Liver Cancer Study Literatures

Ma Hongbao [1], Margaret Ma [2], Yang Yan [1]

[1] Brookdale Hospital, Brooklyn, New York 11212, USA; [2] Cambridge, MA 02138, USA
ma8080@gmail.com

Abstract: Cancer is the general name for a group of more than 100 diseases. Although there are many kinds of cancer, all cancers start because abnormal cells grow out of control. Untreated cancers can cause serious illness and death. The body is made up of trillions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries. Liver cancer is a cancer that originates in the liver. Liver tumors are discovered on medical imaging equipment or present themselves symptomatically as an abdominal mass, abdominal pain, yellow skin, nausea or liver dysfunction. The leading causes of liver cancer is cirrhosis due to hepatitis B, hepatitis C, and alcohol. Liver cancers are different than liver metastases, which originate from elsewhere in the body and spread to the liver. Liver cancers are formed from either the liver itself or from structures within the liver, including blood vessels or the bile duct. Primary liver cancer is the sixth most frequent cancer globally and the second leading cause of cancer death. In 2012 it occurred in 782,000 people and resulted in 746,000 deaths. This artcile introduces recent reports as references in the related studies.
[Ma H, Young M, Yang Y. **Liver Cancer Study Literatures.** *Cancer Biology* 2015;5(1):93-107]. (ISSN: 2150-1041). http://www.cancerbio.net. 7

Key words: Liver; cancer; life; cell; medicine

1. Introduction

Cancer is the general name for a group of more than 100 diseases. Although there are many kinds of cancer, all cancers start because abnormal cells grow out of control. Untreated cancers can cause serious illness and death. The body is made up of trillions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries. Liver cancer is a cancer that originates in the liver. Liver tumors are discovered on medical imaging equipment or present themselves symptomatically as an abdominal mass, abdominal pain, yellow skin, nausea or liver dysfunction. The leading causes of liver cancer is cirrhosis due to hepatitis B, hepatitis C, and alcohol. Liver cancers are different than liver metastases, which originate from elsewhere in the body and spread to the liver. Liver cancers are formed from either the liver itself or from structures within the liver, including blood vessels or the bile duct. Primary liver cancer is the sixth most frequent cancer globally and the second leading cause of cancer death. In 2012 it occurred in 782,000 people and resulted in 746,000 deaths.

The following introduces recent reports as references in the related studies.

Agopian, V. G., M. Harlander-Locke, et al. "A novel prognostic nomogram accurately predicts hepatocellular carcinoma recurrence after liver transplantation: analysis of 865 consecutive liver transplant recipients." J Am Coll Surg. 2015 Apr;220(4):416-27. doi: 10.1016/j.jamcollsurg.2014.12.025. Epub 2014 Dec 27.

BACKGROUND: Although radiologic size criteria (Milan/University of California, San Francisco [UCSF]) have led to improved outcomes after liver transplantation (LT) for hepatocellular carcinoma (HCC), recurrence remains a significant challenge. We analyzed our 30-year experience with LT for HCC to identify predictors of recurrence. STUDY DESIGN: A novel clinicopathologic risk score and prognostic nomogram predicting post-transplant HCC recurrence was developed from a multivariate competing-risk Cox regression analysis of 865 LT recipients with HCC between 1984 and 2013. RESULTS: Overall patient and recurrence-free survivals were 83%, 68%, 60% and 79%, 63%, and 56% at 1-, 3-, and 5-years, respectively. Hepatocellular carcinoma recurred in 117 recipients, with a median time to recurrence of 15 months, involving the lungs (59%), abdomen/pelvis (38%), liver (35%), bone (28%), pleura/mediastinum (12%), and brain (5%). Multivariate predictors of recurrence included tumor grade/differentiation (G4/poor diff hazard ratio [HR] 8.86; G2-3/mod-poor diff HR 2.56), macrovascular (HR 7.82) and microvascular (HR 2.42) invasion, nondownstaged tumors outside Milan criteria (HR 3.02), nonincidental tumors with radiographic maximum diameter $\geq$5 cm (HR 2.71) and <5 cm (HR 1.55), and pretransplant

neutrophil-to-lymphocyte ratio (HR 1.77 per log unit), maximum alpha fetoprotein (HR 1.21 per log unit), and total cholesterol (HR 1.14 per SD). A pretransplantation model incorporating only known radiographic and laboratory parameters had improved accuracy in predicting HCC recurrence (C statistic 0.79) compared with both Milan (C statistic 0.64) and UCSF (C statistic 0.64) criteria alone. A novel clinicopathologic prognostic nomogram included explant pathology and had an excellent ability to predict post-transplant recurrence (C statistic 0.85). CONCLUSIONS: In the largest single-institution experience with LT for HCC, excellent long-term survival was achieved. Incorporation of routine pretransplantation biomarkers to existing radiographic size criteria significantly improves the ability to predict post-transplant recurrence, and should be considered in recipient selection. A novel clinicopathologic prognostic nomogram accurately predicts HCC recurrence after LT and may guide frequency of post-transplantation surveillance and adjuvant therapy.

Bamia, C., P. Lagiou, et al. "Coffee, tea and decaffeinated coffee in relation to hepatocellular carcinoma in a European population: multicentre, prospective cohort study." Int J Cancer. 2015 Apr 15;136(8):1899-908. doi: 10.1002/ijc.29214. Epub 2014 Sep 24.

Inverse associations of coffee and/or tea in relation to hepatocellular carcinoma (HCC) risk have been consistently identified in studies conducted mostly in Asia where consumption patterns of such beverages differ from Europe. In the European Prospective Investigation into Cancer and nutrition (EPIC), we identified 201 HCC cases among 486,799 men/women, after a median follow-up of 11 years. We calculated adjusted hazard ratios (HRs) for HCC incidence in relation to quintiles/categories of coffee/tea intakes. We found that increased coffee and tea intakes were consistently associated with lower HCC risk. The inverse associations were substantial, monotonic and statistically significant. Coffee consumers in the highest compared to the lowest quintile had lower HCC risk by 72% [HR: 0.28; 95% confidence intervals (CIs): 0.16-0.50, p-trend < 0.001]. The corresponding association of tea with HCC risk was 0.41 (95% CI: 0.22-0.78, p-trend = 0.003). There was no compelling evidence of heterogeneity of these associations across strata of important HCC risk factors, including hepatitis B or hepatitis C status (available in a nested case-control study). The inverse, monotonic associations of coffee intake with HCC were apparent for caffeinated (p-trend = 0.009), but not decaffeinated (p-trend = 0.45) coffee for which, however, data were available for a fraction of subjects.

Results from this multicentre, European cohort study strengthen the existing evidence regarding the inverse association between coffee/tea and HCC risk. Given the apparent lack of heterogeneity of these associations by HCC risk factors and that coffee/tea are universal exposures, our results could have important implications for high HCC risk subjects.

Banka, V. K., S. H. Moon, et al. "Development of 4-hexadecyl-4,7-diaza-1,10-decanedithiol (HDD) kit for the preparation of the liver cancer therapeutic agent Re-188-HDD/lipiodol." Nucl Med Biol. 2015 Mar;42(3):317-22. doi: 10.1016/j.nucmedbio.2014.11.013. Epub 2014 Dec 5.

INTRODUCTION: A lipiodol solution of (188)Re-4-hexadecyl-2,2,9,9-tetramethyl-4,7-diaza-1,10-decanedithiol (HTDD) has been successfully developed for liver cancer therapy; however, its preparation requires a multi-step synthesis and it is characterized by a low labeling yield. METHODS: We synthesized a new compound, 4-hexadecyl-4,7-diaza-1,10-decanedithioacetate (AHDD), without gem dimethyl groups to address these issues. AHDD was formulated into a kit and was labeled with (188)Re. Biodistribution study was performed using normal BALB/c mice. RESULTS: The kit was labeled with (188)Re with a high efficiency (98.8+/-0.2%). After extraction with lipiodol, the overall yield of (188)Re-HDD/lipiodol was as high as 90.2+/-2.6%. A comparative biodistribution study of (188)Re-HTDD and (188)Re-HDD was performed in normal mice after intravenous injection. The lungs were identified as the main uptake site due to capillary-blockage. (188)Re-HDD/lipiodol showed a significantly higher lung uptake than that of (188)Re-HTDD/lipiodol (p<0.05). CONCLUSION: The newly synthesized (188)Re-HDD/lipiodol showed improved radiolabeling yield and biodistribution results compared to (188)Re-HTDD/lipiodol, and may therefore be more suitable for liver cancer therapy.

Bassuk, S. S. and J. E. Manson "Oral contraceptives and menopausal hormone therapy: relative and attributable risks of cardiovascular disease, cancer, and other health outcomes." Ann Epidemiol. 2015 Mar;25(3):193-200. doi: 10.1016/j.annepidem.2014.11.004. Epub 2014 Nov 13.

PURPOSE: To summarize the relative risks (RRs) and attributable risks (ARs) of major health outcomes associated with use of combined oral contraceptives (OCs) and menopausal hormone therapy (HT). METHODS: For OCs, measures of association are from meta-analyses of observational studies. For HT, these measures are from the Women's Health Initiative, a large randomized trial of HT for chronic disease prevention in postmenopausal women

aged 50 to 79 years. RESULTS: Current OC use increases risks of venous thromboembolism and ischemic stroke. However, women of reproductive age are at low baseline risk, so the ARs are small. OC use also increases risk of breast and liver cancer and reduces risk of ovarian, endometrial, and colorectal cancer; the net effect is a modest reduction in total cancer. The Women's Health Initiative results show that HT does not prevent coronary events or overall chronic disease in postmenopausal women as a whole. Subgroup analyses suggest that timing of HT initiation influences the relation between such therapy and coronary risk, and its overall risk-benefit balance, with more favorable effects (on a relative scale) in younger or recently menopausal women than in older women or those further past the menopausal transition. However, even if the RR do not vary by these characteristics, the low absolute baseline risks of younger or recently menopausal women translate into low ARs in this group.

