

# World Journal of *Gastrointestinal Surgery*

*World J Gastrointest Surg* 2024 November 27; 16(11): 3381-3642



**EDITORIAL**

- 3381 Advances in beyond total mesorectal excision surgery: Behind the scenes  
*Peltrini R*
- 3385 Minimally invasive multivisceral resection in rectal cancer: Preparation or Precipitation?  
*Ramírez Sánchez C, Lomeli Martínez SM*
- 3391 Pembrolizumab in patients with gastric cancer and liver metastases: A paradigm shift in immunotherapy  
*Christodoulidis G, Bartzi D, Koumarelas KE, Kouliou MN*
- 3395 Biliary microbiome and gallstones: A silent friendship  
*Banerjee T, Goswami AG, Basu S*
- 3400 Benefits and drawbacks of radiofrequency ablation *via* percutaneous or minimally invasive surgery for treating hepatocellular carcinoma  
*Hsieh CL, Peng CM, Chen CW, Liu CH, Teng CT, Liu YJ*
- 3408 Immunotherapy for metastatic gastric cancer  
*Li CF, Lian LL, Li QR, Jiao Y*

**MINIREVIEWS**

- 3413 Risk factors and prevention of pancreatic fistula after laparoscopic gastrectomy for gastric cancer  
*Liu SS, Xie HY, Chang HD, Wang L, Yan S*

**ORIGINAL ARTICLE****Retrospective Cohort Study**

- 3425 Proposal for a new classification of anorectal abscesses based on clinical characteristics and postoperative recurrence  
*Chen SZ, Sun KJ, Gu YF, Zhao HY, Wang D, Shi YF, Shi RJ*

**Retrospective Study**

- 3437 Risk factors for hemocoagulase-associated hypofibrinogenemia in patients with gastrointestinal bleeding  
*Zou F, Wu MT, Wang YY*
- 3445 Effect of surgical timing on postoperative outcomes in patients with acute cholecystitis after delayed percutaneous transhepatic gallbladder drainage  
*Gao W, Zheng J, Bai JG, Han Z*

- 3453** Clinical significance of appendicoliths in elderly patients over eighty years old undergoing emergency appendectomy: A single-center retrospective study  
*Min LQ, Lu J, He HY*
- 3463** Clinical study of different interventional treatments for primary hepatocellular carcinoma based on propensity-score matching  
*Cheng XB, Yang L, Lu MQ, Peng YB, Wang L, Zhu SM, Hu ZW, Wang ZL, Yang Q*
- 3471** How to preserve the native or reconstructed esophagus after perforations or postoperative leaks: A multidisciplinary 15-year experience  
*Nachira D, Calabrese G, Senatore A, Pontecorvi V, Kuzmych K, Belletatti C, Boskoski I, Meacci E, Biondi A, Raveglia F, Bove V, Congedo MT, Vita ML, Santoro G, Petracca Ciavarella L, Lococo F, Punzo G, Trivisonno A, Petrella F, Barbaro F, Spada C, D'Ugo D, Cioffi U, Margaritora S*
- 3484** Predicting prolonged postoperative ileus in gastric cancer patients based on bowel sounds using intelligent auscultation and machine learning  
*Shi S, Lu C, Shan L, Yan L, Liang Y, Feng T, Chen Z, Chen X, Wu X, Liu SD, Duan XL, Wang ZZ*
- 3499** Factors influencing agitation during anesthesia recovery after laparoscopic hernia repair under total inhalation combined with caudal block anesthesia  
*Zhu YF, Yi FY, Qin MH, Lu J, Liang H, Yang S, Wei YZ*
- 3511** Laparoscopic cholecystectomy plus common bile duct exploration for extrahepatic bile duct stones and postoperative recurrence-associated risk factors  
*Liao JH, Li JS, Wang TL, Liu WS*
- Observational Study**
- 3520** Analysis of therapeutic effect of cell reduction combined with intraperitoneal thermoperfusion chemotherapy in treatment of peritoneal pseudomyxoma  
*Li WW, Ru XM, Xuan HY, Fan Q, Zhang JJ, Lu J*
- 3531** Effect of comprehensive management combined with cognitive intervention on patient cooperation and complications during digestive endoscopy  
*Yuan JD, Zhang ZZ*
- Basic Study**
- 3538** New rabbit model for benign biliary stricture formation with repeatable administration  
*Sun QY, Cheng YM, Sun YH, Huang J*

