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The Prevalence of Liver Metastasis and Cancer Death to the HCC patient under treatment at the Bertoua Regional Hospital in Est Region Cameroon

Olivier Lieuga^a ,Tatiana Jiengoué^a and Augustine Nji Asakizi^a

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ABSTRACT

Introduction: Effective therapies for hepatocellular carcinoma (HCC) are selected based on tumor stage, liver function (Child-Pugh score), and overall patient health, with a multidisciplinary approach providing the best outcomes. Curative treatments are generally reserved for early-stage disease, while systemic therapies are used for advanced stages

Methods: It is descriptive study done on the prevalence of cancer death occurred to the HCC patients (187 men and 84 women) under treatment at the Intensive Care Unit of Bertoua Regional Hospital from June to September 2025 after receiving ethical clearance and Research Authorization from Est Public Health Delegation – Cameroon. Convenience sampling was done. The analysis included chemotherapy, immunotherapy, locoregional therapies, liver transplantation and surgical resection. Data were collected using structured questionnaires, observations and analyzed using descriptive statistics and analyses

Results: Despite Sorafenib 200mg given to the 28,04% of 271 HCC patients, 45,38% has developed liver metastasis and 25,46% are died. Any others therapies used to treat patient such as immunotherapy, surgical resection, liver transplantation, locoregional therapies and local ablations.

Keywords: Hepatocellular, Liver Cirrhosis ,Therapies ,Carcinoma

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1. INTRODUCTION

HCC differs from other cancers in that the majority of cases arise on the background of a diseased organ, with chronic necro-inflammation, often accompanied by fibrosis or cirrhosis, therefore likely to be dominant influences on tumour immunity, (Bermier, J. 2016). Treatment options for patients with hepatocellular carcinoma are outlined in national and international guidelines, with slight differences in the therapeutic approach between Asia, Europe, and North America, Kim HY, Lampertico P, Nam JY, et al (2022). The Barcelona Clinic of Liver Cancer (BCLC) algorithm is the most widely used staging system and subdivides patients with hepatocellular carcinoma into five clinical stages: very early stage (BCLC 0), early stage (BCLC A), intermediate stage (BCLC B), advanced stage (BCLC C), and terminal stage (BCLC D), Kim HS, Yu X, Kramar J et al (2022).

Treatment options are broadly categorized as curative (liver transplantation, resection, or ablation/segmental transarterial radioembolization [TARE]) and noncurative (transarterial chemoembolization [TACE], systemic therapies), Zheng J, Seier K, Gonen M, et al (2017). When feasible, transplantation is the most definitive treatment option, but organ shortage limits this curative therapy. Systemic therapies are being studied in BCLC A and B to see if this addition to traditional therapy can further improve OS, Johnson PJ, Ahamaraj S, Berhane S, Bonnett L and Ma YT (2021).

Surgery (liver resection or liver transplantation) represents the main curative treatment option for patients with hepatocellular carcinoma. Ideal candidates for liver surgery are those with single tumours and maintained liver function, Bruix J, Cheng AL, Meinhardt G, Nakajima K, De sanctis Y and L Lovet

(2017). Liver transplantation is generally recommended for patients with multifocal disease or decompensated cirrhosis. The surgical management of patients with hepatocellular carcinoma who have cirrhosis is complex, Scheiner B, Pomeij K, Kirstein MM, et al (2022). Patients should therefore be assessed by multidisciplinary teams in experienced centres and both resection and transplantation should be considered. When treating a patient with hepatocellular carcinoma with liver resection it is important to determine the patient's underlying liver function, the international liver cancer association (2022). Hepatocellular carcinoma in non-cirrhotic liver is less common but, in this population, liver resection should be the first treatment option if the tumour is technically resectable. The goal of liver resection in patients with hepatocellular carcinoma is to achieve a complete R0 outcome, with clear resection margins, Zheng J, Seier K, Gonen M, et al (2017)

HCC onset and progression result from the dysregulation of mechanisms regulating various cellular aspects, such as proliferation, apoptosis, motility, autophagy, angiogenesis and metabolism. The drugs used currently for HCC treatment interface with these processes at multiple levels, Shigeta et al (2020). With the increasing knowledge of the HCC tumor immune environment, immunotherapy either alone or in combination with targeted treatments has been developed. Immune response mechanisms during tumor progression have been investigated for decades, the efficacy and safety of immunotherapeutic methods are also being tested in the clinical treatment of malignancies, Deng H et al (2020).

2. RELATED WORKS

In the 1980s, the first studies in immunotherapy were initiated to use it in the treatment of HCC, is an immunotherapy that stimulates the immune system as an adjuvant treatment for cancer, with the recognition of cellular receptors that stimulate the body's defences against tumor cells, *Mei J et al. (2021)*. Immunotherapy is a hot spot in the field of cancer treatment represented by immune checkpoint inhibitors (ICIs), which aim to improve the immune system's ability to recognize target and eliminate cancer cells, *Johnson D.B et al (2015)*. The composition of the HCC immune microenvironment is the result of the interaction of immunosuppressive cells, immune effector cells, cytokine environment, and tumor cell intrinsic signalling pathway, *Owonikolo T.K et al (2021)* and immunotherapy with strong antitumor immunity has received more and more research attention due to the limited responsiveness of HCC to ICIs monotherapy, *Zhong L et al (2021)*.