Bergthold, G., P. Bandopadhayay, et al. "Expression profiles of 151 pediatric low-grade gliomas reveal molecular differences associated with location and histological subtype." Neuro Oncol. 2015 Mar 29. pii: nov045.

BACKGROUND: Pediatric low-grade gliomas (PLGGs), the most frequent pediatric brain tumor, comprise a heterogeneous group of diseases. Recent genomic analyses suggest that these tumors are mostly driven by mitogene-activated protein kinase (MAPK) pathway alterations. However, little is known about the molecular characteristics inherent to their clinical and histological heterogeneity. METHODS: We performed gene expression profiling on 151 paraffin-embedded PLGGs from different locations, ages, and histologies. Using unsupervised and supervised analyses, we compared molecular features with age, location, histology, and BRAF genomic status. We compared molecular differences with normal pediatric brain expression profiles to observe whether those patterns were mirrored in normal brain. RESULTS: Unsupervised clustering distinguished 3 molecular groups that correlated with location in the brain and histological subtype. "Not otherwise specified" (NOS) tumors did not constitute a unified class.

Braun, A. C., J. Hendrick, et al. "The Rho-specific GAP protein DLC3 coordinates endocytic membrane trafficking." J Cell Sci. 2015 Apr 1;128(7):1386-99. doi: 10.1242/jcs.163857. Epub 2015 Feb 11.

Membrane trafficking is known to be coordinated by small GTPases, but the identity of their regulators, the guanine nucleotide exchange factors (GEFs) and GTPase-activating proteins (GAPs) that ensure balanced GTPase activation at different subcellular sites is largely elusive. Here, we show in living cells that deleted in liver cancer 3 (DLC3, also known as STARD8) is a functional Rho-specific GAP protein, the loss of which enhances perinuclear RhoA activity. DLC3 is recruited to Rab8-positive membrane tubules and is required for the integrity of the Rab8 and Golgi compartments. Depletion of DLC3 impairs the transport of internalized transferrin to the endocytic recycling compartment (ERC), which is restored by the simultaneous downregulation of RhoA and RhoB. We further demonstrate that DLC3 loss interferes with epidermal growth factor receptor (EGFR) degradation associated with prolonged receptor signaling. Taken together, these findings identify DLC3 as a novel component of the endocytic trafficking machinery, wherein it maintains organelle integrity and regulates membrane transport through the control of Rho activity.

Delire, B. and P. Starkel "The Ras/MAPK pathway and hepatocarcinoma: pathogenesis and therapeutic implications." Eur J Clin Invest. 2015 Apr 1. doi: 10.1111/eci.12441.

Hepatocellular carcinoma (HCC) is still a major health problem, often diagnosed at an advanced stage. The multikinase inhibitor Sorafenib is to date the sole approved systemic therapy. Several signaling pathways are implicated in tumor development and progression. Among these pathways, the Ras/MAPK pathway is activated in 50-100% of human HCCs and is correlated with a poor prognosis. Multiple mechanisms lead to the deregulation of the Ras pathway in liver cancer. Ras and Raf genes mutations are rare events in human hepatocarcinogenesis in contrast with experimental models in rodents. Down-regulation of several Ras/MAPK pathway inhibitors like GAPs, RASSF proteins, DUSP1, Sprouty and Spred proteins is largely implicated in the aberrant activation of this pathway in the context of wild-type Ras and Raf genes. Epigenetic or posttranscriptional mechanisms lead to the downregulation of these tumor suppressor genes. Ras/MAPK pathway effectors are potential therapeutic targets. In particular after the arrival of Sorafenib, a lot of Ras/MAPK inhibitors have emerged and are still in preclinical or clinical investigation for HCC therapy. The aim of this work is to review the main intracellular mechanisms leading to aberrant Ras pathway activation in HCC and the potential therapeutic implications. This article is protected by copyright. All rights reserved.

Farra, R., B. Dapas, et al. "Impairment of the Pin1/E2F1 axis in the anti-proliferative effect of bortezomib in hepatocellular carcinoma cells."

BACKGROUND: The modest efficacy of available therapies for Hepatocellular carcinoma (HCC) indicates the need to develop novel therapeutic approaches. For the proteasome inhibitor Bortezomib (BZB), potentially attractive for HCC treatment, the mechanism of action is largely unknown. The BZB effect on E2Fs and the E2Fs control on the peptidylproline cis-trans isomerase (Pin1), prompted us to explore the BZB effect on the Pin1-E2F1 axis. METHODS: The tumorigenic cell line HuH7 together with the non-tumorigenic cells IHH and the human pluripotent stem cell derived hepatocytes (hPSC-H), were used as cellular models of HCC and normal liver cells, respectively. RESULTS: BZB reduces HuH7 growth as shown by cell counting, cell vitality test and cell cycle analysis; this is paralleled by the decrease of Pin1, E2F1, cyclin A2 and of the hyper-phosphorylated pRB. Pin1-E2F1 axis impairment justifies the anti-proliferative effect since Pin-E2F1 depletion decreases HuH7 growth while the over-expression rescues BZB-induced inhibition of proliferation. Moreover, Pin1-E2F1 promote HuH7 growth via the up-regulation of cyclin D1, cyclin E, cyclin A2, E2F2 and in part E2F3. Finally, in the control cells IHH and hPSC-H, BZB effect on cell vitality is not irrelevant, a fact correlated to the cellular proliferation rate. Thus, BZB effect on healthy liver tissue may not be entirely negligible hence caution should be exercised in its use in liver regeneration processes. CONCLUSION: For the first time we prove the functional involvement of the Pin1-E2F1 axis in the anti-proliferative effect of BZB indicating Pin1-E2F as an attractive target to control HCC cell growth.

Ferlay, J., I. Soerjomataram, et al. "Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012." Int J Cancer. 2015 Mar 1;136(5):E359-86. doi: 10.1002/ijc.29210. Epub 2014 Oct 9.

Estimates of the worldwide incidence and mortality from 27 major cancers and for all cancers combined for 2012 are now available in the GLOBOCAN series of the International Agency for Research on Cancer. We review the sources and methods used in compiling the national cancer incidence and mortality estimates, and briefly describe the key results by cancer site and in 20 large "areas" of the world. Overall, there were 14.1 million new cases and 8.2 million deaths in 2012. The most commonly diagnosed cancers were lung (1.82 million), breast (1.67 million), and colorectal (1.36 million); the most common causes of cancer death were lung cancer (1.6 million deaths), liver cancer (745,000 deaths), and stomach cancer (723,000 deaths).

Hashimoto, A., N. Chiba, et al. "Incidence of Malignancy and the Risk of Lymphoma in Japanese Patients with Rheumatoid Arthritis Compared to the General Population." J Rheumatol. 2015 Apr;42(4):564-571. Epub 2015 Jan 15.

OBJECTIVE: Recent advances in the management of patients with rheumatoid arthritis (RA) increased the rates of disease remission and patient life expectancy, while malignancy has become a more common cause of death. Here, we report the incidence of malignancy in a nationwide survey of Japanese patients with RA compared to the general population, focusing on the risk of lymphoma, which often arises in patients with RA. METHODS: Data on the occurrence of malignancy were collected from patients registered in a nationwide Japanese cohort database, the National Database of Rheumatic Diseases by iR-net in Japan, from 2003 to 2012. To adjust for different population composition and to compare the incidence of malignancy with the general population, standardized incidence rates (SIR) were calculated. To identify risk factors for lymphoma, individual patient data were obtained for multivariate analysis for the year before lymphoma diagnosis. RESULTS: In 10 years, the cohort composed of 66,953 patient-years yielded 559 malignancies, most frequently lung cancer, followed by gastric cancer, breast cancer, and lymphoma. The overall incidence of malignancies in patients with RA was slightly lower than in the general population (SIR 0.89, 95% CI 0.82-0.97).

Huntzicker, E. G., K. Hotzel, et al. "Differential effects of targeting Notch receptors in a mouse model of liver cancer." Hepatology. 2015 Mar;61(3):942-52. doi: 10.1002/hep.27566. Epub 2015 Jan 28.

Primary liver cancer encompasses both hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCA). The Notch signaling pathway, known to be important for the proper development of liver architecture, is also a potential driver of primary liver cancer. However, with four known Notch receptors and several Notch ligands, it is not clear which Notch pathway members play the predominant role in liver cancer. To address this question, we utilized antibodies to specifically target Notch1, Notch2, Notch3, or jagged1 (Jag1) in a mouse model of primary liver cancer driven by v-akt murine thymoma viral oncogene homolog and neuroblastoma RAS viral oncogene homolog (NRas). We show that inhibition of Notch2 reduces tumor burden by eliminating highly malignant HCC- and CCA-like tumors. Inhibition of the Notch ligand, Jag1, had a similar effect, consistent with Jag1 acting in cooperation with Notch2. This effect was specific to Notch2, because Notch3 inhibition did not decrease

tumor burden. Unexpectedly, Notch1 inhibition altered the relative proportion of tumor types, reducing HCC-like tumors but dramatically increasing CC-like tumors. Finally, we show that Notch2 and Jag1 are expressed in, and Notch2 signaling is activated in, a subset of human HCC samples. CONCLUSIONS: These findings underscore the distinct roles of different Notch receptors in the liver and suggest that inhibition of Notch2 signaling represents a novel therapeutic option in the treatment of liver cancer. (Hepatology 2015;61:942-952).

Kim, H. S., K. S. Lee, et al. "MicroRNA-31 functions as a tumor suppressor by regulating cell cycle and epithelial-mesenchymal transition regulatory proteins in liver cancer." Oncotarget. 2015 Mar 10.

