Comparative Evaluation of Superb Microvascular Imaging and Dynamic Contrast-Enhanced Magnetic Resonance Imaging in Differentiating Benign and Malignant Breast Masses

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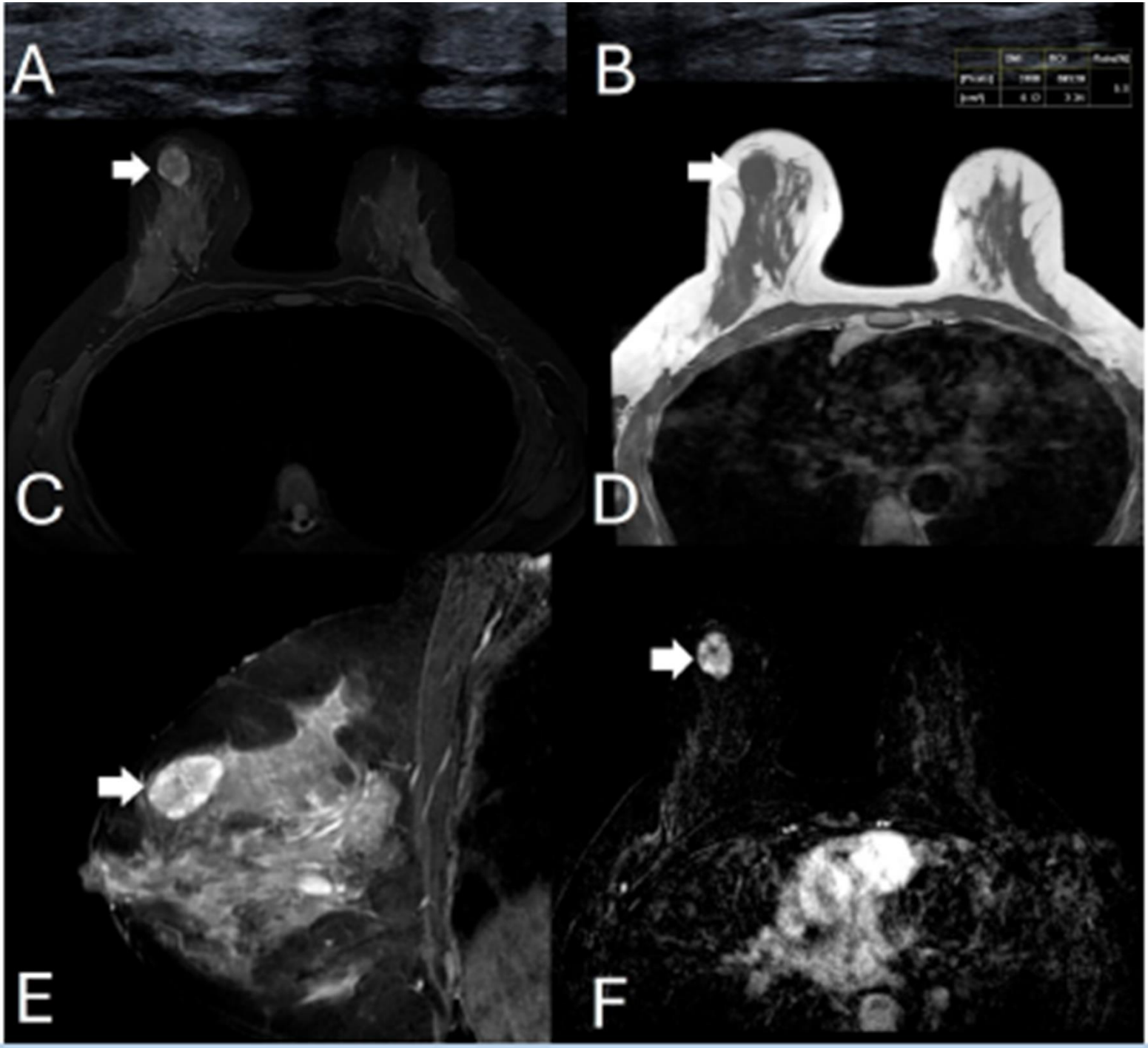
Objectives—Our study aims to compare the diagnostic performance of superb microvascular imaging (SMI) and dynamic contrast-enhanced magnetic resonance imaging (MRI) in differentiating benign from malignant breast masses, using histopathological findings as the reference standard.

