensitivity and specificity of the high risk assessment model of HCC were 25.00% and 81.00%, respectively, and those of AFP combined with ultrasound were 33.33% and 98.84%, respectively. There was no significant difference in the survival rate of HCC between the high risk group and the general risk group ( $\chi^2=0.03$ ,  $P=0.87$ ), and between the clinical screening group and the non-screening group ( $\chi^2=0.37$ ,  $P=0.55$ ). [Conclusion] The result suggests that the value of high risk assessment and clinical screening with AFP and abdominal ultrasound is limited for screening of hepatocellular carcinoma, more sensitive serologic markers are required for the screening.

**Key words:** hepatocellular carcinoma; screening; high-risk population; survival; Liaoning

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肝细胞性肝癌 (hepatocellular carcinoma, HCC, 以下简称肝癌)是我国常见的恶性肿瘤之一。发病率位居恶性肿瘤第4位,死亡率位居恶性肿瘤第2位<sup>[1]</sup>,全世界46.7%的肝癌新发病例和37.5%的死亡病例发生在中国<sup>[2]</sup>,且超过60%的肝癌患者在初诊时已经进入中晚期,治疗费用负担重<sup>[3]</sup>,总体5年生存率只有12.1%<sup>[4]</sup>。肝炎病毒感染是肝癌发生的主要因素,全球约56%肝癌是由乙型肝炎病毒(hepatitis B virus, HBV)感染导致,20%由丙型肝炎病毒(hepatitis C virus, HCV)感染导致<sup>[5]</sup>。我国肝癌死亡病例中,男、女性归因于HBV感染的比例分别占55.6%和46.5%<sup>[6]</sup>。研究证明对肝癌高危人群定期进行筛查以发现早期病例是实现肝癌早诊早治、改善患者预后或提高生存率的主要途径<sup>[7-9]</sup>。目前发表的肝癌筛查结果,缺乏后续随访确诊恶性肿瘤情况及对高危人群评估模型和临床筛查方法效果的客观评价<sup>[10]</sup>。故本研究对2016—2018年3年间沈阳城市居民肝癌早诊早治的筛查效果进行分析评价。

## 1 资料与方法

### 1.1 筛查对象

在沈阳市随机选取2个主城区,对2个主城区全部24个社区常住居民开展调查,纳入标准:①年龄40~74岁;②本市户籍常住人口;③所有筛查对象非肝癌患者;④无严重心、肺、肾功能障碍或精神疾患;⑤无癌症史;⑥自愿参加项目并签署知情同意书。

### 1.2 研究方法

#### 1.2.1 高危人群评估

所有调查对象需填写危险因素调查问卷,问卷内容包括基本信息、饮食习惯、生活环境、生活方式和习惯、心理和情绪、疾病既往史、恶性肿瘤家族史等。工作人员质控后录入国家癌症中心开发的高危人群评估系统。该系统以“哈佛癌症风险指数(Harvard Cancer Risk Index)”为理论基础,依据我国常见的癌症流行病学资料研发出的适合中国人群的个体癌症风险综合评估体系<sup>[11]</sup>。高危风险评估系统引入肝癌相关危险因素包含吸烟、饮酒、HBsAg感染、肝炎肝硬化疾病史、肝癌家族史等。

#### 1.2.2 临床筛查

肝癌高危人群方可进入临床筛查,进行血液采

集,检测乙肝病毒表面抗原(hepatitis B virus surface antigen, HBsAg)和血清甲胎蛋白(alpha-fetoprotein, AFP),结合腹部超声检查。AFP检测使用电化学发光免疫分析法,检测试剂为罗氏诊断公司生产的配套产品。AFP>20ng/ml为异常。

#### 1.2.3 随访

本研究对所有参加高危评估对象利用肿瘤登记数据库,通过身份证号码匹配,记录被随访者的肿瘤发病时间、部位、死亡时间和原因。以2016年第一批肝癌高危人群参加临床筛查的时间作为起始点,随访截止日期为2019年10月30日。

#### 1.2.4 相关指标定义

①临床筛查阳性定义为AFP结果异常或超声检查为其他占位性病变。②高危风险率=肝癌高危人数/问卷调查数×100%。③临床筛查参与率=实际筛查人数/高危风险人数×100%。

### 1.3 统计学处理

采用SAS9.2软件进行统计学分析,计数资料用百分数表示,采用 $\chi^2$ 检验和Fisher精确检验进行各组间差异比较和分层分析。生存率的比较采用Log-rank检验。检验水准: $\alpha=0.05$ ,双侧检验。