MicroRNA-31 (miR-31) is among the most frequently altered microRNAs in human cancers and altered expression of miR-31 has been detected in a large variety of tumor types, but the functional role of miR-31 still hold both tumor suppressive and oncogenic roles in different tumor types. MiR-31 expression was down-regulated in a large cohort of hepatocellular carcinoma (HCC) patients, and low expression of miR-31 was significantly associated with poor prognosis of HCC patients. Ectopic expression of miR-31 mimics suppressed HCC cell growth by transcriptional deregulation of cell cycle proteins. Additional study evidenced miR-31 directly to suppress HDAC2 and CDK2 expression by inhibiting mRNA translation in HCC cells. We also found that ectopic expression of miR-31 mimics reduced metastatic potential of HCC cells by selectively regulating epithelial-mesenchymal transition (EMT) regulatory proteins such as N-cadherin, E-cadherin, vimentin and fibronectin. HCC tissues derived from chemical-induced rat liver cancer models validated that miR-31 expression is significantly down-regulated, and that those cell cycle- and EMT-regulatory proteins are deregulated in rat liver cancer. Overall, we suggest that miR-31 functions as a tumor suppressor by selectively regulating cell cycle and EMT regulatory proteins in human hepatocarcinogenesis providing a novel target for the molecular treatment of liver malignancies.

Kishikawa, T., M. Otsuka, et al. "Decreased miR122 in hepatocellular carcinoma leads to chemoresistance with increased arginine." Oncotarget. 2015 Mar 21.

Reduced expression of microRNA122 (miR122), a liver-specific microRNA, is frequent in hepatocellular carcinoma (HCC). However, its biological significances remain poorly understood. Because deregulated amino acid levels in cancers can affect their biological behavior, we determined the amino acid levels in miR122-silenced mouse liver tissues, in which intracellular arginine levels were significantly increased. The increased intracellular arginine levels were through upregulation of the solute carrier family 7 (SLC7A1), a transporter of arginine and a direct target of miR122. Arginine is the substrate for nitric oxide (NO) synthetase, and intracellular NO levels were increased in miR122-silenced HCC cells, with increased resistance to sorafenib, a multikinase inhibitor. Conversely, maintenance of the miR122-silenced HCC cells in arginine-depleted culture media, as well as overexpression of miR122 in miR122-low-expressing HCC cells, reversed these effects and rendered the cells more sensitive to sorafenib.

Kochan, K., P. Heraud, et al. "Comparison of FTIR transmission and transfection substrates for canine liver cancer detection." Analyst. 2015 Mar 16;140(7):2402-11. doi: 10.1039/c4an01901f.

FTIR spectroscopy is a widely used technique that provides insights into disease processes at the molecular level. Due to its numerous advantages it is becoming an increasingly powerful tool for the study of biological materials and has the potential to become an excellent diagnostic method, especially considering the low cost of transflection substrates. However, questions about the usefulness of the transflection measurement mode due to the complicated nature of physical processes occurring during the measurement and in particular the Electric Field Standing Wave (EFSW) effect have been raised. In this paper we present a comparison of the two most common FT-IR measurement modes: transmission and transfection using healthy and pathologically altered tissue (histiocytic sarcoma). We found that the major differences between normal and cancerous tissue were associated with changes DNA and carbohydrate content.

Konishi, H., K. Shirabe, et al. "Suppression of silent information regulator 1 activity in noncancerous tissues of hepatocellular carcinoma: Possible association with non-B non-C hepatitis pathogenesis." Cancer Sci. 2015 Mar 3. doi: 10.1111/cas.12653.

Silent information regulator 1 (SIRT1) is a nicotinamide adenine dinucleotide (NAD+)-dependent protein deacetylase. In mice, mSirt1 deficiency causes the onset of fatty liver via regulation of the hepatic nutrient metabolism pathway. In this study, we demonstrate SIRT1 expression, activity and NAD+ regulation using noncancerous liver tissue specimens from hepatocellular carcinoma patients with non-B non-C (NBNC) hepatitis. SIRT1 expression levels were higher in NBNC patients than in healthy donors, while SIRT1 histone H3K9 deacetylation activity was suppressed in NBNC patients. In the liver of hepatitis patients, decreased NAD+ amounts and its

regulatory enzyme nicotinamide phosphoribosyltransferase expression levels were observed, and this led to inhibition of SIRT1 activity. SIRT1 expression was associated with HIF1 protein accumulation in both the NBNC liver and liver cancer cell lines. These results may indicate that the NBNC hepatitis liver is exposed to hypoxic conditions. In HepG2 cells, hypoxia induced inflammatory chemokines, such as CXCL10 and MCP-1.

Maass, T., J. Marquardt, et al. "Increased liver carcinogenesis and enrichment of stem cell properties in livers of Dickkopf 2 (Dkk2) deleted mice." Oncotarget. 2015 Mar 16.

Dkk2 a antagonist of the Wnt/beta-catenin-signaling pathway was shown to be silenced in diverse cancers. More recent data indicate that Dkk family members may also possess functions independent of Wnt-signaling during carcinogenesis. The detailed biological function of Dkks and its relevance for liver cancer is unknown. We analyzed the effects of a genetic deletion of Dkk2 (Dkk2-/-) in a hepatocarcinogenesismodel using DEN/Phenobarbital. Untreated Dkk2-/- animals, showed considerable atypia with variation of hepatocytesize and chromatin density. In livers of Dkk2-/- mice nodule formation was seen at 9 months of age with focal loss of trabecular architecture and atypical hepatocytes and after DEN induction Dkk2-/- mice developed significantly more livertumors compared to controls. Whole transcriptome analysis of untreated Dkk2-/- livertissue revealed a Dkk2-dependent genetic network involving Wnt/beta-Catenin but also multiple additional oncogenic factors, such as e.g. Pdgf-b, Gdf-15 and Hnf4a. Dkk2-/- tumorcells showed a significant deregulation of stemness genes associated with enhanced colony forming properties. Integration of the Dkk2-/- signature into human data was strongly associated with patients survival. Dkk2 deletion results in alterations of liver morphology leading to an increased frequency of livercancer. The associated genetic changes included factors not primarily related to Wnt/beta-Catenin-signaling and correlated with the clinical outcome of HCC-patients.

Mastron, J. K., K. S. Siveen, et al. "Silymarin and hepatocellular carcinoma: a systematic, comprehensive, and critical review." Anticancer Drugs. 2015 Jun;26(5):475-486.

The blessed milk thistle (Silybum marianum L.), a flowering plant native to Mediterranean Europe, has been consumed and extensively used as a cure for various chronic liver ailments over several centuries. Milk thistle extract, known as silymarin, is a complex mixture of seven major flavonolignans and one flavonoid. The phytoconstituents of silymarin owe their therapeutic and hepatoprotective effects to their strong antioxidant and anti-inflammatory properties. Primary liver cancer, also known as hepatocellular carcinoma (HCC), occurs in a milieu of oxidative stress and inflammation. The etiology of HCC includes chronic infection with hepatitis B and C viruses, cirrhosis, and exposure to dietary and environmental hepatocarcinogens. Current therapeutic options for HCC, including surgical resection and liver transplantation, have limited benefits and are essentially ineffective. Chemoprevention, using phytochemicals with potent antioxidant and anti-inflammatory properties, represents a fascinating strategy, which has been a subject of intense investigation in the recent years. In this review, we explore the potential role of silymarin as a chemopreventive and therapeutic agent for HCC. The review systematically evaluates the preclinical in-vitro and in-vivo studies investigating the effects of silymarin and its constituents on HCC.

Miyagawa, Y., P. Marino, et al. "Herpes simplex viral-vector design for efficient transduction of nonneuronal cells without cytotoxicity." Proc Natl Acad Sci U S A. 2015 Mar 31;112(13):E1632-41. doi: 10.1073/pnas.1423556112. Epub 2015 Mar 16.

The design of highly defective herpes simplex virus (HSV) vectors for transgene expression in nonneuronal cells in the absence of toxic viral-gene activity has been elusive. Here, we report that elements of the latency locus protect a nonviral promoter against silencing in primary human cells in the absence of any viral-gene expression. We identified a CTCF motif cluster 5' to the latency promoter and a known long-term regulatory region as important elements for vigorous transgene expression from a vector that is functionally deleted for all five immediate-early genes and the 15-kb internal repeat region. We inserted a 16.5-kb expression cassette for full-length mouse dystrophin and report robust and durable expression in dystrophin-deficient muscle cells in vitro. Given the broad cell tropism of HSV, our design provides a nontoxic vector that can accommodate large transgene constructs for transduction of a wide variety of cells without vector integration, thereby filling an important void in the current arsenal of gene-therapy vectors.

Nicolaidou, V. and C. Koufaris MicroRNA responses to environmental liver carcinogens: Biological and clinical significance, Clin Chim Acta. 2015 Mar 12;445:25-33. doi: 10.1016/j.cca.2015.03.006.

A large number of biological, chemical, and dietary factors have been implicated in the development of liver cancer. These involve complex and protracted interactions between genetic,

epigenetic, and environmental factors. The survival rate for patients diagnosed with late-stage liver cancer is currently low due to the aggressive nature of the disease and resistance to therapy. An increasing body of evidence has offered support for the crucial role of non-coding microRNA (miRNA) in directing hepatic responses to environmental risk factors for liver cancer. In this review we focus on miRNA responses to environmental liver cancer risk factors and their potential biological and clinical significance.