Methods—This prospective study was conducted from April 2022 to March 2024. A total of 112 breast lesions from 110 patients were evaluated using gray-scale ultrasonography, SMI, and dynamic contrast-enhanced MRI. The vascular index (VI) obtained during SMI examination and kinetic curve patterns from MRI were analyzed.

Results—Histopathological analysis revealed 62 benign and 50 malignant lesions. The VI showed a statistically significant difference between benign and malignant lesions, with a mean VI of 5.12 $\pm$ 4.66 in benign masses and 10.13 $\pm$ 5.48 in malignant masses ($P < .001$). The ROC analysis demonstrated an AUC of 0.79 for SMI with a VI cut-off value of 4.15, yielding a sensitivity of 92%, specificity of 60%, and accuracy of 74%. A statistically significant correlation was found between VI values and MRI contrast enhancement kinetic curve types ($P < .05$). MRI demonstrated superior diagnostic performance, with an AUC of 0.89 and sensitivity, specificity, and accuracy of 98, 80.65, and 88.39%, respectively.

Conclusions—SMI, when used in conjunction with conventional ultrasonography and MRI, provides significant diagnostic value in differentiating benign from malignant breast masses. The study supports the potential integration of SMI into routine breast cancer diagnostic workflows, particularly in settings where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upon our findings.

In conclusion, our study demonstrates that SMI, when used alongside conventional imaging modalities such as grayscale US and DCE MRI, offers significant benefits in distinguishing benign from malignant breast masses. The clinical implications are substantial, suggesting that SMI could be integrated into routine breast cancer screening and diagnostic workflows to enhance early detection and treatment planning. These findings underscore the importance of a multimodal imaging approach, combining the strengths of SMI and MRI to achieve optimal diagnostic accuracy in breast cancer evaluation.

Metabolic syndrome is associated with breast cancer mortality: A systematic review and meta-analysis

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Abstract. Harborg S, Larsen HB, Elsgaard S, Borgquist S. Metabolic syndrome is associated with breast cancer mortality: A systematic review and meta-analysis. *J Intern Med.* 2025;**297**:262–75.

Background. This systematic review and meta-analysis assesses the association between metabolic syndrome and breast cancer (BC) outcomes in BC survivors.

Methods. Systematic searches were carried out in PubMed and Embase using variations of the search terms: breast neoplasms (population), metabolic syndrome (exposure), and survival (outcome). Metabolic syndrome was characterized according to the American Heart Association, which includes the presence of three out of five abnormal findings among the risk factors: high blood pressure, high triglycerides, low high-density lipoprotein, high

Results. From the 1019 studies identified in the literature search, 17 were deemed eligible. These encompassed 42,135 BC survivors. The pooled estimates revealed that BC survivors who had metabolic syndrome at the time of their BC diagnosis experienced increased risk of recurrence (HR 1.69, 95% CI: 1.39–2.06), BC mortality (HR 1.83, 95% CI: 1.35–2.49), and shorter disease-free survival (HR 1.57, 95% CI: 1.36–1.81) compared to BC survivors without metabolic syndrome.

Conclusions. Among BC survivors, metabolic syndrome was associated with inferior BC outcomes. This necessitates the creation of clinical guidelines that include metabolic screening for BC survivors. Further research should identify effective interventions to reduce the prevalence of metabolic syndrome among BC survivors to improve metabolic health and BC outcomes.