The immune system has safeguards in place to prevent it from attacking healthy cells, the safeguards are called checkpoints, *Wang L et al (2012)*. Some cancers have learned how to activate these checkpoints to avoid being found and killed by the immune system. Various modes of immunotherapy – including monoclonal antibodies, immune checkpoint inhibitors, cancers vaccines, adoptive – T – cell therapies and oncolytic viruses have achieved considerable success in clinical trials and patient results, *Zheng X et al (2022)*. Immune Checkpoint Inhibitors (ICIs) is the most established method cancer cells often checkpoints “(proteins on immune cells that keep responses in check, like PD-1 and CTLA – 4), PD – 1/PD – L1 inhibitors like nivolumab, pembrolizumab, atezolizumab, durvalumab) block the interaction between the

programmed death – 1 protein on T – cells and its ligand on tumor cells, unleashing the T-cells to attack the cancer, *Kim N et al (2018)*.

CTLA – 4 inhibitors (eg; ipilimumab, tremelimumab) block another inhibitory pathway, further enhancing T – Cell activity, *Meerveld – Eggink A et al (2017)*. Combination therapy has proven more effective than monotherapy. A common first line treatment for advanced HCC combines atezolizumab (anti – PD – L1) with bevacizumab (an anti VEGF agent that starves the tumor of blood and also has immunomodulatory effects, *(Majidpoor J and Mortezaee, 2021)*. The primary approaches leverage the immune system's components to target the tumor within the liver's unique, often immune-suppressive, microenvironment, *Sperandio RC et al (2022)*.

Chemotherapy a type of cancer treatment that uses drugs to destroy cancer cells, *Zhen, J. et al. (2017)*, it works by stopping or slowing the growth of cancer cells, which grow and divide quickly, it harms healthy cells that divide quickly, *Scheiner B. et al. (2022)*. Depending on the type of cancer and how advanced it is, chemotherapy can cure or control cancer or ease symptoms caused by cancer, *Bruix J. et al. (2017)*. It cures cancer by destroying cancer cells to the point that the Doctor can no longer detect them in the body, *Ahamaraj S. et al. (2017)*. It is a type of treatment that uses drugs to attack cancer, *Zheng J. et al. (2017)*. including HCC. These drugs work by preventing the growth and division of the cancer cells, *Kim H.S. et al. (2000)*. Chemotherapy has been used as a treatment for HCC for many years, and it remains an important treatment option despite the addition in recent years of new types of treatment, *Decaens T. et al. (2022)*. The goal of chemotherapy is to destroy cancer cells, *Mercer C.A. et al. (2009)*. traditional

chemotherapies work by killing cells that divide rapidly, Klion Sky D.J. (2022). Damage to healthy blood cells lead to side effects such as fatigue, or infection, Boya, P. et al. (2013). Chemotherapy can also damage the cells that line mucous membranes, these drugs may be used alone or in combination with other chemotherapy drugs or other types of cancer treatments such as immunotherapy and targeted therapy, Komatsu, M.(2011).

Locoregional Therapies (LRTs) for HCC are image – guided, tumor directed procedures designed to destroy tumors, prevent progression and bridge patients to transplant, acting as the standard of care for early (ablation) and intermediate stages, Weis, S.M. & Cheresch, D.A. (2000). They play a crucial role in HCC management and are selectively adopted on technical aspects, Lui, Z.L. et al. (2023). patient clinical status and tumor characteristics, previous studies have consistently highlighted the efficacy of combining LRTs with molecular targeted agents in HCC treatment, Morse, M.A. et al. (2019). Recent studies propose that integrating LRTs with immune checkpoint inhibitors and molecular targeted agents could provide substantial therapeutic benefits, Kong, F.H. et al. (2021), a notion underpinned by both basic and clinical evidence, Melincivci, C.S. et al. (2018).

LRTs, pivotal in HCC management, encompass tumour targeted procedures under imaging guidance, generally categorised into the percutaneous approach and the intra-arterial approach, Chu J.S. et al. (2013). As a result, various percutaneous, mage – guided, locoregional therapies have emerged in order to improve outcomes, initially among inoperable patients, Sharma, A. et al. (2020). After decades of

thorough investigation and clinical experience in the field of interventional oncology, numerous minimal invasive treatment options have been developed and include curative modalities such as percutaneous radiofrequency ablation (RFA), Xu, Z.H et al.(2024), microwave Ablation (MWA), percutaneous ethanol injection (PEI), cryoablation (CA), irreversible electroporation (IRE) and palliative therapies such as bland trans – arterial embolization (TAE), conventional Transarterial Chemoembolization (Ctace) or chemoembolization with drug – electing beads and more recently local endovascular radiotherapy via the trans – arterial delivery of beta emitting microparticles, Torimuror, T. et al. (2016). Radiation therapy such as Stereotactic Body Radiotherapy (SERT), utilized for localized, unresectable tumors, particularly when they are not amenable to other ablative techniques, Wang, Z et al. (2018). CT – guided brachytherapy is used like emerging technique for large central tumors, Pan, Y.X. et al. (2021).

3. MATERIALS & METHODS

It is descriptive study done on the prevalence of cancer death occurred to the HCC patients (187 men and 84 women) under treatment at the Intensive Care Unit of Bertoua Regional Hospital from June to September 2025 after receiving ethical clearance and Research Authorization from Est Public Health Delegation – Cameroon. The analysis included chemotherapy, immunotherapy, locoregional therapies, liver transplantation and surgical resection. Data were collected using structured questionnaires, observations and analyzed using descriptive statistics and analyses. The analysis included chemotherapy, immunotherapy, locoregional therapies, liver transplantation and surgical resection. Data were collected using structured

questionnaires, observations and analyzed using descriptive statistics and analyses

Convenience sampling was done, all the cases of elective HCC admitted during the study period were included. Age > 20, men and women, Cameroonians or not but residents in Cameroon. The sample size was 271 patients calculated was calculated using the formula $n = (Z^2 \times p \times q) / e^2$ where n = minimum sample size, z= confidence interval, p= prevalence of decompensated cirrhosis, q= 1 - p and e= margin of error, 3%.