Niessen, C., J. Igl, et al. "Factors Associated with Short-Term Local Recurrence of Liver Cancer after Percutaneous Ablation Using Irreversible Electroporation: A Prospective Single-Center Study." J Vasc Interv Radiol. 2015 Mar 23. pii: S1051-0443(15)00168-2. doi: 10.1016/j.jvir.2015.02.001.
        PURPOSE: To evaluate the risk factors associated with short-term local recurrence of malignant liver lesions after irreversible electroporation (IRE). MATERIALS AND METHODS: Thirty-nine consecutive patients (79 malignant liver lesions) were treated with IRE, of whom 14 were excluded from the analysis (including 12 without 6 mo of follow-up and two with incomplete ablation). The remaining 25 patients (aged 59.4 y +/- 11.2) had 48 malignant liver lesions, including 22 hepatocellular carcinomas (HCCs), six cholangiocellular carcinomas, and 20 metastatic liver cancers. Multivariate analyses were used to evaluate the associations of risk factors with early recurrence. The characteristics of patients, lesions, and IRE procedures were assessed by logistic regression. RESULTS: Fourteen of the 48 treated lesions (29.2%) showed early local recurrence after 6 months. Tumor volume (< 5 cm3 vs >/= 5 cm3; P = .022) and underlying disease type (HCC, cholangiocellular carcinoma, or metastatic disease; P = .023) were independently associated with early local recurrence. However, distances to the surrounding portal veins (< 0.5 cm vs >/= 0.5 cm; P = .810), hepatic veins (P = .170), hepatic arteries (P = .761), and bile ducts (P = .226) were not significantly associated with local recurrence.

Ooi, K. L., S. I. Loh, et al. "Growth inhibition of human liver carcinoma HepG2 cells and alpha-glucosidase inhibitory activity of Murdannia bracteata (C.B. Clarke) Kuntze ex J.K. Morton extracts." J Ethnopharmacol. 2015 Mar 13;162:55-60. doi: 10.1016/j.jep.2014.12.030. Epub 2014 Dec 29.
        ETHNOPHARMACOLOGICAL RELEVANCE: The juice of the entire fresh herb and infusion of dried sample of Murdannia bracteata are consumed to treat liver cancer and diabetes in Malaysia. However, no scientific evidence of these bioactivities has been reported. MATERIALS AND METHODS: To verify the therapeutic potentials of sequential extracts and infusion of this plant by determining its cytotoxicity against human liver carcinoma HepG2 cells and alpha-glucosidase inhibitory activity. The cytotoxic activities of the extracts against HepG2 were determined using a methylene blue assay, and an alpha-glucosidase inhibitory assay was used to assess anti-diabetic activity. The molecular basis of the anti-hepatocellular carcinoma activity of the most active extract was determined using RT-PCR. Chemical profiling of the most active extract was performed using GC-MS and UPLC analyses. RESULTS: The results obtained from the cytotoxic screening revealed the dose-dependent growth inhibition of the HepG2 cells by only the hexane extract, with an EC50 value of 37.17+/-1.00microg/ml. The HepG2 cell death was found to be apoptotic in nature and based on the significant biphasic induction of caspase-3, suggesting that the extract inhibited cell growth through a caspase-3-dependent pathway. The hexane extract also displayed alpha-glucosidase inhibitory activity, with an EC50 of 117.04+/-2.34microg/ml. GC-MS analysis revealed that alpha-tocopherol was the major volatile compound in the hexane extract, and two phenolics (apigenin and caffeic acid derivatives) were detected using UPLC.

Papatheodoridis, G. V., H. L. Chan, et al. Risk of hepatocellular carcinoma in chronic hepatitis B: Assessment and modification with current antiviral therapy, J Hepatol. 2015 Apr;62(4):956-967. doi: 10.1016/j.jhep.2015.01.002. Epub 2015 Jan 13.
        In the treatment of chronic hepatitis B (CHB), the ultimate goal is preventing hepatitis B virus (HBV)-associated liver disease, including hepatocellular carcinoma (HCC). Recently published studies show that in CHB patients treated with the currently recommended first-line nucleos(t)ide analogs (NAs) entecavir or tenofovir, annual HCC incidences range from 0.01% to 1.4% in non-cirrhotic patients, and from 0.9% to 5.4% in those with cirrhosis. In Asian studies including matched untreated controls, current NA therapy consistently resulted in a significantly lower HCC incidence in patients with cirrhosis, amounting to an overall HCC risk reduction of approximately 30%; in non-cirrhotic patients, HCC risk reduction was overall approximately 80%, but this was only observed in some studies. For patients of Caucasian origin, no appropriate comparative studies are available to date to evaluate the impact of NA treatment on HCC. Achievement of a virologic response under current NA therapy was associated with a lower HCC risk in Asian, but not Caucasian studies. Studies comparing entecavir or tenofovir with

older NAs generally found no difference in HCC risk reduction between agents, except for one study which used no rescue therapy in patients developing lamivudine resistance.

Rachidi, S., S. Sun, et al. "Endoplasmic reticulum heat shock protein gp96 maintains liver homeostasis and promotes hepatocellular carcinogenesis." J Hepatol. 2015 Apr;62(4):879-88. doi: 10.1016/j.jhep.2014.11.010. Epub 2014 Nov 22.

BACKGROUND & AIMS: gp96, or grp94, is an endoplasmic reticulum (ER)-localized heat shock protein 90 paralog that acts as a protein chaperone and plays an important role for example in ER homeostasis, ER stress, Wnt and integrin signaling, and calcium homeostasis, which are vital processes in oncogenesis. However, the cancer-intrinsic function of gp96 remains controversial. METHODS: We studied the roles of gp96 in liver biology in mice via an Albumin promoter-driven Cre recombinase-mediated disruption of gp96 gene, hsp90b1. The impact of gp96 status on hepatic carcinogenesis in response to diethyl-nitrosoamine (DENA) was probed. The roles of gp96 on human hepatocellular carcinoma cells (HCC) were also examined pharmacologically with a targeted gp96 inhibitor. RESULTS: We demonstrated that gp96 maintains liver development and hepatocyte function in vivo, and its loss genetically promotes adaptive accumulation of long chain ceramides, accompanied by steatotic regeneration of residual gp96+ hepatocytes. The need for compensatory expansion of gp96+ cells in the gp96- background predisposes mice to develop carcinogen-induced hepatic hyperplasia and cancer from gp96+ but not gp96- hepatocytes. We also found that genetic and pharmacological inhibition of gp96 in human HCCs perturbed multiple growth signals, and attenuated proliferation and expansion. CONCLUSIONS: gp96 is a pro-oncogenic chaperone and an attractive therapeutic target for HCC.

Rajendran, K., V. Karunagaran, et al. "Biosynthesis of hematite nanoparticles and its cytotoxic effect on HepG2 cancer cells." Int J Biol Macromol. 2015 Mar;74:376-81. doi: 10.1016/j.ijbiomac.2014.12.028. Epub 2014 Dec 24.

Iron oxide nanoparticles were gaining significant importance in a variety of applications due to its paramagnetic properties and biocompatibility. Various chemical methods were employed for hematite nanoparticle synthesis which require special equipment or a complex production process. In this study, protein capped crystalline hexagonal hematite (alpha-Fe2O3) nanoparticles were synthesized by green approach using culture supernatant of a newly isolated bacterium, Bacillus cereus SVK1 at ambient conditions. The synthesized nanoparticles were characterized by electron microscopy, X-ray diffraction, UV-visible spectroscopy and Fourier transform infrared spectroscopic analysis. Nanoparticles were evaluated for its possible anticancer activity against HepG2 liver cancer cells by MTT assay. Hematite nanoparticles with an average diameter of 30.2nm, exhibited a significant cytotoxicity toward HepG2 cells in a concentration-dependent manner (CTC50=704ng/ml).

Ramanivas, T., B. Sushma, et al. "Design, synthesis and biological evaluations of chirally pure 1,2,3,4-tetrahydroisoquinoline analogs as anti-cancer agents." Eur J Med Chem. 2015 Mar 6;92:608-18. doi: 10.1016/j.ejmech.2015.01.030. Epub 2015 Jan 15.

A series of fifteen chiral 1,2,3,4-tetrahydroisoquinoline (THIQ) derivatives have been synthesized and their antiproliferative properties have been studied. The in vitro screening was performed against five cancer cell lines; MCF-7 (breast cancer), A549 (lung cancer), DU-145 (prostate cancer), Hela (cervical cancer) and HepG2 (liver cancer). Most of the compounds showed promising activity with IC50 Values ranging from 0.72 to 92.6 muM. Among them, compounds 9a and 9b have shown significant activity against human prostate cancer cell line, i.e., DU-145 with IC50 value 0.72 and 1.23 muM respectively. To investigate the mechanism of action, detailed biological studies of compounds 9a and 9b were carried out on the human prostate cancer cell line, DU-145. Flow cytometric analysis revealed that these compounds induced cell cycle arrest at G2/M phase. Tubulin polymerization assay and immunofluorescence analysis results suggested that these compounds effectively inhibit microtubule assembly formation in DU-145. The apoptosis inducing properties were evaluated by DNA fragmentation analysis, Caspase-3 activity assay, Annexin V-FITC assay and Western blot analysis of proapoptotic protein, Bax and antiapoptotic protein Bcl-2.

Ridruejo, E. "Does hepatitis B virus therapy reduce the risk of hepatocellular carcinoma?" Expert Opin Drug Saf. 2015 Mar;14(3):439-51. doi: 10.1517/14740338.2015.998649. Epub 2014 Dec 30.

INTRODUCTION: Liver cancer is one of the most common cancers. Hepatocellular carcinoma (HCC) represents > 90% of primary liver cancers and is a major global health problem today. Chronic hepatitis B virus (HBV) infection is associated with more than half of HCCs. AREAS COVERED: Long-term therapy with nucleos(t)ide analogues (NUCs) improves outcomes in HBV-infected patients by slowing the progression of liver disease. It is associated with improvements in histological and

clinical outcomes, improved patient survival, reduced need for liver transplantation and improved liver function in patients with decompensated liver disease. This review highlights the results of previous studies conducted on HCC prevention with long-term NUC therapy. Studies include the use of all available drugs in different clinical scenarios, and the comparison between treated and untreated patients. EXPERT OPINION: NUCs have been studied extensively in HCC prevention. A comprehensive review of the literature has shown that they can be safely and effectively used for this purpose. Despite some discrepancies between studies, most of the evidence favors using NUC therapy for HCC prevention.