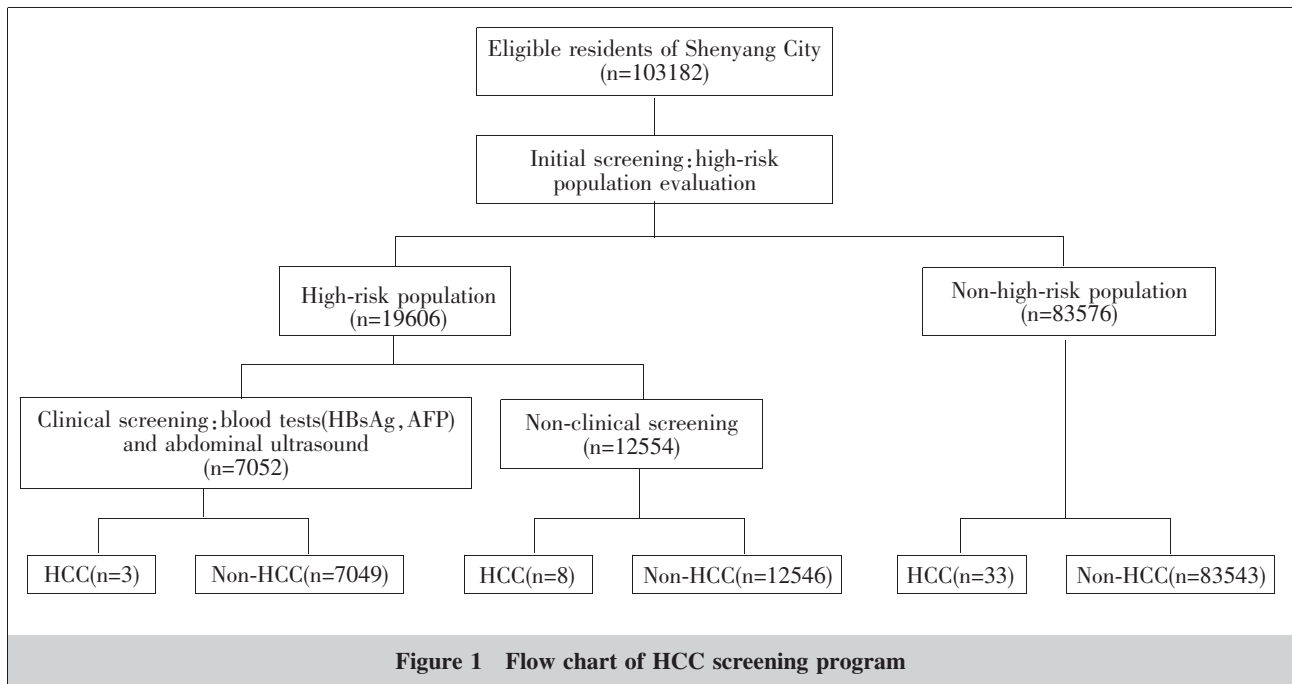
## 2 结果

### 2.1 肝癌筛查参与情况

2016—2018年进行肝癌高危评估共103 182人,评估出的肝癌高风险人群19 606人,高危风险率为19.00%。肝癌高危人群中7052人进行临床筛查,临床筛查参与率为35.97%(Figure 1)。肝癌高危率、筛查参与率在性别与年龄别间差异均具有统计学意义,女性高于男性,50~59岁年龄组高于其他年龄组( $P<0.05$ )(Table 1)。

### 2.2 肝癌临床筛查结果

参加临床筛查的对象中,共检出HBsAg阳性者351人,检出率为4.98%;AFP阳性者48人,检出率为0.68%。超声结果中肝硬化检出39人,检出率为0.55%,肝占位性病变检出36人,检出率为0.51%。男性HBsAg阳性率、肝硬化检出率、肝占位检出率均高于女性,差异有统计学意义(5.95% vs 4.44%,  $P<0.01$ ; 1.19% vs 0.20%,  $P<0.01$ ; 0.75% vs 0.38%,  $P<0.05$ )。随着年龄的增加,肝硬化和肝占位的检出