**META-ANALYSIS**

- 3546** Preventive effect of probiotics on infections following colorectal cancer surgery: An umbrella meta-analysis  
*Han Y, Wang Y, Guan M*
- 3559** Meta-analysis of electrical stimulation promoting recovery of gastrointestinal function after gynecological abdominal surgery  
*Huang XX, Gu HF, Shen PH, Chu BL, Chen Y*

- 3568** Outcome and risk factors of ulcer healing after gastric endoscopic submucosal dissection: A systematic review and meta-analysis

*Chen DY, Chen HD, Lv XD, Huang Z, Jiang D, Li Y, Han B, Han LC, Xu XF, Li SQ, Lin GF, Huang ZX, Lin JN, Lv XP*

### CASE REPORT

- 3578** Therapeutic endoscopic retrograde cholangiopancreatography in a patient with asplenia-type heterotaxy syndrome: A case report

*Zhang YY, Ruan J, Fu Y*

- 3584** Blue rubber blister nevus syndrome: A case report

*Wang WJ, Chen PL, Shao HZ*

- 3590** Emergency pancreaticoduodenectomy for pancreatitis-associated necrotic perforation of the distal stomach and full-length duodenum: A case report

*Tong KN, Zhang WT, Liu K, Xu R, Guo W*

- 3598** Primary hepatic leiomyosarcoma masquerading as liver abscess: A case report

*Wu FN, Zhang M, Zhang K, Lv XL, Guo JQ, Tu CY, Zhou QY*

- 3606** Unexpected right-sided sigmoid colon in laparoscopy: A case report and review of literature

*Hu SF, Liu XY, Liu HB, Hao YY*

### LETTER TO THE EDITOR

- 3614** Endoscopic ultrasound-guided biliary drainage *vs* percutaneous transhepatic biliary drainage for malignant biliary obstruction after endoscopic retrograde cholangiopancreatography failure

*Zhao H, Zhang XW, Song P, Li X*

- 3618** Preoperative malnutrition in elderly gastric cancer patients and adverse postoperative outcomes of radical gastrectomy

*Liu SS, Wang L*

- 3623** Reconsideration of the clinical management of hepatic hemangioma

*Zhang ZH, Jiang C, Li JX*

- 3629** Cognitive clarity in colon surgery: The dexmedetomidine advantage

*Rao AG, Nashwan AJ*

- 3632** Preoperative gastric retention in endoscopic retrograde cholangiopancreatography

*Efthymiou A, Kennedy PT*

- 3636** Does shear wave elastography technology provide better value for the assessment of perianal fistulizing Crohn's disease?

*Wu J*

- 3639** Unlocking the diagnostic potential of vascular endothelial growth factor and interleukin-17: Advancing early detection strategies for hepatocellular carcinoma

*Subramanian S, Rajakumar HK*

**ABOUT COVER**

Editorial Board Member of *World Journal of Gastrointestinal Surgery*, Andrea Cavallaro, MD, PhD, Doctor, Research Assistant Professor, Researcher, Department of Surgery and Medical Surgical Specialties, University of Catania, Catania 95123, Italy. [andreacavallaro@tiscali.it](mailto:andreacavallaro@tiscali.it)

**AIMS AND SCOPE**

The primary aim of *World Journal of Gastrointestinal Surgery* (*WJGS*, *World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

*WJGS* mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, *etc.*

**INDEXING/ABSTRACTING**

The *WJGS* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Current Contents/Clinical Medicine, Journal Citation Reports/Science Edition, PubMed, PubMed Central, Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2024 Edition of Journal Citation Reports® cites the 2023 journal impact factor (JIF) for *WJGS* as 1.8; JIF without journal self cites: 1.7; 5-year JIF: 1.9; JIF Rank: 123/290 in surgery; JIF Quartile: Q2; and 5-year JIF Quartile: Q3.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Zi-Hang Xu, Production Department Director: Xiang Li, Cover Editor: Jia-Ru Fan.