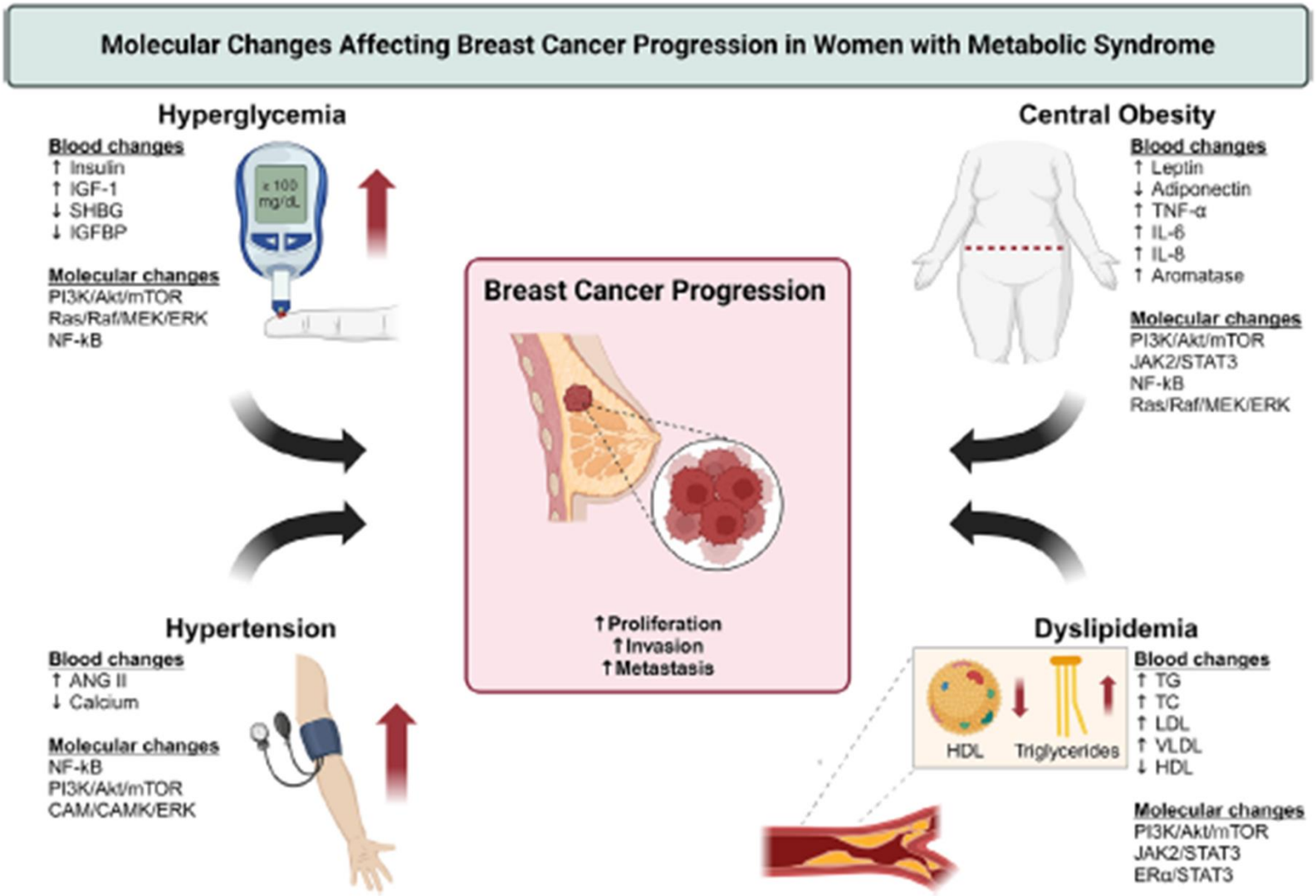

Fig. 1 *Molecular changes affecting breast cancer progression in women with metabo*

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CAM/CAMK/ERK, calcium–calmodulin (CAM)/calcium-calmodulin-dependent protein [illegible] regulated kinase (ERK); ERα/STAT3, estrogen receptor alpha/signal transducer and activator of transcription 3; HDL, high-density lipoprotein; IGF-1, insulin growth factor 1; IGFBP, insulin-like growth factor-binding protein; IL-6, interleukin 6; IL-8,

life.