率升高(Table 2)。

### 2.3 肝癌筛查技术灵敏度和特异性分析

随访共发现肝癌病例 44 例,其中高风险组 11 例,一般风险人群组 33 例;高风险组中参与临床筛查人群发现 3 例,未筛查人群发现 8 例(Figure 1)。高危评估模型的敏感性为 25.00%,特异性为 81.00%。临床检查发现阳性病例 83 例,随访发现肝癌 3 例,1 例 AFP 阳性,超声诊断均为肝硬化,AFP 联合超声诊断的敏感性为 33.33%,特异性为 98.84%(Table 3)。

### 2.4 不同人群肝癌生存分析

肝癌高危风险组和一般风险组发生肝癌分别为 11 例和 33 例,两组人群生存率差异无统计学意义 ( $\chi^2=0.03, P=0.87$ )。临床筛查组和未筛查组发生肝癌分别为 3 例和 8 例,两组人群生存率差异无统计学意义 ( $\chi^2=0.37, P=0.55$ )。

## 3 讨论

近十年,辽宁省恶性肿瘤发病率与全国同期发

**Table 1 Basic information of population for high-risk assessment**

| Characteristics | Total  | Percentage (%) | High-risk population |         | Clinical examination |         |
|-----------------|--------|----------------|----------------------|---------|----------------------|---------|
|                 |        |                | N                    | Rate(%) | N                    | Rate(%) |
| Gender          |        |                |                      |         |                      |         |
| Male            | 45426  | 44.03          | 7404                 | 16.30*  | 2523                 | 34.08*  |
| Female          | 57756  | 55.97          | 12202                | 21.13   | 4529                 | 37.12   |
| Age(years)      |        |                |                      |         |                      |         |
| 40~49           | 23253  | 22.54          | 5021                 | 19.68*  | 1881                 | 37.46*  |
| 50~59           | 34408  | 33.35          | 7103                 | 21.35   | 2791                 | 39.29   |
| 60~74           | 45521  | 44.12          | 7482                 | 16.78   | 2380                 | 31.81   |
| Total           | 103182 | 100.00         | 19606                | 19.00   | 7052                 | 35.97   |

Note: \* $P<0.05$

**Table 2 Comparison of abnormal result detection rates by sex and age groups[n(%)]**

| Groups     | HBsAg+    | P     | AFP+     | P    | Cirrhosis | P     | Hepatic occupying lesions | P    |
|------------|-----------|-------|----------|------|-----------|-------|---------------------------|------|
| Gender     |           |       |          |      |           |       |                           |      |
| Male       | 150(5.95) | <0.01 | 18(0.71) | 0.80 | 30(1.19)  | <0.01 | 19(0.75)                  | 0.03 |
| Female     | 201(4.44) |       | 30(0.66) |      | 9(0.20)   |       | 17(0.38)                  |      |
| Age(years) |           |       |          |      |           |       |                           |      |
| 40~49      | 97(5.18)  | 0.34  | 15(0.80) | 0.77 | 6(0.32)   | 0.02  | 7(0.37)                   | 0.50 |
| 50~59      | 148(5.30) |       | 18(0.64) |      | 12(0.43)  |       | 14(0.50)                  |      |
| 60~74      | 106(4.45) |       | 15(0.63) |      | 21(0.88)  |       | 15(0.63)                  |      |
| Total      | 351(4.98) |       | 48(0.68) |      | 39(0.55)  |       | 36(0.51)                  |      |

病率基本一致,而同期恶性肿瘤死亡率高于全国平均水平<sup>[12]</sup>。早期筛查、早期诊断和有效治疗对于改善肝癌的预后转归尤为重要。本研究中,使用肝癌高危评估系统进行初筛,肝癌高危率为 19.00%,与河北省、江

**Table 3 Sensitivity and specificity of screening technology**

| Screening technology |               | HCC |        | Total  | Sensitivity (%) | Specificity (%) |
|----------------------|---------------|-----|--------|--------|-----------------|-----------------|
|                      |               | Yes | No     |        |                 |                 |
| High-risk assessment | High-risk     | 11  | 19595  | 19606  | 25.00           | 81.00           |
|                      | Non-high-risk | 33  | 83543  | 83576  |                 |                 |
|                      | Total         | 44  | 103138 | 103182 |                 |                 |
| Clinical examination | Positive      | 1   | 82     | 83     | 33.33           | 98.84           |
|                      | Negative      | 2   | 6967   | 6969   |                 |                 |
|                      | Total         | 3   | 7049   | 7052   |                 |                 |