The data for this study were collected using structured questionnaires, entered and analysed in Microsoft Excel 2016, confidence interval was calculated along with frequency and percentages for binary data

4. RESULTS & DISCUSSION

This part analyzes results concerning treatment used to treat HCC patients as well as the liver metastasis at the Bertoua Regional Hospital.

[See Annex — Table 1: HCC Patients Characteristics]

[See Annex — Table 2 : Evaluation of Curative Therapies]

[See Annex — Table 3: Evaluation of Systemic Therapies]

[See Annex — Table 4: Evaluation of prevalence of Liver Metastasis and Cancer Death]

Despite Sorafenib 200mg given to the 28,04% of 271 HCC patients, 45,38% has developed liver metastasis and 25,46% are died. 8,48% in the Intensive Care Unit. Any others therapies used to treat patient such as immunotherapy, surgical resection, liver transplantation, locoregional therapies and local ablations. The majority of patients were Cameroonians with 61,99%. The Hospital indicated that there are shortages of sorafenib 200 mg in the Pharmacy.

Hepatocellular carcinoma (HCC) is highly aggressive, and the development of metastasis or recurrence is a primary cause of death in patients under treatment. Approximately 50-60% of patients are diagnosed at or progress to an advanced stage, with a median overall survival (mOS) of 6-8 months in such cases, Siegel RH et al., (2022). Liver metastasis in Hepatocellular Carcinoma (HCC) patients—specifically the spread to other areas of the liver or the development of new, Tarao K et al., (2019) distant intrahepatic lesions during treatment is highly common, as the liver is the primary site of both tumor recurrence and metastatic spread, Sung H et al., (2020) While the prevalence of extrahepatic metastasis (metastasis outside the liver) is around 10-15%, the rate of intrahepatic recurrence (new metastasis within the liver) after curative treatment is very high, with reports of up to 60-70% within five years, Kanwal F et al., (2020).

5. CONCLUSION

Hepatocellular carcinoma (HCC) treatment failure often stems from advanced stage at diagnosis, underlying liver dysfunction (cirrhosis), and high tumor recurrence rates after ablation or resection. Common causes include poor response to systemic therapy, drug resistance, and comorbidities preventing further treatment. The prognosis for advanced HCC remains poor, with low 5-year survival rates, necessitating multidisciplinary. Avoiding failure in hepatocellular carcinoma (HCC) treatment requires a multidisciplinary approach focused on early detection, precise staging, effective management of underlying liver disease, and utilizing tailored treatments, particularly in the context of preventing high recurrence rates.

