# OPTIMIZATION OF HEPATOCELLULAR CARCINOMA DETECTION IN MULTIPHASIC COMPUTED TOMOGRAPHY USING CUT-OFF VALUES OF VASCULAR CONTRAST ENHANCEMENT

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## Introduction

Hepatocellular carcinoma (HCC) is one of the highly prevalent malignancies in (holding fourth place) in Egypt. Post viral hepatitic cirrhosis and decompensated cirrhosis show higher HCC incidence rate.

The early diagnosis provides a better chance to use curative therapeutic options. Therefore, surveillance is indicated among high risk groups using ultrasonography (US) and serum alpha-fetoprotein as recommended in guidelines.

Multiphasic CT and MR imaging with contrast medium are evidence based effective imaging techniques for HCC diagnosis and staging. An optimum multiphasic CT study is indispensable to achieve the following:

Selection and planning of management plan.

Proper assessment of tumor burden and providing surgical relevant anatomical details.

Regarding local therapeutic procedures, it helps in selection of appropriate procedure and chemotherapeutic agent dose.

Evaluation of outcome and planning necessary additional procedures.

## Aim of the work

The aim of the work is to define the relation between aortic and hepatic parenchymal enhancement values measured at hepatic arterial phase and specific diagnostic points. The study also aims at setting cut-off values to differentiate between optimum and suboptimum CT studies.

## Patients:

This retrospective study was conducted upon 40 cirrhotic patients having at least two multiphasic CT studies performed within 4week duration.

## Methods:

Two multiphasic CT studies were performed, each performed following a routine multiphasic CT study:

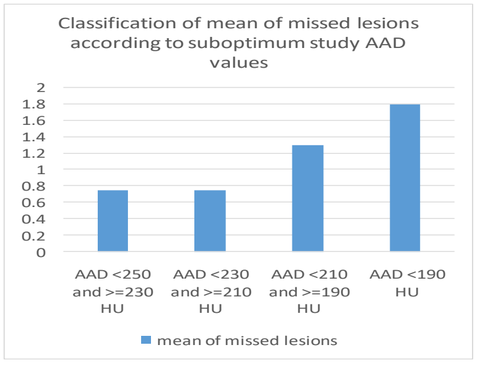
- Non-enhanced phase.
- Hepatic arterial phase (HAP).
- Hepatic (portal) venous phase (PVP).
- Delayed (equilibrium) phase (DP).

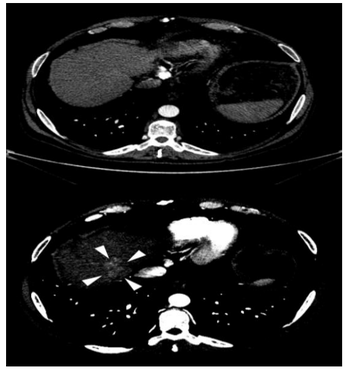
One optimum study fulfilling the following set of image quality criteria and one suboptimum study not matching them.

| Late arterial phase image quality measures | Portal venous phase image quality measures | Delayed phase image quality measures |
|---|---|---|
| • Aortic attenuation density (AAD) = 250-300 HU | • Dynamic hepatic enhancement (DHE) ≥ 50 HU | • Maintained Liver enhancement (close to 50 HU) |
| • Minimal differential liver enhancement (20-30 HU) | • Avid portal vein | |
| • Avid portal vein | • Avid hepatic veins | |

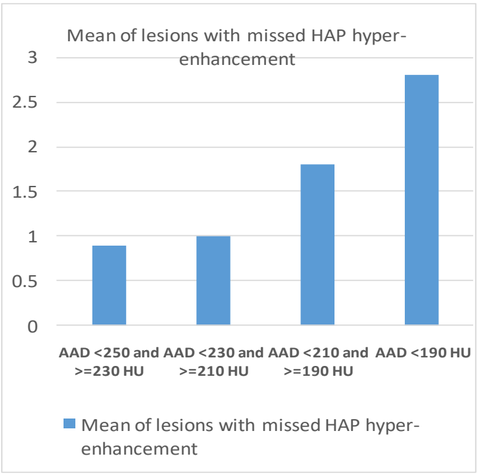
## Results

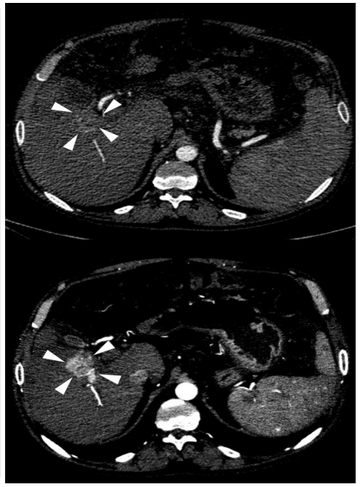
Suboptimum studies showed a total of 40 detected lesions compared to 106 lesions in corresponding optimum studies. Number of missed lesions rises as AAD gets lower.



Regarding HAP hyper-enhancement, suboptimum studies showed a total of 42 lesions showing HAP hyper-enhancement compared to 96 lesions in corresponding optimum studies with consequently under-estimated LIRADS rank.



Regarding peri-lesion satellite detection, suboptimum studies showed a total of 4 lesions showing missed detection of peri-lesion satellites. Also noted that suboptimum studies showed 40 lesions with missed detection of arterial feeders

## Conclusions

AAD and DHE values are easy to apply objective image quality criteria enabling marking a study as accepted optimum study or sub-optimal study (must be repeated).

AAD value is the sole factor that correlates with accurate detection of lesion number (AAD must exceed 250 HU for appropriate assessment of tumor burden) and arterial feeders (AAD must exceed 230 HU to provide an added angiography feature).

DHE value is the main factor that correlates with accurate lesion ranking (DHE must exceed 20 HU for proper lesion visibility), yet AAD value takes the upper hand regarding HAP hyper-enhancement expression (AAD must exceed 250 HU).