苏省等情况相似<sup>[13-14]</sup>,但高于云南省及湖南省<sup>[15-16]</sup>。临床筛查参与率为 35.97%,低于全国农村肝癌高危人群筛查依从性<sup>[17-19]</sup>,与全国其他城市肝癌筛查参与情况相似<sup>[14-15]</sup>。这与农村肝癌筛查选择肝癌发病率、死亡率较高的乡和村作为目标人群,且目标人群参加定期体检的可能性较低有关。有研究显示未参加过定期体检人群中超过 60%的对象具有参加防癌筛查的意愿<sup>[20]</sup>。

本研究临床筛查结果显示,HBsAg 阳性率、肝硬化和肝占位性病检出率男性均高于女性,恰与肝癌筛查参与情况相反,女性整体可能更易于接受肿瘤防治的宣教知识,同时提示应该加强男性群体进行癌症防治知识宣教,提高其癌症防治健康素养。AFP 阳性检出率为 0.68%,超声检查未有阳性患者检出,肝癌阳性检出率低于湖南、重庆等地区<sup>[16,21]</sup>。

本研究显示肝癌高危评估模型的敏感性为 25.00%,特异性为 81.00%,敏感性较低。分析原因可能与研究对象为城市普通居民、居民填写评估问卷时夸大了与疾病的相关性、评估模型纳入参数类别较单一有关。评估模型仅考虑了传统流行病学风险因素,多项研究发现 HBsAg 阳性是肝癌发生的独立预测因子<sup>[22]</sup>,本研究中 HBsAg 阳性率为 4.98%,低于全国乙肝血清流行病学检查 HBsAg 阳性率 (7.2%)<sup>[23]</sup>。

肝癌早期诊断的方法包括血清学和影像学检查。本研究利用常规的 AFP 联合超声进行临床筛查,敏感性仅为 33.33%,特异性为 98.84%,灵敏度较低。AFP 作用于肝癌监控效果不佳主要有两个原因。首先,肝硬化患者 AFP 水平的波动可反映 HBV 或 HCV 感染的激活,潜在肝病的恶化或肝癌发展。其次,只有小部分早期肝肿瘤 (10%~20%) 出现 AFP 血清水平异常<sup>[24]</sup>。超声早期检测肝癌高度依赖于检测者的经验技能和仪器的质量,超声质量也受患者特征的影响,肝脏结节多的肥胖患者、非酒精性脂肪

肝引起的肝硬化患者超声质量不足以评估肝癌<sup>[25]</sup>。而且肝硬化的特征为纤维化间隔和再生结节,这些特征在超声上产生粗糙的图像,影响对小肿瘤的识别。本研究后期随访参与筛查人群中最终患肝癌的患者 3 例,其 2 例筛查诊断结果

为 AFP 阴性肝硬化,1 例为 AFP 阳性肝硬化。因此,目前肝癌常用筛查技术的有效性值得进一步研究。

我们通过进一步分析本项目肝癌高危和非高危人群生存情况发现,高风险组与一般风险组、筛查组与未筛查组的生存率差异没有统计学意义。有随机对照研究比较了中国慢性乙型肝炎患者 (无论是否存在肝硬化) 进行监测 (每 6 个月 AFP 联合超声检查) 和不监测的结果发现随访组肝癌相关死亡率降低 37%<sup>[26]</sup>,其他类型证据很大程度也增强了定期随访的获益<sup>[27-28]</sup>。因此,建议将血清学指标纳入肝癌高危评估模型参数以提高评估的灵敏度。随着分子诊断技术的快速发展,肝癌早期诊断的血清标志物的价值得到验证<sup>[29-31]</sup>,建议应加快肝癌早期标志物的研发与应用,并将高危人群的随访监测纳入整体筛查方案,以此提高肝癌筛查领域整体的卫生经济学效益。

## 参考文献:

- [1] 郑荣寿,孙可欣,张思维,等. 2015 年中国恶性肿瘤流行情况分析[J]. 中华肿瘤杂志,2019,1(41):19-28.  
Zheng RS,Sun KX,Zhang SW,et al. Report of cancer epidemiology in China,2015 [J]. Chinese Journal of Oncology,2019,1(41):19-28.
- [2] Ervik FLM,Ferlay J,Mery L. Cancer today [EB/OL]. <http://gco.iarc.fr/today>,2020-07-19.
- [3] Qiu WQ,Shi JF,Guo LW,et al. Medical expenditure for liver cancer in urban China:a 10-year multicenter retrospective survey (2002-2011)[J]. J Cancer Res Therap,2018,14(1):163-170.
- [4] Zeng H,Chen W,Zheng R,et al. Changing cancer survival in China during 2003-15:a pooled analysis of 17 population-based cancer registries[J]. Lancet Global health,2018,6(5):e555-e567.
- [5] Yang F,Ma L,Yang Y,et al. Contribution of hepatitis B virus infection to the aggressiveness of primary liver cancer:a clinical epidemiological study in Eastern China[J].