REFERENCES

- Jonas M, Kelly DA, Mizerski J, et al. Clinical trial of lamivudine in children with chronic hepatitis B. *N Engl J Med* 2002;346:1706–13.
- Lai CL, Lin HJ, Lau HJ, et al. Effect of recombinant $\alpha 2$ IFN with or without prednisolone in Chinese HBsAg carrier children. *QJM* 1991;78:155–63.
- Bortolotti F, Jara P, Barbera C, et al. Long term effect of a interferon in children with chronic hepatitis B. *Gut* 2000; 46:715–8
- Lampertico P, Del Ninno E, Vigano M, et al. Long term suppression of HBeAg negative chronic hepatitis B by 24 months and 2019; interferon therapy. *Hepatology* 2003;37:756–63.
- Kasper D.L., Fauci A.S., Longo D.L, et al: Harrison's principles of internal medicine. 16th edition. 2005.
- Keeffe EB, Dieterich DT, Han SH, Jacobson IM, Martin P, Schiff ER, et al. A treatment algorithm for the management of chronic hepatitis B virus infection in the United States: 2008 update. *Clin Gastroenterol Hepatol*. Dec 2008;6(12):1315-41; quiz 1286.
- Chen CJ, Yang HI, Iloeje UH. Hepatitis B virus DNA levels and outcomes in chronic hepatitis B. *Hepatology*. May 2009;49(5 Suppl):S72-84
- Fattovich G, Stroffolini T, Zagni I, et al. Hepatocellular carcinoma in cirrhosis: incidence and risk factors. *Gastroenterology* 2004; 127(Suppl 1):S35–S50.
- McMahon BJ, Alberts SR, Wainwright RB, et al. Hepatitis B-related sequelae. Prospective study in 1400 hepatitis B surface antigen positive Alaska native carriers. *Arch Intern Med* 1990;150:1051– 1054.
- Mizokami M, Orito E. Molecular evolution of hepatitis viruses. *Intervirology* 1999;42:159–165
- Tanaka Y, Kurbanov F, Mano S, et al. Molecular tracing of the global hepatitis C virus epidemic predicts regional patterns of hepatocellular carcinoma mortality. *Gastroenterology* 2006;130: 703–714.
- El-Serag HB, Rudolph KL. Hepatocellular carcinoma: epidemiology and molecular carcinogenesis. *Gastroenterology* 2007;132: 2557–2576.
- Chang MH. Hepatitis B virus and cancer prevention. *Recent Results Cancer Res* 2011;188:75–84
- Fattovich G, Bortolotti F, Donato F. Natural history of chronic hepatitis B: special emphasis on disease progression and prognostic factors. *J Hepatol* 2008;48:335–352
- Yang JD, Kim WR, Coelho R, et al. Cirrhosis is present in most patients with hepatitis B and hepatocellular carcinoma. *Clin Gastroenterol Hepatol* 2011;9:64–70
- Yang HI, Lu SN, Liaw YF, et al. Hepatitis B e antigen and the risk of hepatocellular carcinoma. *N Engl J Med* 2002;347:168–174
- Chen CJ, Yang HI, Iloeje UH. Hepatitis B virus DNA levels and outcomes in chronic hepatitis B. *Hepatology* 2009;49(Suppl): S72–S84.
- Chun HM, Roediger MP, Hullsiek KH, et al. Hepatitis B Virus Coinfection Negatively Impacts HIV Outcomes in HIV Seroconverters. *The Journal of Infectious Diseases*. 2012;205(2):185-193. doi:10.1093/infdis/jir720
- McMahon BJ. The natural history of chronic hepatitis B virus infection. *Hepatology*. 2009;49(5 Suppl):S45-55 2.
- Schweitzer A, Horn J, Mikolajczyk RT, Krause G, Ott JJ Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2013. *Lancet* 2015; 386: 1546–55 3. Ott J, Stevens G, Groeger J, Wiersma S. Global epidemiology of Hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. *Vaccine* 2012;30(12): 2212–9 4.
- Lukhwireni A, Burnett RJ, Selabe SG, Mzileni MO, Mphahlele MJ. Increased detection of HBV DNA in HBsAg-positive and HBsAg-negative South African HIV/AIDS patients enrolling for Highly active antiretroviral therapy at a Tertiary Hospital. *J Med Virol* 2009;81(3):406–12 5.
- Boyles TH, Cohen K. The prevalence of hepatitis B infection in a rural South African HIV clinic. *S Afr Med J* 2011;101(7):470–1 6.
- Firnhaber C, Reyneke A, Schulze D, et al. The prevalence of hepatitis B co-infection in a South African urban government HIV clinic. *S Afr Med J* 2008;98(7):541-4 7.
- Burnett RJ, Ngobeni JM, Francois G, et al. Increased exposure to hepatitis B virus infection in HIV-positive South African antenatal women. *Int J STD AIDS* 2007;18(3):152–6 8.
- Andersson MI, Maponga TG, Ijaz S, et al. The epidemiology of hepatitis B virus infection in HIV-infected and HIV-uninfected pregnant women in the Western Cape, South Africa. *Vaccine* 2013;31(47):5579-84 9.
- Puoti M1, Torti C, Bruno R, Filice G, Carosi G. Natural history of chronic hepatitis B in co-infected patients. *J Hepatol* 2006; 44(1 Suppl):S65-70 10.
- Maynard JE. Hepatitis B: Global importance and need for control. *Vaccine* 1990;8(SUPPL.):S18-S20
- Mohd Hanafiah K, Groeger J, Flaxman AD, Wiersma ST. Global epidemiology of hepatitis virus infection: new estimates of age-specific antibody to HCV seroprevalence. *Hepatology* 2013;57(4):1333-42
- Lavanchy D. The global burden of hepatitis C. *Liver Int*. 2009;29 Suppl 1:74-Ellis LA, Brown D, Conradie JD, Paterson A, Sher R, Mollo J, et al. Prevalence of hepatitis C in South Africa: detection of anti-HCV in recent and stored serum. *J Med Virol* 1990;32(4):249- 51
- Davis GL. Hepatitis C virus genotypes and quasispecies. *Am J Med* 1999;107(6B):21S-6S
- Messina JP, Humphreys I, Flaxman A, et al. Global distribution and prevalence of hepatitis C virus genotypes. *Hepatology*. 2015;61(1):77–87
- Benova L, Mohamoud YA, Calvert C, AbuRaddad LJ. Vertical transmission of hepatitis C virus:

- systematic review and meta-analysis. *Clin Infect Dis*. 2014;59(6):765-73
- Floreani A. Hepatitis C and pregnancy. *World J Gastroenterol*. 2013;19(40):6714-20
- Jafari S, Copes R, Baharlou S, Etmnan M, Buxton J. Tattooing and the risk of transmission of hepatitis C: a systematic review and metaanalysis. *Int J Infect Dis*. 2010;14(11):E928- E9
- Nelson PK, Mathers BM, Cowie B, et al. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews. *Lancet*. 2011;378(9791):571-83
- Zein CO, Levy C, Basu A, Zein NN. Chronic hepatitis C and type II diabetes mellitus: a prospective cross-sectional study. *Am J Gastroenterol*. 2005;100(1):48-5
- EASL Recommendations on Treatment of Hepatitis C 2018. *J Hepatol* 2018; 69(2): 461- 511
- Smith JO, Sterling RK. Systematic review: non-invasive methods of fibrosis analysis in chronic hepatitis C. *Alimentary pharmacology & therapeutics*. 2009;30(6):557-76
- Karmochkine M, Carrat F, Dos Santos O, Cacoub P, Raguin G. A case-control study of risk factors for hepatitis C infection in patients with unexplained routes of infection. *J Viral Hepat*. 2006;13(11):775-82
- Nelson PK, Mathers BM, Cowie B, et al. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews. *Lancet*. 2011;378(9791):571-83
- Lau GK, Piratvisuth T, Luo KX, Marcellin P, Thongsawat S, et al. (2005) Peginterferon Alfa-2a, lamivudine, and the combination for HBeAg-positive chronic hepatitis B. *N Engl J Med* 352: 2682-2695. 2.
- Conjeevaram HS, Lok AS (2003) Management of chronic hepatitis B. *J Hepatol* 38 Suppl 1: S90-103.
- Karayiannis P (2003) Hepatitis B virus: old, new and future approaches to antiviral treatment. *J Antimicrob Chemother* 51: 761-785.
- Wellington K, Jarvis B (2001) Silymarin: a review of its clinical properties in the management of hepatic disorders. *BioDrugs* 15: 465-489.
- Strader DB, Bacon BR, Lindsay KL, La Brecque DR, Morgan T, et al. (2002) Use of complementary and alternative medicine in patients with liver disease. *Am J Gastroenterol* 97: 2391-2397.
- Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, et al. (1998) Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. *JAMA* 280: 1569-1575.
- Flora K, Hahn M, Rosen H, Benner K (1998) Milk thistle (*Silybum marianum*) for the therapy of liver disease. *Am J Gastroenterol* 93: 139-143.
- Varga Z, Czompa A, Kakuk G, Antus S (2001) Inhibition of the superoxide anion release and hydrogen peroxide formation in PMNLs by flavonolignans. *Phytother Res* 15: 608-612.
- Dehmlow C, Erhard J, de Groot H (1996) Inhibition of Kupffer cell functions as an explanation for the hepatoprotective properties of silibinin. *Hepatology* 23: 749-754
- Wilasrusmee C, Kittur S, Shah G, Siddiqui J, Bruch D, et al. (2002) Immunostimulatory effect of *Silybum Marianum* (milk thistle) extract. *Med Sci Monit* 8: BR439-443.
- Neumann UP, Biermer M, Eurich D, Neuhaus P, Berg T (2010) Successful prevention of hepatitis C virus (HCV) liver graft reinfection by silibinin monotherapy. *J Hepatol* 52: 951-952.
- Beinhardt S, Rasoul-Rockenschaub S, Maieron A, PH S-M, Hofer H PF (2012) Intravenous Silibinin-therapy in patients with chronic hepatitis C in the transplant setting. *J Hepatology* 56: S77.
- Pares A, Planas R, Torres M, Caballeria J, Viver JM, et al. (1998) Effects of silymarin in alcoholic patients with cirrhosis of the liver: results of a controlled, double-blind, randomized and multicenter trial. *J Hepatol* : 615-621.
- Sepanlou SG, Safiri S, Bisignano C, et al; GBD 2017 Cirrhosis Collaborators. The global, regional, and national burden of cirrhosis by cause in 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet Gastroenterol Hepatol*. 2020;5(3):245-266. doi:10.1016/S2468-1253(19)30349-8
- Tapper EB, Parikh ND. Mortality due to cirrhosis and liver cancer in the United States, 1999-2016. *BMJ*. 2018;362:k2817. doi:10.1136/bmj.k2817
- Centers for Disease Control and Prevention. CDC WONDER: about provisional mortality statistics, 2018 through last month. Accessed March 13, 2023. <https://wonder.cdc.gov/mcd-icd10-provisional.html>
- Serper M, Kaplan DE, Taddei TH, Tapper EB, Cohen JB, Mahmud N. Nonselective beta blockers, hepatic decompensation, and mortality in cirrhosis: a national cohort study. *Hepatology*. 2023;77(2): 489-500. doi:10.1002/hep.32737
- Flemming JA, Dewit Y, Mah JM, Saperia J, Groome PA, Booth CM. Incidence of cirrhosis in young birth cohorts in Canada from 1997 to 2016: a retrospective population-based study. *Lancet Gastroenterol Hepatol*. 2019;4(3):217-226. doi:10.1016/S2468-1253(18)30339-X
- Hirode G, Saab S, Wong RJ. Trends in the burden of chronic liver disease among hospitalized US adults. *JAMA Netw Open*. 2020;3(4):e201997-e201997. doi:10.1001/jamanetworkopen.2020.1997
- Foster C, Baki J, Nikirk S, Williams S, Parikh ND, Tapper EB. Comprehensive health-state utilities in contemporary patients with cirrhosis. *Hepatol Commun*. 2020;4 (6):852-858. doi:10.1002/hep4.1512
- Asrani SK, Hall L, Hagan M, et al. Trends in chronic liver disease-related hospitalizations: a population-based study. *Am J Gastroenterol*. 2019;114(1):98-106. doi:10.1038/s41395-018- 0365-4