Conclusions

Among BC survivors, metabolic syndrome was associated with poorer BC outcomes. The findings of this study emphasize the importance of metabolic screening for BC survivors. Future research should focus on assessing how lipid control, reversing diabetes, and making healthy lifestyle choices could decrease the prevalence of metabolic syndrome in this population and ultimately enhance BC survival.

CME MOC

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Hyperglycemic crises in adults: A look at the 2024 consensus report

ABSTRACT

Hospital admissions for diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS), the most severe hyperglycemic emergencies in patients with diabetes, have increased considerably over the past decade. The previous version of the American Diabetes Association's consensus report on the diagnosis and treatment of DKA and HHS was published 15 years ago. The updated consensus report (June 2024) introduces revised criteria for the diagnosis and resolution of DKA and HHS, as well as new recommendations for assessment, management, and prevention.

KEY POINTS

The new report's most relevant update incorporates quantitative beta-hydroxybutyrate measurement (ideally through bedside testing) into DKA and HHS diagnostic criteria, and also recommends its use when assessing severity and determining DKA resolution.

Managing mild and uncomplicated moderate DKA with subcutaneous insulin in a noncritical care setting, when clinically appropriate, is now recommended.

TABLE 1

2024 consensus report criteria for resolution of diabetic ketoacidosis and hyperglycemic hyperosmolar state

Resolution criteria[5]	
Diabetic ketoacidosis	**Hyperglycemic hyperosmolar state**
Plasma or capillary beta-hydroxybutyrate < 0.6 mmol/L AND Venous pH ≥ 7.3 OR Bicarbonate ≥ 18 mmol/L	Serum osmolality < 300 mOsm/kg AND Blood glucose < 250 mg/dL AND Urine output > 0.5 mL/kg/hour AND Cognitive status improved

Approximately 30% of patients with DKA present with mixed acid-base disorders, and resuscitation with isotonic saline (the most frequently used fluid worldwide) often results in associated hyperchloremic metabolic acidosis during treatment. Therefore, using anion gap to assess treatment adequacy and resolution is unjustified whenever beta-hydroxybutyrate measurement is available. The resolution of DKA depends on the adequate suppression of ketonemia, and measurement of beta-hydroxybutyrate now represents best practice in monitoring treatment response. However, in settings where beta-hydroxybutyrate measurement is not available, we believe that normalization of anion gap is still a good surrogate marker for DKA resolution.