- Front Oncol,2019,9:370.
- [6] Chen W,Xia C,Zheng R,et al. Disparities by province, age,and sex in site-specific cancer burden attributable to 23 potentially modifiable risk factors in China;a comparative risk assessment [J]. Lancet Global health,2019,7(2): e257-e269.
  - [7] Singal AG,Pillai A,Tiro J.Early detection,curative treatment,and survival rates for hepatocellular carcinoma surveillance in patients with cirrhosis;a meta-analysis[J]. PLoS Med,2014,11(4):e1001624.
  - [8] 陈建国,张永辉,朱健,等. 启东肝癌的早诊早治及筛查效果评价[J]. 中华肿瘤杂志,2017,39(12):946-951.  
Chen JG,Zhang YH,Zhu J,et al. Early diagnosis and early treatment for liver cancer in Qidong:survival of patients and effectiveness of screening [J]. Chinese Journal of Oncology,2017,39(12):946-951.
  - [9] Wu CY,Hsu YC,Ho HJ,et al. Association between ultrasonography screening and mortality in patients with hepatocellular carcinoma;a nationwide cohort study [J]. Gut,2016,65(4):693-701.
  - [10] 于慧会,任英,张亮,等. 2014-2018 年辽宁省城市居民肝癌筛查结果分析[J].现代预防医学,2020,47(5):913-916.  
Yu HH,Ren Y,Zhang L,et al. Hepatocellular carcinoma screening among residents,Liaoning Province,2014-2018 [J]. Modern Preventive Medicine,2020,47(5):913-916.
  - [11] 代敏,石菊芳,李霓. 中国城市癌症早诊早治项目设计及预期目标[J].中华预防医学杂志,2013,47(2):179-182.  
Dai M,Shi JF,Li N.Urban cancer early detection and treatment project design and expectation in China[J]. Chinese Journal of Preventive Medicine,2013,47(2):179-182.
  - [12] 穆慧娟,礼彦侠,于丽娅,等. 辽宁省五城市 2006-2015 年恶性肿瘤发病死亡情况及流行趋势分析 [J]. 中国肿瘤,2020,29(9):644-651.  
Mu HJ,Li YX,Yu LY,et al. Trend of incidence and mortality in five cities of Liaoning Province from 2006 to 2015[J]. China Cancer,2020,29(9):644-651.
  - [13] 温转,师金,梁迪,等. 2018-2019 年度河北省城市癌症早诊早治项目人群风险评估分析 [J]. 中国肿瘤,2019,28(10):757-763.  
Wen Z,Shi J,Liang D,et al. Cancer risk assessment among urban residents in Hebei Province based on cancer screening program from 2018 to 2019 [J]. China Cancer,2019,28(10):757-763.
  - [14] 徐红,王秦.2015-2016 年度南通市城市居民癌症风险评估和筛查结果分析 [J]. 现代预防医学,2017,44(20): 3724-3752.
  - Xu H,Wang Q. Assessment on cancer risk and analysis on screening results of urban residents in Nantong from 2015 to 2016 [J]. Modern Preventive Medicine,2017,44 (20):3724-3752.
  - [15] 张强,黄云超,沈丽达,等. 云南省 127960 名城市居民癌症风险评估及筛查结果分析 [J]. 中国肿瘤,2018,27 (9):641-646.  
Zhang Q,Huang YC,Shen LD,et al. Analysis of cancer risk assessment and screening results among urban residents in Kunming City [J]. China Cancer,2018,27 (9): 641-646.
  - [16] 肖海帆,颜仕鹏,许可葵,等. 湖南省 2012-2018 年城市癌症早诊早治项目临床筛查结果初步分析 [J]. 中国肿瘤,2019,28(11):807-815.  
Xiao HF,Yan SP,Xu KK,et al. Analysis of cancer screening program in Changsha urban area from 2012 to 2018[J]. China Cancer,2019,28(11):807-815.
  - [17] 俞霞,季明芳,程伟民,等. 中山市小榄镇肝癌高发发现场筛查评估及问题分析[J].肿瘤防治研究,2016,43(4): 287-290.  
Yu X,ji MF,Cheng WM,et al. Situation and problem on screening of liver cancer in high-incidence area of Xiaolan,Zhongshan City [J]. Cancer Research on Prevention and Treatment,2016,43(4):287-290.
  - [18] 查震球,贾尚春,陈叶纪,等. 2015-2018 年安徽省癌症早诊早治项目农村地区肝癌筛查分析[J].中国肿瘤,2019, 28(10):743-748.  
Zha ZQ,Jia SC,Chen YJ,et al. Results of liver cancer screening in rural areas of Anhui Province from 2015 to 2018[J]. China Cancer,2019,28(10):743-748.
  - [19] 于慧会,吕广艳,庞景国,等. 辽宁省建平地区 7338 例肝癌高危人群肝脏超声筛查结果分析[J]. 肿瘤学杂志, 2017,23(11):1004-1006.  
Yu HH,Lyu GY,Pang JG,et al. Screening of hepatocellular carcinoma with ultrasonography in high risk population in Jianping County,Liaoning Province [J]. Journal of Chinese Oncology,2017,23(11):1004-1006.
  - [20] 毛阿燕,石菊芳,邱五七,等. 2015-2017 年中国城市居民肿瘤早发现意识现状及相关因素分析[J]. 中华预防医学杂志,2020,54(1):54-61.  
Mao AY,Shi JF,Qiu WQ,et al. Analysis on the consciousness of the cancer early detection and its influencing factors among urban residents in China from 2015 to 2017[J]. Chinese Journal of Preventive Medicine,2020,54 (1):54-61.
  - [21] He M,Li BB,Du J,et al. Cancer screening among urban