**NAME OF JOURNAL**

*World Journal of Gastrointestinal Surgery*

**ISSN**

ISSN 1948-9366 (online)

**LAUNCH DATE**

November 30, 2009

**FREQUENCY**

Monthly

**EDITORS-IN-CHIEF**

Peter Schemmer

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/1948-9366/editorialboard.htm>

**PUBLICATION DATE**

November 27, 2024

**COPYRIGHT**

© 2024 Baishideng Publishing Group Inc

**INSTRUCTIONS TO AUTHORS**

<https://www.wjgnet.com/bpg/gerinfo/204>

**GUIDELINES FOR ETHICS DOCUMENTS**

<https://www.wjgnet.com/bpg/GerInfo/287>

**GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH**

<https://www.wjgnet.com/bpg/gerinfo/240>

**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/GerInfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>



## Unlocking the diagnostic potential of vascular endothelial growth factor and interleukin-17: Advancing early detection strategies for hepatocellular carcinoma

Shanmathi Subramanian, Hamrish Kumar Rajakumar

**Specialty type:** Gastroenterology and hepatology

**Provenance and peer review:**

Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's classification**

**Scientific Quality:** Grade C

**Novelty:** Grade B

**Creativity or Innovation:** Grade B

**Scientific Significance:** Grade B

**P-Reviewer:** Qin H

**Received:** September 7, 2024

**Revised:** September 24, 2024

**Accepted:** October 10, 2024

**Published online:** November 27, 2024

**Processing time:** 52 Days and 19.1 Hours



**Shanmathi Subramanian, Hamrish Kumar Rajakumar**, Department of General Surgery, Government Medical College, Omandurar Government Estate, Chennai 600002, Tamil Nādu, India

**Corresponding author:** Hamrish Kumar Rajakumar, MBBS, Academic Editor, Academic Research, Junior Editor, Researcher, Department of General Surgery, Government Medical College, Omandurar Government Estate, 169 Wallajah Road, Police Quarters, Triplicane, Chennai 600002, Tamil Nādu, India. [hamrishkumar2003@gmail.com](mailto:hamrishkumar2003@gmail.com)

### Abstract

Tian *et al* investigated the diagnostic value of serum vascular endothelial growth factor (VEGF) and interleukin-17 (IL-17) in primary hepatocellular carcinoma (PHC). Their retrospective study, published in the *World Journal of Gastrointestinal Surgery*, revealed that the serum levels of VEGF and IL-17 are significantly elevated in PHC patients compared with healthy controls. These biomarkers are closely associated with pathological features such as tumor metastasis and clinical tumor node metastasis stage. A receiver operating characteristic analysis further confirmed the diagnostic efficacy thereof, suggesting that VEGF and IL-17 could serve as valuable tools for early detection and treatment guidance. This study underscores the potential of integrating these biomarkers into clinical practice to increase diagnostic accuracy and improve patient management in PHC.

**Key Words:** Hepatocellular carcinoma; Biomarkers; Early detection; Diagnostic accuracy; Treatment strategies; Therapeutic targets

©The Author(s) 2024. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core Tip:** Serum vascular endothelial growth factor (VEGF) and interleukin-17 (IL-17) levels show significant promise as diagnostic biomarkers for primary hepatocellular carcinoma (PHC), suggesting potential improvements in early detection and treatment strategies. Elevated levels of these biomarkers correlate with key pathological features and clinical stages of PHC, highlighting their diagnostic value. However, challenges such as cost and availability may limit their widespread use. Integrating VEGF and IL-17 into clinical practice could refine diagnostic accuracy and inform personalized treatment plans, potentially enhancing patient outcomes through more targeted and effective interventions.