Roberts, D. D., S. Kaur, et al. "Therapeutic targeting of the thrombospondin-1 receptor CD47 to treat liver cancer." J Cell Commun Signal. 2015 Mar 18.
        CD47 is a signaling receptor for the matricellular protein thrombospondin-1 and a counter-receptor for signal regulatory protein-alpha (SIRPalpha) on macrophages. Following its initial discovery in 1992 as a cell surface protein that is over-expressed by ovarian carcinoma, elevated CD47 expression has emerged as a negative prognostic factor for a variety of cancers. CD47 is also a potential therapeutic target based on the ability of CD47 blockade to cause regression of tumors in mice, and a humanized CD47 antibody has recently entered phase I clinical trials. CD47 blockade may control tumor growth by inhibiting thrombospondin-1 signaling or by preventing inhibitory SIRPalpha signaling in tumor-associated macrophages. A recent publication by Lee et al. (Hepatology 60:179-191, 2014) provides evidence that blocking CD47 signaling specifically depletes tumor-initiating stem cells in hepatocellular carcinoma and implicates cathepsin-S/protease-activated receptor-2 signaling in mediating this therapeutic response.

Schneider-Yin, X., A. M. van Tuyll van Serooskerken, et al. "Biallelic inactivation of protoporphyrinogen oxidase and hydroxymethylbilane synthase is associated with liver cancer in acute porphyrias." J Hepatol. 2015 Mar;62(3):734-8. doi: 10.1016/j.jhep.2014.11.029. Epub 2014 Nov 28.
        Variegate porphyria (VP) and acute intermittent porphyria (AIP), the two most common types of acute porphyrias (AHPs), result from a partial deficiency of protoporphyrinogen oxidase (PPOX) and hydroxymethylbilane synthase (HMBS), respectively. A rare but serious complication in the AHPs is hepatocellular carcinoma (HCC). However, the underlying pathomechanisms are yet unknown. We performed DNA sequence analysis in cancerous and non-cancerous liver tissue of a VP and an AIP patient, both with HCC. In samples of both cancerous and non-cancerous liver tissues from the patients, we identified the underlying PPOX and HMBS germline mutations, c.1082dupC and p.G111R, respectively. Additionally, we detected a second somatic mutation, only in the cancer tissue i.e., p.L416X in the PPOX gene of the VP patient and p.L220X in the HMBS gene of the AIP patient, both located in trans to the respective germline mutations. Both somatic mutations were not detected in 10 non-porphyria-associated HCCs. Our data demonstrate that in the hepatic cancer tissue of AHP patients, somatic second-hit mutations result in nearly complete inactivation of the enzymes catalyzing major steps in the heme biosynthetic pathway. Both PPOX and HMBS, which might act as tumor suppressors, play a crucial role in the development of HCC in these individuals.

Schulze, K., S. Imbeaud, et al. "Exome sequencing of hepatocellular carcinomas identifies new mutational signatures and potential therapeutic targets." Nat Genet. 2015 Mar 30. doi: 10.1038/ng.3252.
        Genomic analyses promise to improve tumor characterization to optimize personalized treatment for patients with hepatocellular carcinoma (HCC). Exome sequencing analysis of 243 liver tumors identified mutational signatures associated with specific risk factors, mainly combined alcohol and tobacco consumption and exposure to aflatoxin B1. We identified 161 putative driver genes associated with 11 recurrently altered pathways. Associations of mutations defined 3 groups of genes related to risk factors and centered on CTNNB1 (alcohol), TP53 (hepatitis B virus, HBV) and AXIN1. Analyses according to tumor stage progression identified TERT promoter mutation as an early event, whereas FGF3, FGF4, FGF19 or CCND1 amplification and TP53 and CDKN2A alterations appeared at more advanced stages in aggressive tumors. In 28% of the tumors, we identified genetic alterations potentially targetable by US Food and Drug Administration (FDA)-approved drugs. In conclusion, we identified risk factor-specific mutational signatures and defined the extensive landscape of altered genes and pathways in HCC, which will be useful to design clinical trials for targeted therapy.

Shimizu, M., Y. Shirakami, et al. Chemopreventive Potential of Green Tea Catechins in Hepatocellular Carcinoma, Int J Mol Sci. 2015 Mar 17;16(3):6124-6139.
        Hepatocellular carcinoma (HCC), which is a common malignancy worldwide, usually develops in a cirrhotic liver due to hepatitis virus infection. Metabolic syndrome, which is frequently complicated by obesity and diabetes mellitus, is also a critical risk

factor for liver carcinogenesis. Green tea catechins (GTCs) may possess potent anticancer and chemopreventive properties for a number of different malignancies, including liver cancer. Antioxidant and anti-inflammatory activities are key mechanisms through which GTCs prevent the development of neoplasms, and they also exert cancer chemopreventive effects by modulating several signaling transduction and metabolic pathways. Furthermore, GTCs are considered to be useful for the prevention of obesity- and metabolic syndrome-related carcinogenesis by improving metabolic disorders. Several interventional trials in humans have shown that GTCs may ameliorate metabolic abnormalities and prevent the development of precancerous lesions. The purpose of this article is to review the key mechanisms by which GTCs exert chemopreventive effects in liver carcinogenesis, focusing especially on their ability to inhibit receptor tyrosine kinases and improve metabolic abnormalities. We also review the evidence for GTCs acting to prevent metabolic syndrome-associated liver carcinogenesis.

Soofi, Y., K. Kanehira, et al. "Pancreatic hepatoid carcinoma: a rare form of pancreatic neoplasm." Diagn Cytopathol. 2015 Mar;43(3):251-6. doi: 10.1002/dc.23195. Epub 2014 Jun 26.

Primary pancreatic hepatoid carcinoma (PHC) is extremely rare, resembling hepatocellular carcinoma (HCC) in terms of morphology and immunohistochemical features. Hepatoid carcinoma can present in other organs, most noticeably in the stomach. PHC is present in two forms either a pure form like HCC or admixed with other histologic tumor components characteristic of the underlying primary site (endocrine tumors, ductal, or acinar adenocarcinomas). Here, we report a 69-year-old male patient with distal pancreatic mass incidentally found during a CT scan workup for a pulmonary nodule suspicious for metastatic prostate adenocarcinoma. We described the clinical, cytological, and histological finding and conducted a literature review.

Sprinzl, M. F., A. Puschnik, et al. "Sorafenib inhibits macrophage-induced growth of hepatoma cells by interference with insulin-like growth factor-1 secretion." J Hepatol. 2015 Apr;62(4):863-70. doi: 10.1016/j.jhep.2014.11.011. Epub 2014 Nov 22.

BACKGROUND & AIMS: Hepatocellular carcinoma (HCC) associated macrophages accelerate tumor progression by growth factor release. Therefore, tumor-associated macrophages (TAM) and their initiated signaling cascades are potential therapeutic targets. Aiming at understanding anticancer effects of systemic HCC therapy, we investigated the impact of sorafenib on macrophage function, focusing on macrophage-related growth factor secretion. METHODS: Macrophage markers, cytokine and growth factor release were investigated in CSF-1 (M1) or GMCSF (M2) maturated monocyte-derived macrophages. Macrophages were treated with sorafenib (1.2-5.0mug/ml) and culture supernatants were transferred to hepatoma cell cultures to assess growth propagation. Insulin-like growth factor (IGF) signaling was blocked with NVP-AEW541 to confirm the role of IGF-1 in macrophage-driven hepatoma cell propagation. Macrophage activation was followed by ELISA of serum soluble mCD163 in sorafenib-treated patients with HCC. RESULTS: Alternative macrophages (M2), which showed higher IGF-1 (p=0.022) and CD163 mRNA (p=0.032) expression compared to classical macrophages (M1), increased hepatoma growth. This effect was mediated by M2-conditioned culture media. In turn, sorafenib lowered mCD163 and IGF-1 release by M2 macrophages, which decelerated M2 macrophage driven HuH7 and HepG2 proliferation by 47% and 64%, respectively. IGF-receptor blockage with NVP-AEW541 reduced growth induction by M2-conditioned culture media in a dose dependent manner. A transient mCD163 reduction during sorafenib treatment indicated a coherent M2 macrophage inhibition in patients with HCC. CONCLUSIONS: Sorafenib alters macrophage polarization, reduces IGF-1-driven cancer growth in vitro and partially inhibits macrophage activation in vivo. Thus macrophage modulation might contribute to the anti-cancer activity of sorafenib. However, more efficient macrophage-directed therapies are required.

Steele, J. R., A. K. Jones, et al. "Why bundled payments could drive innovation: an example from interventional oncology." J Oncol Pract. 2015 Mar;11(2):e199-205. doi: 10.1200/JOP.2014.001523. Epub 2015 Jan 20.

Some have suggested that the current fee-for-service health care payment system in the United States stifles innovation. However, there are few published examples supporting this concept. We implemented an innovative temporary balloon occlusion technique for yttrium 90 radioembolization of nonresectable liver cancer. Although our balloon occlusion technique was associated with similar patient outcomes, lower cost, and faster procedure times compared with the standard-of-care coil embolization technique, our technique failed to gain widespread acceptance. Financial analysis revealed that because the balloon occlusion technique avoided a procedural step associated with a lucrative Current Procedural Terminology billing code, this new technique resulted in a significant decrease in hospital and physician revenue in the current fee-for-service payment system, even though the new technique

would provide a revenue enhancement through cost savings in a bundled payment system. Our analysis illustrates how in a fee-for-service payment system, financial disincentives can stifle innovation and advancement of health care delivery.

Sukato, D. C., S. Tohme, et al. "The Prognostic Role of Neutrophil-to-Lymphocyte Ratio in Patients with Unresectable Hepatocellular Carcinoma Treated with Radioembolization." J Vasc Interv Radiol. 2015 Mar 27. pii: S1051-0443(15)00167-0. doi: 10.1016/j.jvir.2015.01.038.