- Tarao K, Nozaki A, Ikeda T, et al. Real impact of liver cirrhosis on the development of hepatocellular carcinoma in various liver diseases-meta-analytic assessment. *Cancer Med.* 2019;8(3):1054-1065. doi:10.1002/cam4.1998
- Carbonell N, Pauwels A, Serfaty L, Fourdan O, Lévy VG, Poupon R. Improved survival after variceal bleeding in patients with cirrhosis over the past two decades. *Hepatology.* 2004;40(3):652-659. doi: 10.1002/hep.20339
- Arvaniti V, et al. Infections in patients with cirrhosis increase mortality four fold and should be used in determining prognosis. *Gastroenterology* 2010;139:1246-1256.
- Berzigott A., et al. Obesity is an independent risk factor for clinical decompensation in patients with cirrhosis. *Hepatology* 2011;54:555-561.
- Dienstag J.L., et al. A prospective study of progression in compensated, histologically advanced chronic hepatitis C. *Hepatology* 2011;54:396-405.
- Durand F, et al. Assessment of the prognosis of cirrhosis: Child-Pugh versus MELD. *Journal of Hepatology* 2005;42.
- Franchis de, et al. Non-invasive diagnosis of cirrhosis and the natural history of its complications. *Best Practice & Research Clinical Gastroenterology* 2007;21(1):3-18.
- Friedman SL. Mechanisms of hepatic fibrogenesis. *Gastroenterology* 2008;134:1655-1669.
- Garcia-Tsao G, et al. Management and treatment of patients with cirrhosis and portal hypertension: recommendations from the Department of Veterans Affairs Hepatitis C Resource Center Program and the National Hepatitis C program. *The American Journal of Gastroenterology* 2009;104(7):1802-1829
- Greenbaum L.E. and Wells R.G. The role of stem cells in liver repair and fibrosis. *The International Journal of Biochemistry and Cell Biology* 2011;43:222-229.
- Jiao J, et al. Hepatic fibrosis. *Current Opinion in Gastroenterology* 2009;25(3):223-229.
- Kanwal F, et al. An explicit quality indicator set for measurement of quality of care in patients with cirrhosis. *Clinical Gastroenterology and Hepatology* 2010;8:709
- Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021; 71: 209-49.
- Siegel RL, Miller KD, Fuchs HE, Jemal A. Cancer statistics, 2022. *CA Cancer J Clin* 2022; 72: 7-33. 3 Petrick JL, Florio AA, Znaor A, et al. International trends in hepatocellular carcinoma incidence, 1978-2012. *Int J Cancer* 2020; 147: 317-30.
- Sun J, Althoff KN, Jing Y, et al. Trends in hepatocellular carcinoma incidence and risk among persons with HIV in the US and Canada, 1996-2015. *JAMA Netw Open* 2021; 4: e2037512. 5 Chen T, Liu J, Li Y, Wei S. Burden of disease associated with dietary exposure to aflatoxins in China in 2020. *Nutrients* 2022; 14: 1027.
- Romano A, Angeli P, Piovesan S, et al. Newly diagnosed hepatocellular carcinoma in patients with advanced hepatitis C treated with DAAs: a prospective population study. *J Hepatol* 2018; 69: 345-52.
- Dave S, Park S, Murad MH, et al. Comparative effectiveness of entecavir versus tenofovir for preventing hepatocellular carcinoma in patients with chronic hepatitis B: a systematic review and meta-analysis. *Hepatology* 2021; 73: 68-78.
- Papatheodoridis GV, Idilman R, Dalekos GN, et al. The risk of hepatocellular carcinoma decreases after the first 5 years of entecavir or tenofovir in Caucasians with chronic hepatitis B. *Hepatology* 2017; 66: 1444-53.
- Chiang CJ, Yang YW, You SL, Lai MS, Chen CJ. Thirty-year outcomes of the national hepatitis B immunization program in Taiwan. *JAMA* 2013; 310: 974-76.
- Kanwal F, Kramer JR, Asch SM, Cao Y, Li L, El-Serag HB. Long-term risk of hepatocellular carcinoma in HCV patients treated with direct acting antiviral agents. *Hepatology* 2020; 71: 44-55.
- Kim HY, Lampertico P, Nam JY, et al. An artificial intelligence model to predict hepatocellular carcinoma risk in Korean and Caucasian patients with chronic hepatitis B. *J Hepatol* 2022; 76: 311-18.
- Kim HS, Yu X, Kramer J, et al. Comparative performance of risk prediction models for hepatitis B-related hepatocellular carcinoma in the United States. *J Hepatol* 2022; 76: 294-301.
- Zheng J, Seier K, Gonen M, et al. Utility of serum inflammatory markers for predicting microvascular invasion and survival for patients with hepatocellular carcinoma. *Ann Surg Oncol* 2017; 24: 3706-14.
- Johnson PJ, Dhanaraj S, Berhane S, Bonnett L, Ma YT. The prognostic and diagnostic significance of the neutrophil-to-lymphocyte ratio in hepatocellular carcinoma: a prospective controlled study. *Br J Cancer* 2021; 125: 714-16.
- Bruix J, Cheng AL, Meinhardt G, Nakajima K, De Sanctis Y, Llovet J. Prognostic factors and predictors of sorafenib benefit in patients with hepatocellular carcinoma: analysis of two phase III studies. *J Hepatol* 2017; 67: 999-1008.
- Scheiner B, Pomej K, Kirstein MM, et al. Prognosis of patients with hepatocellular carcinoma treated with immunotherapy—development and validation of the CRAFTY score. *J Hepatol* 2022; 76: 353-63. 87 Vogel A, Martinelli E, ESMO Guidelines Committee. Updated treatment recommendations for hepatocellular carcinoma (HCC) from the ESMO Clinical Practice guidelines. *Ann Oncol* 2021; 32: 801-05.
- Bruix J, Chan SL, Galle PR, Rimassa L, Sangro B. Systemic treatment of hepatocellular carcinoma: an EASL position paper. *J Hepatol* 2021; 75: 960-74.
- The International Liver Cancer Association. ILCA systemic therapy guidance. <https://ilca-online.org/wp->