**Citation:** Subramanian S, Rajakumar HK. Unlocking the diagnostic potential of vascular endothelial growth factor and interleukin-17: Advancing early detection strategies for hepatocellular carcinoma. *World J Gastrointest Surg* 2024; 16(11): 3639-3642

**URL:** <https://www.wjgnet.com/1948-9366/full/v16/i11/3639.htm>

**DOI:** <https://dx.doi.org/10.4240/wjgs.v16.i11.3639>

## TO THE EDITOR

We are pleased to have read the insightful and high-quality study by Tian *et al*[1], published in the *World Journal of Gastrointestinal Surgery*. The focus of this retrospective study was on the diagnostic value of serum vascular endothelial growth factor (VEGF) and interleukin-17 (IL-17) in patients with primary hepatocellular carcinoma (PHC). The authors concluded that serum VEGF and IL-17 Levels were significantly elevated in PHC patients compared with healthy individuals, with a significant correlation between these markers and pathological features such as tumor metastasis and clinical tumor node metastasis stage. Receiver operating characteristic analysis further confirmed the diagnostic efficacy of both serum VEGF and IL-17 for PHC. The authors highlight the potential of these biomarkers to serve as valuable reference indicators for the early diagnosis and treatment guidance of PHC.

PHC represents a significant global health burden, ranking as the fifth most common cancer worldwide and the second leading cause of cancer-related death in men[2]. This high incidence highlights the need for improved diagnostic and therapeutic strategies. The global landscape of hepatocellular carcinoma (HCC) is further complicated by regional variations, such as those observed in India, where the prevalence and etiological factors are shifting. In India, the rise in cases linked to alcohol and metabolic dysfunction-associated steatotic liver disease highlights the evolving nature of the disease, necessitating updated reviews and targeted interventions. Despite its lower overall incidence and mortality rates than global figures, India faces increasing annual rates of change in HCC incidence and mortality[3].

Current diagnostic and treatment protocols for HCC involve a combination of biochemical markers, imaging techniques, and histological evaluations. Serum alpha-fetoprotein (AFP) remains a commonly used biomarker, although it has limitations in sensitivity and specificity for early-stage PHC. Imaging modalities such as ultrasound, computed tomography, and magnetic resonance imaging play crucial roles in the detection and staging of HCC. Treatment options include surgical resection, liver transplantation, tumor ablation, transarterial therapies, and systemic chemotherapies such as sorafenib and lenvatinib[4].

## COMPARATIVE ANALYSIS WITH EXISTING BIOMARKERS

Various biomarkers have been extensively studied to increase diagnostic accuracy and predict therapeutic outcomes in PHC. AFP is the most widely used biomarker for diagnosing PHC, but it has limitations, including false positives and false negatives. Its diagnostic performance varies, with the reported sensitivity ranging between 22% and 61% and the reported specificity ranging from 81% to 100%, depending on the cutoff value used[5]. In contrast, the Lens culinaris-agglutinin-reactive fraction of AFP (AFP-L3) has shown higher specificity, but lower sensitivity than AFP[6]. Another marker, the protein induced by vitamin K absence or antagonist-II (PIVKA-II), shows promise, with an area under the curve (AUC) of 0.696 and a sensitivity of 70.89%, but it does not outperform AFP[6]. Combining AFP and PIVKA-II has improved diagnostic accuracy, although this combination still faces limitations in sensitivity and specificity.