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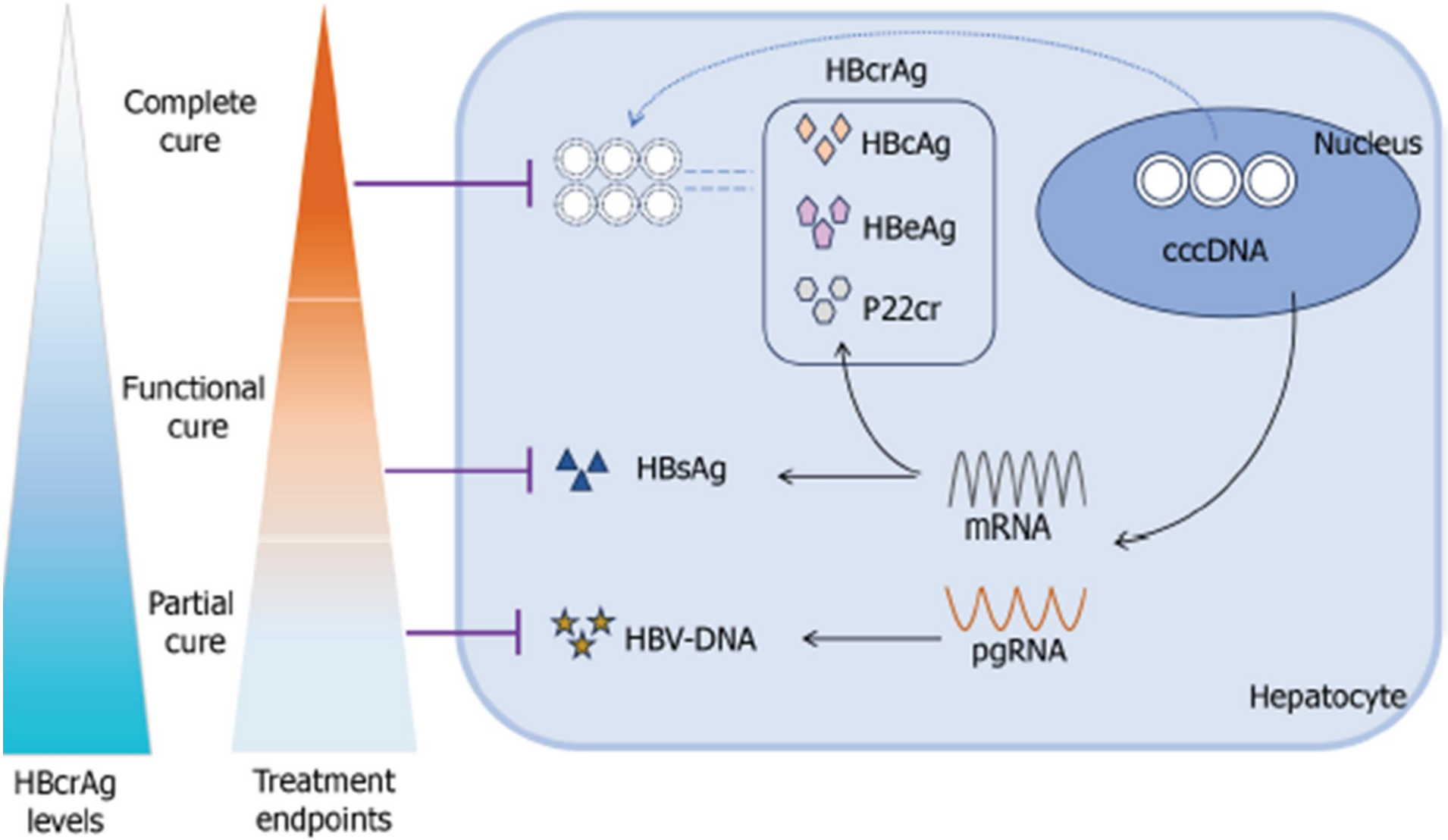
MINIREVIEW

Hepatitis B core-related antigen as a promising serological marker for monitoring hepatitis B virus cure

Yue Qiu, Qiao Tang, Xiao-Qing Liu, Yun-Ling Xue, Yi Zeng, Peng Hu

Abstract

Hepatitis B virus (HBV) infection is a global health concern. The current sequential endpoints for the treatment of HBV infection include viral suppression, hepatitis B e antigen (HBeAg) seroconversion, functional cure, and covalently closed circular DNA (cccDNA) clearance. Serum hepatitis B core-related antigen (HBcrAg) is an emerging HBV marker comprising three components: HBeAg, hepatitis B core antigen, and p22cr. It responds well to the transcriptional activity of cccDNA in the patient's liver and is a promising alternative marker for serological testing. There is a strong correlation, and a decrease in its level corresponds to sustained viral suppression. In patients with chronic hepatitis B (CHB), serum HBcrAg levels are good predictors of HBeAg seroconversion (both spontaneous and after antiviral therapy), particularly in HBeAg-positive patients. Both low baseline HBcrAg levels and decreasing levels early in antiviral therapy favored HBsAg seroconversion, which may serve as a good surrogate option for treatment endpoints. In this review, we summarize the role of serum HBcrAg in the treatment of CHB. Therefore, long-term continuous monitoring of serum HBcrAg levels contributes to the clinical management of patients with CHB and optimizes the choice of treatment regimen, making it a promising marker for monitoring HBV cure.



igure 1 Relationship between different treatment endpoints and hepatitis B core-related antige eplication cycle. cccDNA: Covalently closed circular DNA; pgRNA: Pre-genomic RNA; HBcrAg: Hepatitis B core-re BcAg: Hepatitis B core antigen; HBsAg: Hepatitis B surface antigen; p22cr: Truncated HBcAg.