- content/uploads/2020/06/Systemic-therapy-guidelines-V1.2.pdf (accessed July 26, 2022).
- Kudo M, Kawamura Y, Hasegawa K, et al. Management of hepatocellular carcinoma in Japan: JSH consensus statements and recommendations 2021 update. *Liver Cancer* 2021; 10: 181–223.
- Chen LT, Martinelli E, Cheng AL, et al. Pan-Asian adapted ESMO clinical practice guidelines for the management of patients with intermediate and advanced/relapsed hepatocellular carcinoma: a TOS-ESMO initiative endorsed by CSCO, ISMPO, JSMO, KSMO, MOS and SSO. *Ann Oncol* 2020; 31: 334–51.
- Reig M, Forner A, Rimola J, et al. BCLC strategy for prognosis prediction and treatment recommendation: the 2022 update. *J Hepatol* 2021; 76: 681–93.
- Lang H, Sotiropoulos GC, Dömland M, et al. Liver resection for hepatocellular carcinoma in non-cirrhotic liver without underlying viral hepatitis. *Br J Surg* 2005; 92: 198–202.
- Viganò L, Conci S, Cescon M, et al. Liver resection for hepatocellular carcinoma in patients with metabolic syndrome: a multicenter matched analysis with HCV-related HCC. *J Hepatol* 2015; 63: 93–101.
- Kabir T, Tan ZZ, Syn NL, et al. Laparoscopic versus open resection of hepatocellular carcinoma in patients with cirrhosis: meta analysis. *Br J Surg* 2021; 109: 21–29. 96 Ivanics T, Claasen MP, Patel MS, et al. Long-term outcomes of laparoscopic liver resection for hepatocellular carcinoma: a propensity score matched analysis of a high-volume North American center. *Surgery* 2021; 171: 982–91.
- Berzigotti A, Reig M, Abraldes JG, Bosch J, Bruix J. Portal hypertension and the outcome of surgery for hepatocellular carcinoma in compensated cirrhosis: a systematic review and meta - analysis. *Hepatology* 2015; 61: 526–36.
- Berardi G, Morise Z, Sposito C, et al. Development of a nomogram to predict outcome after liver resection for hepatocellular carcinoma in Child-Pugh B cirrhosis. *J Hepatol* 2020; 72: 75–84.
- Azoulay D, Ramos E, Casellas-Robert M, et al. Liver resection for hepatocellular carcinoma in patients with clinically significant portal hypertension. *JHEP Rep* 2020; 3: 100190.
- Citterio D, Facciorusso A, Sposito C, Rota R, Bhoori S, Mazzaferro V. Hierarchic interaction of factors associated with liver decompensation after resection for hepatocellular carcinoma. *JAMA Surg* 2016; 151: 846–53.
- Serenari M, Han KH, Ravaioli F, et al. A nomogram based on liver stiffness predicts postoperative complications in patients with hepatocellular carcinoma. *J Hepatol* 2020; 73: 855–62.
- Allaire M, Goumard C, Lim C, Le Cleach A, Wagner M, Scatton O. New frontiers in liver resection for hepatocellular carcinoma. *JHEP Rep* 2020; 2: 100134.
- Marasco G, Alemanni LV, Colecchia A, et al. Prognostic value of the albumin-bilirubin grade for the prediction of post-hepatectomy liver failure: a systematic review and meta-analysis. *J Clin Med* 2021; 10: 2011.
- Wang, Z. et al. Adjuvant transarterial chemoembolization for HBV-related hepatocellular carcinoma after resection: a randomized controlled study. *Clin. Cancer Res.* 24, 2074–2081 (2018).
- Wahl DR, Stenmark MH, Tao Y, et al. Outcomes after stereotactic body radiotherapy or radiofrequency ablation for hepatocellular carcinoma. *J Clin Oncol.* 2016;34(5):452-459. doi:10.1200/JCO.2015.61.4925
- Wong H, Tang YF, Yao TJ, Chiu J, Leung R, Chan P, Cheung TT, Chan AC, Pang RW, Poon R, et al. The outcomes and safety of single-agent sorafenib in the treatment of elderly patients with advanced hepatocellular carcinoma (HCC) *Oncologist.* 2011;16:1721–1728. doi: 10.1634/theoncologist.2011-0192. [DOI] [PMC free article] [PubMed] [Google Scholar]
- Wang Z, Ren Z, Chen Y, et al. Adjuvant transarterial chemoembolization for HBV-related hepatocellular carcinoma after resection: a randomized controlled study. *Clin Cancer Res.* 2018;24(9):2074-2081. doi:10.1158/1078-0432.CCR-17-2899
- Weis, S. M. & Chersesh, D. A. Tumor angiogenesis: molecular pathways and therapeutic targets. *Nat. Med.* 17, 1359–1370 (2011).
- WangL, Jia D, Duan F, Sun Z, Liu X, Zhou L, et al. Combined anti-tumor effects of ifn-a and sorafenib on hepatocellular carcinoma in vitro and in vivo. *Biochem Biophys Res Commun* (2012) 422(4):687–92. doi: 10.1016/j.bbrc.2012.05.056
- Yorimitsu T, Klionsky DJ. Autophagy: molecular machinery for self-eating. *Cell Death Differ.* 2005;12:1542–1552. doi: 10.1038/sj.cdd.4401765. [DOI] [PMC free article] [PubMed] [Google Scholar]
- Yang JD, Mohamed EA, Aziz AOA, Shousha HI, Hashem MB, Nabeel MM, et al. Characteristics, management, and outcomes of patients with hepatocellular carcinoma in Africa: a multicountry observational study from the Africa Liver Cancer Consortium. *Lancet Gastroenterol Hepatol.* (2017) 2:103–11. doi: 10.1016/S2468-1253(16)30161-3
- Yoshida, H. et al. Effect of vitamin K2 on the recurrence of hepatocellular carcinoma. *Hepatology* 54, 532–540 (2011).
- Zhang, N. & Li, Y. Receptor tyrosine kinases: biological functions and anticancer targeted therapy. *MedComm.* 4, e446 (2023).
- Zhao Y Li Z. Interplay of estrogen receptors and FOXA factors in the liver cancer. *Mol Cell Endocrinol.* 2015;418:334-339
- Zhang B-H, Yang B-H, Tang Z-Y. Randomized controlled trial of screening for hepatocellular carcinoma. *J Cancer Res Clin Oncol* 2004;130:417-422.
- Zheng K, Zhu X, Fu S, et al. Sorafenib plus hepatic arterial infusion chemotherapy versus sorafenib for