Additionally, other biomarkers, such as alpha-L-fucosidase (AFU) and 5'-nucleotidase (5'-NT), have been investigated for the diagnosis of PHC. AFU demonstrated a sensitivity of 0.78 and specificity of 0.64, whereas 5'-NT exhibited a sensitivity of 0.75 and specificity of 0.72[7]. Biomarkers such as fucosylated glycoproteins, particularly hemopexin and fetuin-A, have shown potential for improved diagnostic accuracy. For example, fucosylated hemopexin exhibited an AUC of 0.9515, with a sensitivity and specificity of 92%, suggesting superior diagnostic performance compared with AFP, AFU, and 5'-NT. The detection of fucosylated glycoproteins, such as fetuin-A, further supports their potential as reliable noninvasive markers for early-stage PHC[8].

## POTENTIAL FOR VEGF AND IL-17 AS THERAPEUTIC TARGETS

The VEGF pathway is crucial for tumor angiogenesis. A meta-analysis demonstrated the effectiveness of anti-VEGF agents in improving progression-free survival in elderly patients with PHC, although the impact on overall survival was

less pronounced when first-line treatments were used. Significant benefits are observed with anti-VEGF agents as second-line therapy following sorafenib[9]. IL-17 has emerged as a promising target in PHC, promoting metastasis and epithelial-mesenchymal transition through the AKT signaling pathway. Inhibiting IL-17 with agents such as secukinumab combined with sorafenib has potential to enhance treatment efficacy[10]. Further trials are necessary to explore the therapeutic effects of anti-VEGF drugs and IL-17 inhibitors in PHC.

---

## INTEGRATING VEGF AND IL-17 INTO CLINICAL PRACTICE

---

Integrating serum VEGF and IL-17 levels into clinical practice can increase diagnostic accuracy and inform treatment strategies for PHC, but several considerations must be addressed. The cost and limited availability of these biomarkers may restrict their widespread use, so their application should be reserved for scenarios where they provide the most benefit. These include doubtful cases where tissue biopsy is contraindicated or in early-stage cases with inconclusive findings where diffusion-weighted imaging and hepatocyte-specific magnetic resonance contrast agents are not available [11]. Their therapeutic potential further underscores their importance in personalized treatment planning. For example, patients with high VEGF levels might benefit from anti-VEGF therapies to improve progression-free survival, whereas elevated IL-17 levels could guide the use of IL-17 inhibitors in combination with standard treatments to increase therapeutic efficacy.

---

## PROPOSED IMPROVEMENTS IN THE STUDY

---

One of the key areas where this study could benefit from improvement is the application of multivariate logistic regression analysis. This statistical method allows for the assessment of the independent predictive value of serum VEGF and IL-17 levels for PHC while controlling for potential confounding variables such as age, sex, tumor size, and other clinicopathological characteristics.

The diagnostic utility of VEGF and IL-17 could be refined by conducting logistic regression analysis to determine the odds ratios at different threshold levels for each biomarker. This would help establish more precise cutoff points, enhancing the specificity and sensitivity of these markers in diagnosing PHC. It would also clarify how incremental changes in VEGF and IL-17 levels correspond to the risk of PHC, potentially leading to more accurate clinical decision-making.

To ensure that the appropriate correlation test was chosen, a normality test using the Shapiro-Wilk test was conducted. This would determine whether the distribution of serum VEGF and IL-17 levels in the study population follows a normal distribution, influencing the decision to use either the Pearson correlation test or the Spearman rank correlation.

A power analysis should be performed to verify that the sample size used in this study was sufficient to detect meaningful differences or associations. This would help validate the statistical significance of the findings and address any concerns related to potential underpowering owing to the relatively limited sample size. Ensuring adequate power would make the results not only statistically significant but also clinically relevant.

---

## FUTURE DIRECTIONS FOR RESEARCH

---

To further advance our understanding of the role of serum VEGF and IL-17 in PHC, a longitudinal study design would be beneficial, allowing us to track changes in serum VEGF and IL-17 levels over time. These findings provide valuable insights into how these biomarkers are correlated with disease progression, treatment response, and patient survival.

Increasing the sample size in future studies would increase the statistical power of the research and improve the generalizability of the results. This approach can also be used to analyze subgroups of patients, such as those at different stages of PHC. In addition, adopting a multicenter study design could reduce selection bias and increase the applicability of findings across diverse populations.