- high risk population in Chongqing, 2012~2016 [J]. China Cancer, 2018, 27(3):198-201.
- 何美, 李必波, 杜佳, 等. 2012~2016 年重庆城市癌症高危人群筛查结果分析[J]. 中国肿瘤, 2018, 27(3):198-201.
- [22] Zeng XC, Zhang L, Liao WJ, et al. Screening and identification of potential biomarkers in hepatitis B virus-related hepatocellular carcinoma by bioinformatics analysis [J]. Front Genet, 2020, 11:55537.
- [23] Cui Y, Jia JD. Update on epidemiology of hepatitis B and C in China[J]. J Gastroenterol Hepatol, 2013, 28 (1):7-10.
- [24] Bisceglie AMD, Sterling RK, Chung RT, et al. Serum alpha-fetoprotein levels in patients with advanced hepatitis C: results from the HALT-C Trial[J]. J Hepatol, 2005, 43 (3):434-441.
- [25] Tzartzeva K, Singal AG. Testing for AFP in combination with ultrasound improves early liver cancer detection[J]. Expert Rev Gastroenterol Hepatol, 2018, 12(10):947-949.
- [26] Zhang BH, Yang BH, Tang ZY. Randomized controlled trial of screening for hepatocellular carcinoma[J]. J Cancer Res Clin Oncol, 2004, 130(7):417-422.
- [27] Trinchet JC, Chaffaut C, Bourcier V, et al. Ultrasonographic surveillance of hepatocellular carcinoma in cirrhosis: a randomized trial comparing 3- and 6-month periodicities [J]. Hepatology, 2011, 54(6):1987-1997.
- [28] Makuuchi M, Kokudo N, Arii S, et al. Development of evidence-based clinical guidelines for the diagnosis and treatment of hepatocellular carcinoma in Japan[J]. Hepatol Res, 2010, 38(1):37-51.
- [29] Xu RH, Wei W, Krawczyk M, et al. Circulating tumour DNA methylation markers for diagnosis and prognosis of hepatocellular carcinoma[J]. Nat Mater, 2017, 16(11):1155-1161.
- [30] Pratedrat P, Chuaypen N, Nimsamer P, et al. Diagnostic and prognostic roles of circulating miRNA-223-3p in hepatitis B virus-related hepatocellular carcinoma[J]. PLoS One, 2020, 15(4):e0232211.
- [31] Ji J, Chen H, Liu XP, et al. A miRNA combination as promising biomarker for hepatocellular carcinoma diagnosis: a study based on bioinformatics analysis[J]. J Cancer, 2018, 9(19):3435-3446.

## 更正启事

《中国肿瘤》2020 年第 29 卷第 12 期刊登的“2019 年浙江省海宁市上消化道肿瘤机会性筛查效果评价”, 该文作者对结果部分进行了修改补充。更正后的全文, 本刊已上传中国知网。由此引起的不便, 向广大读者表示歉意!