INPLASY

INPLASY2025100047

doi: 10.37766/inplasy2025.10.0047

Received: 14 October 2025

Published: 14 October 2025

Corresponding author:
Xiaoxuan Wang

13608937237@163.com

Author Affiliation:
Shandong First Medical University&Shandong Academy of Medical Sciences College of Radiology.

Diagnostic Performance of Diffusion-Weighted Imaging with Quantitative Apparent Diffusion Coefficient for Detecting Residual or Recurrent Hepatocellular Carcinoma after Transarterial Chemoembolization: A Systematic Review and Meta-Analysis

Wang, X.

ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2025100047

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 October 2025 and was last updated on 14 October 2025.

INTRODUCTION

Review question / Objective This systematic review and meta-analysis aims to assess the diagnostic performance of diffusion-weighted imaging (DWI) combined with quantitative apparent diffusion coefficient (ADC) for identifying residual or recurrent HCC following TACE.

Condition being studied Transarterial chemoembolization (TACE) is a first-line therapy for unresectable hepatocellular carcinoma (HCC). Nonetheless, post-procedural rates of residual or recurrent disease are high. The accurate and timely detection of these lesions is essential for adapting treatment plans and improving patient prognosis.

METHODS

Search strategy PubMed:
#1 ("diffusion weighted imaging"[Title/Abstract] OR "diffusion-weighted imaging"[Title/Abstract] OR DWI[Title/Abstract] OR "apparent diffusion coefficient"[Title/Abstract] OR ADC[Title/Abstract]) OR "Diffusion Magnetic Resonance Imaging"[Mesh]
#2 ("hepatocellular carcinoma"[Title/Abstract] OR "hepatocellular cancer"[Title/Abstract] OR HCC[Title/Abstract] OR "liver cell carcinoma"[Title/Abstract] OR hepatoma[Title/Abstract]) OR "Carcinoma, Hepatocellular"[Mesh]
#3 ("transarterial chemoembolization"[Title/Abstract] OR "transcatheter arterial chemoembolization"[Title/Abstract] OR TACE[Title/Abstract] OR "chemoembolization"[Title/Abstract]) OR "Chemoembolization, Therapeutic"[Mesh]
#4 #1 AND #2 AND #3

EmBase:
1. (exp diffusion weighted imaging/) or ("diffusion weighted imaging" or "diffusion-weighted imaging" or DWI or "apparent diffusion coefficient" or ADC).ab,ti.
2. (exp liver cell carcinoma/) or ("hepatocellular carcinoma" or "hepatocellular cancer" or HCC or "liver cell carcinoma" or hepatoma).ab,ti.

3. (exp chemoembolization/) or ("transarterial chemoembolization" or "transcatheter arterial chemoembolization" or TACE or "chemoembolization").ab,ti.
4. 1 and 2 and 3

Web of Science:
#1 TS=("diffusion weighted imaging" OR "diffusion-weighted imaging" OR DWI OR "apparent diffusion coefficient" OR ADC)
#2 TS=("hepatocellular carcinoma" OR "hepatocellular cancer" OR HCC OR "liver cell carcinoma" OR hepatoma)
#3 TS=("transarterial chemoembolization" OR "transcatheter arterial chemoembolization" OR TACE OR "chemoembolization")
#4 #1 AND #2 AND #3

Cochrane library:
#1 MeSH descriptor: [Diffusion Magnetic Resonance Imaging] this term only
#2 ("diffusion weighted imaging" OR "diffusion-weighted imaging" OR DWI OR "apparent diffusion coefficient" OR ADC):ab,ti
#3 #1 OR #2
#4 MeSH descriptor: [Carcinoma, Hepatocellular] this term only
#5 ("hepatocellular carcinoma" OR "hepatocellular cancer" OR HCC OR "liver cell carcinoma" OR hepatoma):ab,ti
#6 #4 OR #5
#7 MeSH descriptor: [Chemoembolization, Therapeutic] this term only
#8 ("transarterial chemoembolization" OR "transcatheter arterial chemoembolization" OR TACE OR "chemoembolization"):ab,ti
#9 #7 OR #8
#10 #3 AND #6 AND #9.

Participant or population Patients with a confirmed HCC diagnosis who underwent one or more TACE sessions and were suspected of having residual or recurrent lesions.

Intervention The index test being DWI combined with quantitative ADC.

Comparator The reference standard being either histopathological examination, contrast-enhanced imaging follow-up (≥3 months) demonstrating typical arterial phase hyperenhancement with subsequent progression, or pathological examination of surgical resection specimens.

Study designs to be included Diagnostic studies.

Eligibility criteria The inclusion criteria were: (1) patients with a confirmed HCC diagnosis who underwent one or more TACE sessions and were suspected of having residual or recurrent lesions; (2) the index test being DWI combined with quantitative ADC; (3) the reference standard being either histopathological examination, contrast-enhanced imaging follow-up (≥3 months) demonstrating typical arterial phase hyperenhancement with subsequent progression, or pathological examination of surgical resection specimens; and (4) diagnostic studies from which true-positive, false-positive, true-negative, and false-negative values could be extracted.

Information sources PubMed, Embase, the Cochrane Library, and Web of Science.

Main outcome(s) Diagnostic studies from which true-positive, false-positive, true-negative, and false-negative values could be extracted.

Quality assessment / Risk of bias analysis The methodological quality of the included studies, including risk of bias and concerns regarding applicability, was assessed using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool.

Strategy of data synthesis A bivariate mixed-effects model was employed for the meta-analysis to pool sensitivity and specificity simultaneously. This approach accounts for the inherent negative correlation between the two metrics and avoids potential bias associated with traditional univariate models. The model was used to calculate pooled estimates with 95% confidence intervals (CIs) and to generate forest plots for sensitivity and specificity. A random-effects model was applied to pool the positive likelihood ratio (PLR), negative likelihood ratio (NLR), and diagnostic odds ratio (DOR), as these metrics typically exhibit substantial heterogeneity and provide a comprehensive measure of diagnostic performance. A summary receiver operating characteristic (SROC) curve was fitted, and the area under the curve (AUC) with its 95% CI was calculated. Diagnostic performance based on the AUC was categorized as excellent (AUC ≥ 0.90), good (0.80 ≤ AUC < 0.90), or moderate (0.70 ≤ AUC < 0.80).

Subgroup analysis To explore potential sources of heterogeneity, subgroup analyses were conducted based on study country, design, reference standard, and ADC threshold. The ratio of diagnostic parameters between subgroups was calculated, and the significance of subgroup differences was tested using a Z-test.

Sensitivity analysis Not applicable.

Language restriction No restriction.

Country(ies) involved China.

Keywords Diffusion-Weighted Imaging; Apparent Diffusion Coefficient; Residual or Recurrent Hepatocellular Carcinoma; Transarterial Chemoembolization; systematic review; meta-analysis.

Contributions of each author

Author 1 - Xiaoxuan Wang.
Email: 13608937237@163.com