A stratified analysis based on treatment response, such as surgery, chemotherapy, or immunotherapy, is essential to determine whether VEGF and IL-17 levels predict treatment success or failure. This could lead to personalized treatment strategies that improve patient outcomes on the basis of biomarker profiles.

Finally, the development of a risk prediction model that integrates VEGF, IL-17, and other clinical factors and biomarkers could enhance clinical decision-making in PHC management. Such a model would aid in early detection, risk stratification, and prognosis, ultimately improving patient management and outcomes in PHC.

---

## IMPLICATIONS FOR GASTROINTESTINAL SURGERY

---

Integrating serum VEGF and IL-17 levels into early diagnostic protocols can significantly impact PHC management. Early detection facilitated by these biomarkers allows for the identification of tumors at a more localized stage, enabling less invasive targeted treatments rather than extensive surgeries. Elevated VEGF and IL-17 levels can help identify candidates for adjuvant therapies, such as anti-VEGF agents or IL-17 inhibitors, aimed at reducing the risk of postoperative



recurrence and improving survival rates. Additionally, incorporating these biomarkers into staging protocols can increase the accuracy of HCC staging, leading to the development of new surgical protocols or guidelines that include biomarker assessments in routine practice.

## CONCLUSION

This study highlights the diagnostic potential of serum VEGF and IL-17 in PHC through their significant elevation in patients. However, it would benefit from incorporating multivariate logistic regression analysis, refining cutoff points, and conducting power analyses to enhance statistical robustness. The literature lacks longitudinal studies and multicenter trials that address the role of these biomarkers in treatment response and prognosis. Future research should focus on these aspects, including stratified analyses and the development of integrated risk prediction models. This could lead to improved early identification of PHC through these biomarkers, resulting in more targeted and effective interventions, potentially reducing the incidence of HCC and improving patient outcomes.

## FOOTNOTES

**Author contributions:** Subramanian S and Rajakumar HK contributed to conceptualization; Rajakumar HK wrote the original draft; Subramanian S contributed to review and editing; All authors have read and approved the final version of the manuscript.

**Conflict-of-interest statement:** The authors declare that they have no conflict of interest.

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

**Country of origin:** India

**ORCID number:** Shanmathi Subramanian [0009-0006-0260-7801](https://orcid.org/0009-0006-0260-7801); Hamrish Kumar Rajakumar [0009-0008-9642-9915](https://orcid.org/0009-0008-9642-9915).