PURPOSE: To assess the prognostic value of neutrophil-to-lymphocyte ratio (NLR) in patients with unresectable intermediate- or advanced-stage hepatocellular carcinoma (HCC) treated with yttrium-90 radioembolization (RE). MATERIALS AND METHODS: Retrospective chart review was performed for 176 patients with intermediate- or advanced-stage HCC treated with RE between August 2000 and November 2012. The appropriate NLR cutoff was determined by receiver operating characteristic curves. Demographic, clinical, radiographic, and pathologic parameters were compared between patients with a normal NLR (< 5) and those with an elevated NLR (>/= 5) before RE. Barcelona Clinic Liver Cancer (BCLC) stage-stratified univariate and multivariate analyses were conducted to determine variables associated with overall survival. RESULTS: Under univariate analyses, patients with a normal NLR were found to have longer survival than individuals with a high NLR in intermediate/advanced-disease and advanced-disease cohorts. A multivariate Cox proportional-hazards model in the advanced-disease group confirmed that elevated NLR, high alpha-fetoprotein level, and low albumin level were independent predictors of worse survival. CONCLUSIONS: This study provides stage-dependent evidence for the prognostic role of NLR in the radioembolized HCC cohort. Patients with BCLC stage C disease with elevated NLR may not derive benefit from RE, and other intervening modalities should be explored in this subpopulation.

Sun, A. M., C. G. Li, et al. "Hepatocarcinoma cell-derived hepatoma-derived growth factor (HDGF) induces regulatory T cells." Cytokine. 2015 Mar;72(1):31-5. doi: 10.1016/j.cyto.2014.12.001. Epub 2015 Jan 5.

BACKGROUND AND AIMS: It is suggested that regulatory immune cells play a critical role in cancer cell growth by facilitating cancer cells to escape from the immune surveillance. The generation of the immune regulatory cells in cancer has not been fully understood yet. This study aims to investigate the role of the hepatoma-derived growth factor (HDGF) in

the generation of regulatory T cells (Treg). METHODS: CCL-9.1 cells (A mouse hepatoma cell line), were cultured. The expression of HDGF in CCL-9.1 cells was assessed by quantitative RT-PCR and Western blotting. The generation of Foxp3(+) T cells was assessed by cell culture and flow cytometry. The immune suppressor function of the Foxp3(+) T cells on CD8(+) T cell activities was assessed by the carboxyfluorescein succinimidyl ester (CFSE)-dilution assay and enzyme-linked immunosorbent assay. RESULTS: The results showed that exposure to PolyIC markedly increased the expression of HDGF in CCL-9.1 cells. Coculture of CCL-9.1 cells and CD4(+) CD25(-) T cells in the presence of PolyIC generated the Forkhead box protein (Foxp)3(+) T cells. The exposure to HDGF increased the expression of Foxp3 and decreased the expression of GATA3 in CD4(+) T cells. After activation, the Foxp3(+) T cells suppressed the CD8(+) T cell proliferation and the release of the cytotoxic cytokines. CONCLUSIONS: Liver cancer cell-derived HDGF can induce Foxp3(+) T cells; the latter has the immune suppressor functions on CD8(+) T cell activities.

Suzuki, A. "Evidence of cell-fate conversion from hepatocytes to cholangiocytes in the injured liver: in-vivo genetic lineage-tracing approaches." Curr Opin Gastroenterol. 2015 Mar 11.

PURPOSE OF REVIEW: Recently, it has been suggested that hepatocytes can potentially convert their fate into that of cholangiocytes when the liver receives an injury. This review concisely summarizes these new findings, especially those obtained in studies using cell-lineage tracing methods. RECENT FINDINGS: Recent advances in technologies using mutant mice with a tamoxifen-inducible Cre/loxP system have allowed heritable labeling of a particular type of cell and enabled us to follow the fate of their progeny. This is generally known as 'genetic lineage-tracing', and has been applied in various studies that require tracking of the fate of cells in living mice. Previous studies using these methods have revealed that hepatocytes themselves can give rise to cholangiocytes through Notch-mediated cell-fate conversion from hepatocytes to cholangiocytes in injured liver tissue and at the onset of liver cancer. SUMMARY: Intensive studies using in-vivo genetic lineage-tracing approaches have provided new insights into the nature of cellular identity and plasticity in the liver, which will contribute to the development of new therapeutic strategies for liver diseases.

Tesori, V., A. C. Piscaglia, et al. "The multikinase inhibitor Sorafenib enhances glycolysis and synergizes

with glycolysis blockade for cancer cell killing." Sci Rep. 2015 Mar 17;5:9149. doi: 10.1038/srep09149.

Although the only effective drug against primary hepatocarcinoma, the multikinase inhibitor Sorafenib (SFB) usually fails to eradicate liver cancer. Since SFB targets mitochondria, cell metabolic reprogramming may underlie intrinsic tumor resistance. To characterize cancer cell metabolic response to SFB, we measured oxygen consumption, generation of reactive oxygen species (ROS) and ATP content in rat LCSC (Liver Cancer Stem Cells) -2 cells exposed to the drug. Genome wide analysis of gene expression was performed by Affymetrix technology. SFB cytotoxicity was evaluated by multiple assays in the presence or absence of metabolic inhibitors, or in cells genetically depleted of mitochondria. We found that low concentrations (2.5-5 muM) of SFB had a relatively modest effect on LCSC-2 or 293 T cell growth, but damaged mitochondria and increased intracellular ROS. Gene expression profiling of SFB-treated cells was consistent with a shift toward aerobic glycolysis and, accordingly, SFB cytotoxicity was dramatically increased by glucose withdrawal or the glycolytic inhibitor 2-DG. Under metabolic stress, activation of the AMP dependent Protein Kinase (AMPK), but not ROS blockade, protected cells from death. We conclude that mitochondrial damage and ROS drive cell killing by SFB, while glycolytic cell reprogramming may represent a resistance strategy potentially targetable by combination therapies.

Thuy le, T. T., Y. Matsumoto, et al. "Cytoglobin Deficiency Promotes Liver Cancer Development from Hepatosteatosis through Activation of the Oxidative Stress Pathway." Am J Pathol. 2015 Apr;185(4):1045-60. doi: 10.1016/j.ajpath.2014.12.017. Epub 2015 Feb 7.

This study was conducted to clarify the role of cytoglobin (Cygb), a globin expressed in hepatic stellate cells (HSCs), in the development of liver fibrosis and cancer in nonalcoholic steatohepatitis (NASH). Cygb expression was assessed in patients with NASH and hepatocellular carcinoma. Mouse NASH model was generated in Cygb-deficient (Cygb(-/-)) or wild-type (WT) mice by giving a choline-deficient amino acid-defined diet and, in some of them, macrophage deletion and N-acetyl cysteine treatment were used. Primary-cultured mouse HSCs isolated from WT (HSCs(Cygb-wild)) or Cygb(-/-) (HSCs(Cygb-null)) mice were characterized. As results, the expression of CYGB was reduced in patients with NASH and hepatocellular carcinoma. Choline-deficient amino acid treatment for 8 weeks induced prominent inflammation and fibrosis in Cygb(-/-) mice, which was inhibited by macrophage deletion. Surprisingly, at 32 weeks, despite no tumor

formation in the WT mice, all Cygb(-/-) mice developed liver cancer, which was ameliorated by N-acetyl cysteine treatment. Altered expression of 31 genes involved in the metabolism of reactive oxygen species was notable in Cygb(-/-) mice. Both HSCs(Cygb-null) and Cygb siRNA-transfected-HSCs(Cygb-wild) exhibited the preactivation condition. Our findings provide important insights into the role that Cygb, expressed in HSCs during liver fibrosis, plays in cancer development with NASH.

Tsukamoto, H. "Metabolic reprogramming and cell fate regulation in alcoholic liver disease." Pancreatology. 2015 Mar 10. pii: S1424-3903(15)00042-3. doi: 10.1016/j.pan.2015.03.003.

Alcoholic liver disease (ALD) should be defined as a life-style metabolic disease. Its pathogenesis is driven by altered cell fate of both parenchymal and non-parenchymal liver cell types, contributing to different pathologic spectra. A critical turning point in progression of ALD is chronic alcoholic steatohepatitis (ASH) or alcoholic neutrophilic hepatitis (AH), which markedly predisposes patients to most devastating ALD sequela, cirrhosis and liver cancer. RESULTS: Our research identifies the pivotal roles of unique metabolic reprogramming in M1 activation of hepatic macrophages (HM) and myofibroblastic activation (MF) of hepatic stellate cells (HSC) in the genesis of inflammation and fibrosis, the two key histological features of chronic ASH and neutrophilic AH. For M1 HM activation, heightened proinflammatory iron redox signaling in endosomes or caveosomes results from altered iron metabolism and storage, promoting IKK/NF-kB activation via interactive activation of p21ras, TAK1, and PI3K. For MF cell fate regulation of HSC, activation of the morphogen Wnt pathway caused by the nuclear protein NECDIN or the single-pass trans-membrane protein DLK1, reprograms lipid metabolism via MeCP2-mediated epigenetic repression of the key HSC quiescence gene Ppar-gamma.

Vasquez-Garzon, V. R., O. Beltran-Ramirez, et al. "Analysis of gene expression profiles as a tool to uncover tumor markers of liver cancer progression in a rat model." Biomed Rep. 2015 Mar;3(2):167-172. Epub 2014 Dec 22.

Establishing a transcriptomic profile of human hepatocellular liver cancer (HCC) progression is a complex undertaking. A rat model of HCC was employed to develop a transcriptomic profile. Using three interventions, preneoplastic lesions appeared after 30 days and they progressed to HCC by 9 months. Preneoplastic and cancer lesions were characterized for transcriptomic analysis, and RNA

from total liver homogenates was obtained at 1, 7, 11 and 16 days after the initiation treatment. RNA from dissected persistent preneoplastic lesions, adjacent tissue or cancer tissue was used for 30 days, and 5, 9, 12 and 18 months. The GeneChip(R) Rat Exon 1.0 ST arrays, Partek software and an Affymetrix console were employed for these analyses. LGALS3BP was differentially expressed at each time point, from the initial period, through the preneoplastic evolution period and until the end of cancer progression period. Twelve differentially expressed genes common to the preneoplastic evolution and to the cancer progression period were detected, which included ABCC3. Validation of the microarrays was confirmed by reverse transcription-quantitative polymerase chain reaction of six genes, including LGALS3BP and ABCC3. Of note, the proteins of these two genes are associated with the multidrug response complex, and evasion of immune surveillance and negative regulation of T cell proliferation. This model is useful for identifying candidate genes, and to validate them with regards to determining their relevance in rat HCC progression.