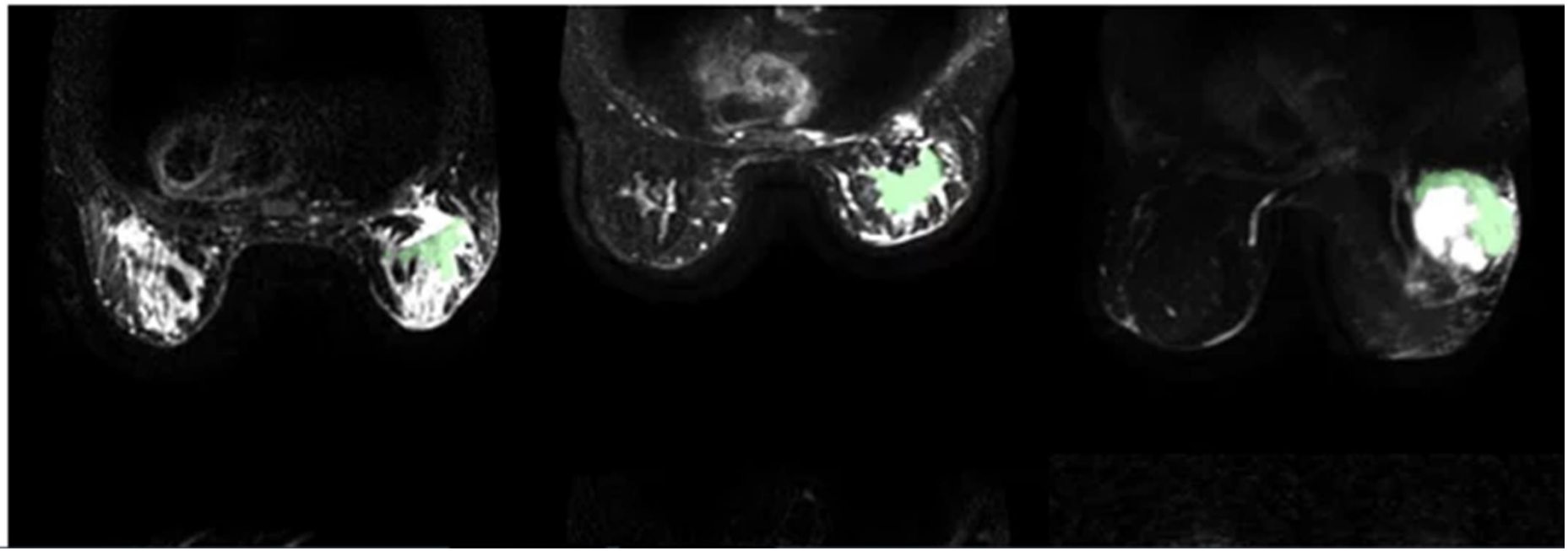
Core Tip: Elimination of hepatitis B virus (HBV) infection by 2030 is a common global goal proposed by the World Health Organization, and the challenge of HBV cure is the persistence of viral replication driven by the covalently closed circular DNA (cccDNA) pool. Currently, clinical markers of HBV DNA and hepatitis B surface antigen have limited utility in predicting HBV cure, either alone or in combination. In this review, we concentrate on the serum hepatitis B core-related antigen, an emerging serologic marker that correlates well with cccDNA, the continued monitoring of which during long-term therapy may aid in clinical management and facilitate the achievement of a complete cure in patients with chronic hepatitis B.

CONCLUSION

In summary, HBcrAg is a promising HBV marker that maintains excellent concordance with intrahepatic cccDNA, and predicts the treatment response and prognosis of patients with CHB well. Observing the rational and dynamic changes in HBcrAg levels may benefit the clinical management of patients with CHB and optimize treatment selection.

MRI technique makes breast cancer 'glow' on imaging

Hannah Murphy | *February 20, 2025* | *Health Imaging* | *Breast MRI*



Courtesy of the University of Waterloo

A new MRI technique is said to be able to more accurately detect breast cancer by “lighting up” malignant tissue on images.