**S-Editor:** Fan M

**L-Editor:** Filipodia

**P-Editor:** Xu ZH

## REFERENCES

- 1 **Tian Q**, Zeng H, Lu QQ, Xie HY, Li Y. Diagnostic value of serum vascular endothelial growth factor and interleukin-17 in primary hepatocellular carcinoma. *World J Gastrointest Surg* 2024; **16**: 2934-2941 [PMID: [39351547](https://pubmed.ncbi.nlm.nih.gov/39351547/) DOI: [10.4240/wjgs.v16.i9.2934](https://doi.org/10.4240/wjgs.v16.i9.2934)]
- 2 **Ferlay J**, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray F. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer* 2015; **136**: E359-E386 [PMID: [25220842](https://pubmed.ncbi.nlm.nih.gov/25220842/) DOI: [10.1002/ijc.29210](https://doi.org/10.1002/ijc.29210)]
- 3 **Giri S**, Singh A. Epidemiology of Hepatocellular Carcinoma in India - An Updated Review for 2024. *J Clin Exp Hepatol* 2024; **14**: 101447 [PMID: [38957612](https://pubmed.ncbi.nlm.nih.gov/38957612/) DOI: [10.1016/j.jceh.2024.101447](https://doi.org/10.1016/j.jceh.2024.101447)]
- 4 **Asafo-Agyei KO**, Samant H. Hepatocellular Carcinoma. 2023 Jun 12. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan- [PMID: [32644603](https://pubmed.ncbi.nlm.nih.gov/32644603/)]
- 5 **Lok AS**, Sterling RK, Everhart JE, Wright EC, Hoefs JC, Di Bisceglie AM, Morgan TR, Kim HY, Lee WM, Bonkovsky HL, Dienstag JL; HALT-C Trial Group. Des-gamma-carboxy prothrombin and alpha-fetoprotein as biomarkers for the early detection of hepatocellular carcinoma. *Gastroenterology* 2010; **138**: 493-502 [PMID: [19852963](https://pubmed.ncbi.nlm.nih.gov/19852963/) DOI: [10.1053/j.gastro.2009.10.031](https://doi.org/10.1053/j.gastro.2009.10.031)]
- 6 **Park SJ**, Jang JY, Jeong SW, Cho YK, Lee SH, Kim SG, Cha SW, Kim YS, Cho YD, Kim HS, Kim BS, Park S, Bang HI. Usefulness of AFP, AFP-L3, and PIVKA-II, and their combinations in diagnosing hepatocellular carcinoma. *Medicine (Baltimore)* 2017; **96**: e5811 [PMID: [28296720](https://pubmed.ncbi.nlm.nih.gov/28296720/) DOI: [10.1097/MD.0000000000005811](https://doi.org/10.1097/MD.0000000000005811)]
- 7 **Junna Z**, Gongde C, Jinying X, Xiu Z. Serum AFU, 5'-NT and AFP as Biomarkers for Primary Hepatocellular Carcinoma Diagnosis. *Open Med (Wars)* 2017; **12**: 354-358 [PMID: [29043300](https://pubmed.ncbi.nlm.nih.gov/29043300/) DOI: [10.1515/med-2017-0051](https://doi.org/10.1515/med-2017-0051)]
- 8 **Comunale MA**, Wang M, Hafner J, Krakover J, Rodemich L, Kopenhagen B, Long RE, Junaidi O, Bisceglie AM, Block TM, Mehta AS. Identification and development of fucosylated glycoproteins as biomarkers of primary hepatocellular carcinoma. *J Proteome Res* 2009; **8**: 595-602 [PMID: [19099421](https://pubmed.ncbi.nlm.nih.gov/19099421/) DOI: [10.1021/pr800752c](https://doi.org/10.1021/pr800752c)]
- 9 **Li X**, Zhang D, Guan S, Ye W, Liu L, Lou L. Efficacy of anti-VEGF agents in the treatment of elderly hepatocellular carcinoma: a systematic review. *Oncotarget* 2017; **8**: 93179-93185 [PMID: [29190987](https://pubmed.ncbi.nlm.nih.gov/29190987/) DOI: [10.18632/oncotarget.21452](https://doi.org/10.18632/oncotarget.21452)]
- 10 **Xu QG**, Yu J, Guo XG, Hou GJ, Yuan SX, Yang Y, Yang Y, Liu H, Pan ZY, Yang F, Gu FM, Zhou WP. IL-17A promotes the invasion-metastasis cascade via the AKT pathway in hepatocellular carcinoma. *Mol Oncol* 2018; **12**: 936-952 [PMID: [29689643](https://pubmed.ncbi.nlm.nih.gov/29689643/) DOI: [10.1002/1878-0261.12306](https://doi.org/10.1002/1878-0261.12306)]
- 11 **Hennedige T**, Venkatesh SK. Imaging of hepatocellular carcinoma: diagnosis, staging and treatment monitoring. *Cancer Imaging* 2013; **12**: 530-547 [PMID: [23400006](https://pubmed.ncbi.nlm.nih.gov/23400006/) DOI: [10.1102/1470-7330.2012.0044](https://doi.org/10.1102/1470-7330.2012.0044)]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA  
**Telephone:** +1-925-3991568  
**E-mail:** [office@baishideng.com](mailto:office@baishideng.com)  
**Help Desk:** <https://www.f6publishing.com/helpdesk>  
<https://www.wjgnet.com>