Vera, M. C., G. B. Pisani, et al. "Comparison of two chemical models to induce hepatic preneoplasia in male Wistar rats." Ann Hepatol. 2015 Mar-Apr;14(2):259-66.

BACKGROUND: One established model to induce hepatic preneoplasia (HP) (DEN 150) uses diethylnitrosamine (DEN) as initiator agent and 2-acetylaminofluorene (2-AAF) as a promoter drug. In addition, both chemicals cause liver cholestasis and fibrosis. AIM: We compared DEN 150 model with another adapted by us, DEN 200 to simplify the first one and to evaluate the effectiveness of both treatments to induce HP in rats. MATERIAL AND METHODS: Male Wistar rats were divided in 3 groups: controls; DEN 150 (rats received 2 doses of DEN, 150 mg/kg body weight, 2 weeks apart, and then 2-AAF, 20 mg/kg body weight, 4 doses per week during 3 weeks); and DEN 200 (rats received a single dose of DEN 200 mg/kg body weight, and 2 weeks apart 2-AAF, 20 mg/kg body weight, 2 doses per week during 3 weeks). Four hepatic enzymes, prothrombin time percentage, the number of bile ductules, total collagen amount, the number of altered hepatic foci (AHF) per liver and the percentage of liver occupied by foci were analyzed. Results. There were no differences in the number of AHF per liver between treated groups. Rats from DEN 200 group showed a significant diminution in the volume of liver occupied by foci. DEN 200 group had no fibrosis and better hemostatic conditions than DEN 150 group. Both groups developed cholestasis.

Wagenaar, T. R., S. Zabludoff, et al. "Anti-miR-21 Suppresses Hepatocellular Carcinoma Growth via Broad Transcriptional Network De-regulation." Mol Cancer Res. 2015 Mar 10. pii: molcanres.0703.2014.

Hepatocellular carcinoma (HCC) remains a significant clinical challenge with few therapeutic options available to cancer patients. MicroRNA 21-5p (miR-21) has been shown to be upregulated in HCC, but the contribution of this oncomiR to the maintenance of tumorigenic phenotype in liver cancer remains poorly understood. We have developed potent and specific single-stranded oligonucleotide inhibitors of miR-21 (anti-miRs) and used them to interrogate dependency on miR-21 in a panel of liver cancer cell lines. Treatment with anti-miR-21, but not with a mismatch control anti-miR, resulted in significant de-repression of direct targets of miR-21 and led to loss of viability in the majority of HCC cell lines tested. Robust induction of caspase activity, apoptosis and necrosis was noted in anti-miR-21 treated HCC cells. Furthermore, ablation of miR-21 activity resulted in inhibition of HCC cell migration and suppression of clonogenic growth. To better understand the consequences of miR-21 suppression, global gene expression profiling was performed on anti-miR-21 treated liver cancer cells, which revealed striking enrichment in miR-21 target genes and de-regulation of multiple growth-promoting pathways. Finally, in vivo dependency on miR-21 was observed in two separate HCC tumor xenograft models. In summary, these data establish a clear role for miR-21 in the maintenance of tumorigenic phenotype in HCC in vitro and in vivo.

Wallace, M. C., D. Preen, et al. "The evolving epidemiology of hepatocellular carcinoma: a global perspective." Expert Rev Gastroenterol Hepatol. 2015 Apr 1:1-15.

Primary liver cancer, the majority of which are hepatocellular carcinomas, is now the second leading cause of cancer death worldwide. Hepatocellular carcinoma is a unique cancer that typically arises in the setting of chronic liver disease at a rate dependent upon the complex interplay between the host, disease and environmental factors. Infection with chronic hepatitis B or C virus is currently the dominant risk factor worldwide. However, changing lifestyle and environmental factors in western countries plus rising neonatal hepatitis B vaccination rates and decreasing exposure to dietary aflatoxins in developing countries are driving an evolution of the epidemiology of this cancer. An understanding of this change is crucial in combating the rising incidence currently being seen in western regions and will underpin the efforts to reduce the mortality rates associated with this cancer.

Yoon, H. I., K. J. Song, et al. "Clinical Benefit of Hepatic Arterial Infusion Concurrent Chemoradiotherapy in Locally Advanced Hepatocellular Carcinoma: A Propensity Score Matching Analysis." Cancer Res Treat. 2015 Mar 5. doi: 10.4143/crt.2014.276.

Purpose: To evaluate whether hepatic arterial infusion concurrent chemoradiotherapy (CCRT) could improve overall survival (OS) in patients with locally advanced hepatocellular carcinoma (LAHCC). Materials and Methods: Two databases were reviewed from Yonsei Cancer Center (YCC) and KLCSG nationwide multi-center HCC cohort. The CCRT group included 106 patients, with stage III-IV, Child-Pugh classification A, Eastern Cooperative Oncology Group performance status 0 or 1, who underwent definitive CCRT as the initial treatment at YCC. We used propensity score matching to adjust for seven clinical factors, including age, tumor size, TNM stage by the Liver Cancer Study Group of Japan, T stage, BCLC staging system, etiology of HCC, and portal vein invasion (PVI), which all differed significantly in the two databases. From the KLCSG cohort enrolled at 32 institutions, 106 patients for the non-CCRT group were defined. Results: After propensity score matching, all patient characteristics were balanced between the two groups. The CCRT group had better OS (median 11.4) than the non-CCRT group (6.6 months; p = 0.02). In multivariate analyses for all patients, CCRT (hazard ratio (HR) 1.48; 95% confidence interval (CI) 1.11-1.97; p = 0.007), tumor size (HR 1.08; 95% CI 1.04-1.12; p < 0.001), and BCLC stage (HR 0.54; 95% CI 0.36-0.8; p = 0.003) were independent prognostic factors for OS. Conclusion: CCRT showed better OS for LAHCC patients. In LAHCC patients with a good performance and normal liver function, CCRT could be a feasible treatment option. All of these findings need to be validated in prospective clinical trials.

The above contents are the collected information from Internet and public resources to offer to the people for the convenient reading and information disseminating and sharing.

References

1. Agopian, V. G., M. Harlander-Locke, et al. "A novel prognostic nomogram accurately predicts hepatocellular carcinoma recurrence after liver transplantation: analysis of 865 consecutive liver transplant recipients." J Am Coll Surg. 2015 Apr;220(4):416-27. doi: 10.1016/j.jamcollsurg.2014.12.025. Epub 2014 Dec 27.
2. Bamia, C., P. Lagiou, et al. "Coffee, tea and decaffeinated coffee in relation to hepatocellular carcinoma in a European population: multicentre, prospective cohort study." Int J Cancer. 2015 Apr 15;136(8):1899-908. doi: 10.1002/ijc.29214. Epub 2014 Sep 24.
3. Banka, V. K., S. H. Moon, et al. "Development of 4-hexadecyl-4,7-diaza-1,10-decanedithiol (HDD) kit for the preparation of the liver cancer therapeutic agent Re-188-HDD/lipiodol." Nucl Med Biol. 2015 Mar;42(3):317-22. doi: 10.1016/j.nucmedbio.2014.11.013. Epub 2014 Dec 5.
4. Bassuk, S. S. and J. E. Manson "Oral contraceptives and menopausal hormone therapy: relative and attributable risks of cardiovascular disease, cancer, and other health outcomes." Ann Epidemiol. 2015 Mar;25(3):193-200. doi: 10.1016/j.annepidem.2014.11.004. Epub 2014 Nov 13.
5. Bergthold, G., P. Bandopadhayay, et al. "Expression profiles of 151 pediatric low-grade gliomas reveal molecular differences associated with location and histological subtype." Neuro Oncol. 2015 Mar 29. pii: nov045.
6. Braun, A. C., J. Hendrick, et al. "The Rho-specific GAP protein DLC3 coordinates endocytic membrane trafficking." J Cell Sci. 2015 Apr 1;128(7):1386-99. doi: 10.1242/jcs.163857. Epub 2015 Feb 11.
7. Delire, B. and P. Starkel "The Ras/MAPK pathway and hepatocarcinoma: pathogenesis and therapeutic implications." Eur J Clin Invest. 2015 Apr 1. doi: 10.1111/eci.12441.
8. Farra, R., B. Dapas, et al. "Impairment of the Pin1/E2F1 axis in the anti-proliferative effect of bortezomib in hepatocellular carcinoma cells." Biochimie. 2015 Mar 3. pii: S0300-9084(15)00050-4. doi: 10.1016/j.biochi.2015.02.015.
9. Ferlay, J., I. Soerjomataram, et al. "Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012." Int J Cancer. 2015 Mar 1;136(5):E359-86. doi: 10.1002/ijc.29210. Epub 2014 Oct 9.
10. Hashimoto, A., N. Chiba, et al. "Incidence of Malignancy and the Risk of Lymphoma in Japanese Patients with Rheumatoid Arthritis Compared to the General Population." J Rheumatol. 2015 Apr;42(4):564-571. Epub 2015 Jan 15.
11. Huntzicker, E. G., K. Hotzel, et al. "Differential effects of targeting Notch receptors in a mouse model of liver cancer." Hepatology. 2015 Mar;61(3):942-52. doi: 10.1002/hep.27566. Epub 2015 Jan 28.
12. Kim, H. S., K. S. Lee, et al. "MicroRNA-31 functions as a tumor suppressor by regulating cell cycle and epithelial-mesenchymal transition regulatory proteins in liver cancer." Oncotarget. 2015 Mar 10.
13. Kishikawa, T., M. Otsuka, et al. "Decreased miR122 in hepatocellular carcinoma leads to chemoresistance with increased arginine." Oncotarget. 2015 Mar 21.
14. Kochan, K., P. Heraud, et al. "Comparison of FTIR transmission and transfection substrates for canine liver cancer detection." Analyst. 2015 Mar 16;140(7):2402-11. doi: 10.1039/c4an01901f.
15. Konishi, H., K. Shirabe, et al. "Suppression of silent information regulator 1 activity in noncancerous tissues of hepatocellular carcinoma: Possible association with non-B non-C hepatitis pathogenesis." Cancer Sci. 2015 Mar 3. doi: 10.1111/cas.12653.
16. Ma H, Chen G. Stem cell. The Journal of American Science 2005;1(2):90-92.
17. Ma H, Cherng S. Eternal Life and Stem Cell. Nature and Science. 2007;5(1):81-96.
18. Ma H, Cherng S. Nature of Life. Life Science Journal 2005;2(1):7 - 15.
19. Ma H, Yang Y. Turritopsis nutricula. Nature and Science 2010;8(2):15-20. http://www.sciencepub.net/nature/ns0802/03_1279_hongbao_turritopsis_ns0802_15_20.pdf.
20. Ma H. The Nature of Time and Space. Nature and science 2003;1(1):1-11.Nature and science 2007;5(1):81-96.
21. Maass, T., J. Marquardt, et al. "Increased liver carcinogenesis and enrichment of stem cell properties in livers of Dickkopf 2 (Dkk2) deleted mice." Oncotarget. 2015 Mar 16.