- hepatocellular carcinoma with major portal vein tumor thrombosis: a randomized trial. *Radiology*. 2022;303(2):455-464. doi:10.1148/radiol.211545
- Zhu W, Peng Y, Wang L, Hong Y, Jiang X, Li Q, et al. Identification of a Fetoprotein-Specific T-cell receptors for hepatocellular carcinoma immunotherapy. *Hepatology* (2018) 68(2):574–89. doi: 10.1002/hep.29844
- Zander R, Schauder D, Xin G, Nguyen C, Wu X, Zajac A, et al. Cd4(+) T cell help is required for the formation of a cytolytic Cd8(+) T cell subset that protects against chronic infection and cancer. *Immunity* (2019) 51(6):1028–42.e4. doi: 10.1016/j.immuni.2019.10.009
- Zhang B, Shi X, Cui K, et al. Real-world practice of conversion surgery for unresectable hepatocellular carcinoma—a single center data of 26 consecutive patients. *BMC Cancer*. 2023;23(1):465. doi:10.1186/s12885-023-10955-7
- Zheng K, Zhu X, Fu S, et al. Sorafenib plus hepatic arterial infusion chemotherapy versus sorafenib for hepatocellular carcinoma with major portal vein tumor thrombosis: a randomized trial. *Radiology*. 2022;303(2):455-464. doi:10.1148/radiol.211545
- Zheng X, Wu Y, Bi J, Huang Y, Cheng Y, Li Y, et al. The use of supercytokines, immunocytokines, engager cytokines, and other synthetic cytokines in

- immunotherapy. *Cell Mol Immunol* (2022) 19(2):192–209. doi: 10.1038/s41423-021 00786-6
- Zou F, Tan J, Liu T, Liu B, Tang Y, Zhang H, et al. The Cd39(+) hbv surface protein-targeted car-T and personalized tumor-reactive Cd8(+) T cells exhibit potent anti-hcc activity. *Mol Ther* (2021) 29(5):1794–807. doi: 10.1016/j.ymthe.2021.01.021

CONFLICTS OF INTEREST

The authors declare no conflict of interest in relation to this work.

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ANNEXES

Annex I — Table 1: HCC Patients Characteristics

Prevalence Rate of HCC Patient Characteristics	Cameroonians		Chadians		Nigerians		Centrafric Republic		Others Nationalities	
	n	%	n	%	n	%	n	%	n	%
HCC Patients Tested Positive per Nationalities	168	61,99	22	8,11	32	11,80	26	9,59	23	8,48
Gender										
Male	115	61,49	15	8,02	23	9,62	18	9,62	16	8,55
Female	53	63,09	7	8,33	9	8,52	8	8,52	7	8,33
Age (Years Old)										
20 – 35	98	58,33	7	31,81	15	46,87	9	34,61	12	52,17
35 - 55	56	33,33	11	50	13	40,62	12	46,15	6	26,08
55 – Over	14	8,33	4	18,18	4	12,5	5	19,23	5	21,73
Marital Status										
Single	78	46,42	6	27,27	14	43,75	11	42,30	16	69,56
Married	27	16,07	9	40,90	9	28,12	6	23,07	3	13,04
Divorced	63	37,5	7	31,81	9	28,12	9	34,61	4	17,39
Education Levels										
Primary	69	41,07	13	59,09	15	46,87	9	34,61	7	30,43
College	48	28,57	6	27,27	9	28,12	12	46,15	12	52,17
University	51	30,35	3	13,63	8	25	5	19,23	4	17,39
Employment										
Unemployed	72	42,85	6	27,27	8	25	10	38,46	7	30,43

Student	15	8,92	5	22,72	7	21,87	6	23,07	5	21,73
Employed	13	7,73	2	9,09	4	12,5	5	19,23	3	13,04
Self – Employed	47	27,97	3	13,63	3	9,37	3	11,53	7	30,43
Retired	21	12,5	4	18,18	10	31,25	2	7,69	1	4,34

Annex II — Table 2 : Evaluation of Curative Therapies

Curative Therapies	Surgical Resection		Liver Transplantation		Chemoembolization		Radioembolization		Local Ablation	
	n	%	n	%	n	%	n	%	n	%
Patient	0	0	0	0	0	0	0	0	0	0

Annex III — Table 3: Evaluation of Systemic Therapies

Result of Systemic Therapies	Sorafenib		Regorafenib		Nivolumab		Traditional Drugs		Ipilimumab	
	n	%	n	%	n	%	n	%	n	%
Patient	76	28,04	0	0	0	0	0	0	0	0

Annex IV — Table 4: Evaluation of prevalence of Liver Metastasis and Cancer Death

Result of Liver Metastasis and Cancer Death	Liver Metastasis		Cancers Death		Intensive Care Unit	
	n	%	n	%	n	%
Patient	123	45,38	69	25,46	23	8,48