Developed by experts at the University of Waterloo in Ontario, Canada, the synthetic correlated diffusion imaging (CDI) technique highlights differences in how water molecules move through cancerous tissue in comparison to healthy tissue. This is achieved by synthesizing and mixing MRI signals at different gradient pulse strengths and timings.

Experts believe the technique can do more than just enhance cancer detection but improve disease management and treatment as well.

“This technology has great potential to not only improve breast cancer detection, but also treatment,” Alexander Wong, PhD, a professor in the Department of Systems Design Engineering at the University of Waterloo and co-director of the Vision and Image Processing (VIP) Lab, said in a release.

sensors

Article

Optimized Synthetic Correlated Diffusion Imaging for Improving Breast Cancer Tumor Delineation

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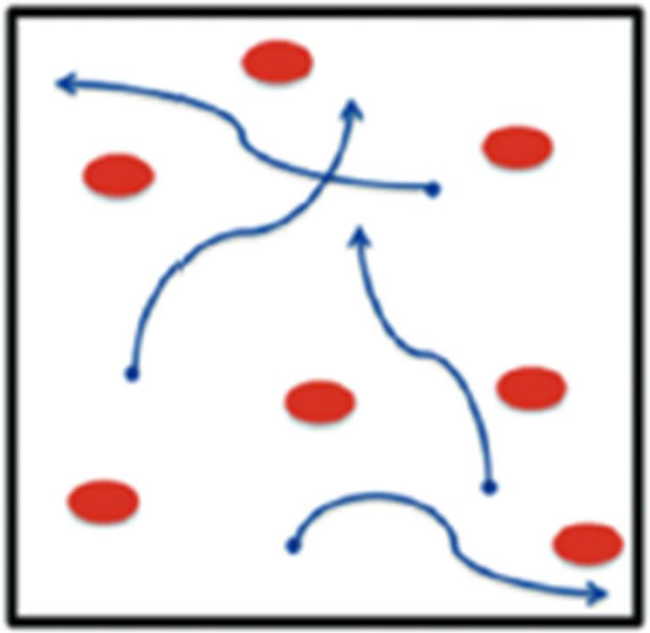
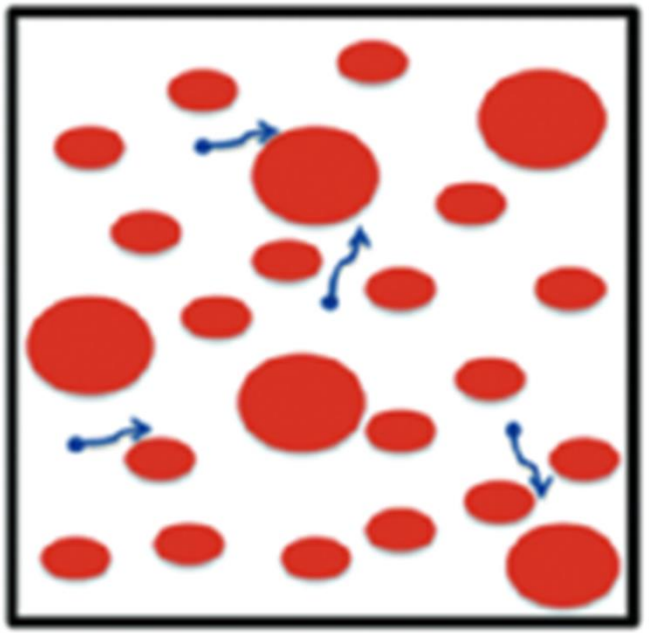
Normal Tissue



Free *Brownian movement* of water molecules in normal tissue (normal diffusion)
Low signal intensity DWI
High signal intensity ADC

Cancer tissue



Restricted *Brownian movement* of water molecules in cancer tissue (restricted diffusion) due to high cellularity, cellular edema and necrosis
High signal intensity DWI
Low signal intensity ADC

Cell

THE END