22. Mastron, J. K., K. S. Siveen, et al. "Silymarin and hepatocellular carcinoma: a systematic, comprehensive, and critical review." Anticancer Drugs. 2015 Jun;26(5):475-486.

23. Miyagawa, Y., P. Marino, et al. "Herpes simplex viral-vector design for efficient transduction of nonneuronal cells without cytotoxicity." Proc Natl Acad Sci U S A. 2015 Mar 31;112(13):E1632-41. doi: 10.1073/pnas.1423556112. Epub 2015 Mar 16.

24. National Center for Biotechnology Information, U.S. National Library of Medicine. http://www.ncbi.nlm.nih.gov/pubmed. 2015.

25. Nicolaidou, V. and C. Koufaris MicroRNA responses to environmental liver carcinogens: Biological and clinical significance, Clin Chim Acta. 2015 Mar 12;445:25-33. doi: 10.1016/j.cca.2015.03.006.

26. Niessen, C., J. Igl, et al. "Factors Associated with Short-Term Local Recurrence of Liver Cancer after Percutaneous Ablation Using Irreversible Electroporation: A Prospective Single-Center Study." J Vasc Interv Radiol. 2015 Mar 23. pii: S1051-0443(15)00168-2. doi: 10.1016/j.jvir.2015.02.001.

27. Ooi, K. L., S. I. Loh, et al. "Growth inhibition of human liver carcinoma HepG2 cells and alpha-glucosidase inhibitory activity of Murdannia bracteata (C.B. Clarke) Kuntze ex J.K. Morton extracts." J Ethnopharmacol. 2015 Mar 13;162:55-60. doi: 10.1016/j.jep.2014.12.030. Epub 2014 Dec 29.

28. Papatheodoridis, G. V., H. L. Chan, et al. Risk of hepatocellular carcinoma in chronic hepatitis B: Assessment and modification with current antiviral therapy, J Hepatol. 2015 Apr;62(4):956-967. doi: 10.1016/j.jhep.2015.01.002. Epub 2015 Jan 13.

29. Rachidi, S., S. Sun, et al. "Endoplasmic reticulum heat shock protein gp96 maintains liver homeostasis and promotes hepatocellular carcinogenesis." J Hepatol. 2015 Apr;62(4):879-88. doi: 10.1016/j.jhep.2014.11.010. Epub 2014 Nov 22.

30. Rajendran, K., V. Karunagaran, et al. "Biosynthesis of hematite nanoparticles and its cytotoxic effect on HepG2 cancer cells." Int J Biol Macromol. 2015 Mar;74:376-81. doi: 10.1016/j.ijbiomac.2014.12.028. Epub 2014 Dec 24.

31. Ramanivas, T., B. Sushma, et al. "Design, synthesis and biological evaluations of chirally pure 1,2,3,4-tertrahydroisoquinoline analogs as anti-cancer agents." Eur J Med Chem. 2015 Mar 6;92:608-18. doi: 10.1016/j.ejmech.2015.01.030. Epub 2015 Jan 15.

32. Ridruejo, E. "Does hepatitis B virus therapy reduce the risk of hepatocellular carcinoma?" Expert Opin Drug Saf. 2015 Mar;14(3):439-51. doi: 10.1517/14740338.2015.998649. Epub 2014 Dec 30.

33. Roberts, D. D., S. Kaur, et al. "Therapeutic targeting of the thrombospondin-1 receptor CD47 to treat liver cancer." J Cell Commun Signal. 2015 Mar 18.

34. Schneider-Yin, X., A. M. van Tuyll van Serooskerken, et al. "Biallelic inactivation of protoporphyrinogen oxidase and hydroxymethylbilane synthase is associated with liver cancer in acute porphyrias." J Hepatol. 2015 Mar;62(3):734-8. doi: 10.1016/j.jhep.2014.11.029. Epub 2014 Nov 28.

35. Schulze, K., S. Imbeaud, et al. "Exome sequencing of hepatocellular carcinomas identifies new mutational signatures and potential therapeutic targets." Nat Genet. 2015 Mar 30. doi: 10.1038/ng.3252.

36. Shimizu, M., Y. Shirakami, et al. Chemopreventive Potential of Green Tea Catechins in Hepatocellular Carcinoma, Int J Mol Sci. 2015 Mar 17;16(3):6124-6139.

37. Soofi, Y., K. Kanehira, et al. "Pancreatic hepatoid carcinoma: a rare form of pancreatic neoplasm." Diagn Cytopathol. 2015 Mar;43(3):251-6. doi: 10.1002/dc.23195. Epub 2014 Jun 26.

38. Sprinzl, M. F., A. Puschnik, et al. "Sorafenib inhibits macrophage-induced growth of hepatoma cells by interference with insulin-like growth factor-1 secretion." J Hepatol. 2015 Apr;62(4):863-70. doi: 10.1016/j.jhep.2014.11.011. Epub 2014 Nov 22.

39. Steele, J. R., A. K. Jones, et al. "Why bundled payments could drive innovation: an example from interventional oncology." J Oncol Pract. 2015 Mar;11(2):e199-205. doi: 10.1200/JOP.2014.001523. Epub 2015 Jan 20.

40. Sukato, D. C., S. Tohme, et al. "The Prognostic Role of Neutrophil-to-Lymphocyte Ratio in Patients with Unresectable Hepatocellular Carcinoma Treated with Radioembolization." J Vasc Interv Radiol. 2015 Mar 27. pii: S1051-0443(15)00167-0. doi: 10.1016/j.jvir.2015.01.038.

41. Sun, A. M., C. G. Li, et al. "Hepatocarcinoma cell-derived hepatoma-derived growth factor (HDGF) induces regulatory T cells." Cytokine. 2015 Mar;72(1):31-5. doi: 10.1016/j.cyto.2014.12.001. Epub 2015 Jan 5.

42. Suzuki, A. "Evidence of cell-fate conversion from hepatocytes to cholangiocytes in the injured liver: in-vivo genetic lineage-tracing approaches." Curr Opin Gastroenterol. 2015 Mar 11.

43. Tesori, V., A. C. Piscaglia, et al. "The multikinase inhibitor Sorafenib enhances glycolysis and synergizes with glycolysis blockade for cancer cell killing." Sci Rep. 2015 Mar 17;5:9149. doi: 10.1038/srep09149.

44. Thuy le, T. T., Y. Matsumoto, et al. "Cytoglobin Deficiency Promotes Liver Cancer Development from Hepatosteatosis through Activation of the Oxidative Stress Pathway." Am J Pathol. 2015 Apr;185(4):1045-60. doi: 10.1016/j.ajpath.2014.12.017. Epub 2015 Feb 7.

45. Tsukamoto, H. "Metabolic reprogramming and cell fate regulation in alcoholic liver disease." Pancreatology. 2015 Mar 10. pii: S1424-3903(15)00042-3. doi: 10.1016/j.pan.2015.03.003.

46. Vasquez-Garzon, V. R., O. Beltran-Ramirez, et al. "Analysis of gene expression profiles as a tool to uncover tumor markers of liver cancer progression in a rat model." Biomed Rep. 2015 Mar;3(2):167-172. Epub 2014 Dec 22.

47. Vera, M. C., G. B. Pisani, et al. "Comparison of two chemical models to induce hepatic preneoplasia in male Wistar rats." Ann Hepatol. 2015 Mar-Apr;14(2):259-66.

48. Wagenaar, T. R., S. Zabludoff, et al. "Anti-miR-21 Suppresses Hepatocellular Carcinoma Growth via Broad Transcriptional Network De-regulation." Mol Cancer Res. 2015 Mar 10. pii: molcanres.0703.2014.

49. Wallace, M. C., D. Preen, et al. "The evolving epidemiology of hepatocellular carcinoma: a global perspective." Expert Rev Gastroenterol Hepatol. 2015 Apr 1:1-15.

50. Wikipedia. The free encyclopedia. http://en.wikipedia.org. 2015.

51. Yoon, H. I., K. J. Song, et al. "Clinical Benefit of Hepatic Arterial Infusion Concurrent Chemoradiotherapy in Locally Advanced Hepatocellular Carcinoma: A Propensity Score Matching Analysis." Cancer Res Treat. 2015 Mar 5. doi: 10.4143/crt.2014.276.

3/15/2015