Journal of Applied Health Management and Technology Vol 4, No 4 (2022) 116-118

Journal of Applied
Health Management and Technology
p-ISSN: 2715-3061
e-ISSN: 2715-307X

http://ejournal.poltekkes-

# "TECHNIQ REAL TIME ULTRASONOGRAPHY IMAGING WITH MRI OR CT SCAN USING FUSION IMAGING (HYBRID IMAGING)"

Giovana Nopa Prancisca [1)] Edy Susanto [2)] Siti daryati [3)] Gatot Murti Wibowo[4)] Datu Euphrat Adi Pradana[5)] Nurul Aulia Hasbi[6)]

[1]*Health Imaging, Tawada Healhcare,Jakarta*
[2,3,4] *Program Studi Imaging Diagnostik, Poltekkes Kemenkes Semarang*
[4] *Radiologi Departemen, RS Cipto Mangunkusumo,Jakarta*
[5]*Program Studi Radiologi,Poltekkes Muhammadiyah,Makassar*

Corresponding author: giovana nopa prancisca
Email: giovana.radiologi@gmail.com

## ABSTRACT

*Introduction : Ultrasound examination (USG) is a modality that is real time, fast, has high resolution, and is dynamic, but ultrasound has shortcomings in displaying the anatomical context presented by CT and MRI, therefore fusion imaging connects several imaging modalities (hybrid imaging) between real time ultrasound, CT and MRI which are useful in providing anatomical information that help each other, besides that it can also be used for biopsy.Case Illustration: In real time ultrasound imaging, the author uses the Phillips brand ultrasound modality with a premium class Epiq 5 type which is equipped with Percunav imaging software and prepared equipment such as a transmitter, patient tracker, Ultrasound tracker (sensor bracket) and the probe used is Convex 5-1 .Discussion: We can see the focal nodule contour in real time with hybrid imaging, and we can compare the diameter of the lesion between the two modalities. In addition, with realtime ultrasound, we can see metastases by looking at vascularization using Doppler.Conclusion: In this 4.0 era, fusion imaging (hybrid imaging) plays a very important role in diagnosis, staging and follow-up during treatment. Fusion imaging allows good control during the review of liver lesions so that no re-exposure to radiation is used.*

Keyword : *Utrasonografi Realtime, MRI, CT Scan, Fusion Imaging*

## Introduction

Conventional cross-sectional imaging techniques [ultrasound, computed tomography (CT), magnetic resonance (MR). It has an important role in noninvasive diagnosis, and in tumor treatment strategies. The techniques used have different working principles, so they complement each other in providing information. The combination of the two imaging techniques developed in recent years is

called fusion imaging. The combination of anatomical imaging techniques (USG with CT or MR imaging), as well as linking between anatomic (CT or MR imaging) and molecular imaging (SPECT or PET) modalities are currently used in clinical practice.

Ultrasound examination (USG) is a modality that is real time, fast and has high resolution, and is dynamic, but ultrasonography has shortcomings in displaying the anatomical context presented by MRI/CT. Therefore, in the industrial revolution 4.0, fusion imaging technology was developed. The benefits of fusion imaging are based on the ability to display together various imaging modalities that help provide the best results for patients.

**Research methods**

The patient had previously had ultrasound, but due to the limitations of ultrasound, which made it difficult to evaluate the whole liver and difficult to penetrate obese patients, the picture of the nodules was less contrasting. Then the patient is subjected to a CT/MRI examination, because to see the nodules or clearly use CT/MRI, while interventional treatment is easier to do using Ultrasonography, besides that the increase in radiation exposure can be minimized, thus this fusion imaging is carried out by combining the advantages of imaging techniques that are different.

In real time ultrasound imaging, the author uses the Phillips brand ultrasound modality with the premium class Epiq 5 type which is equipped with Percunav imaging software and prepared equipment such as Transmitter, patient tracker, Ultrasound tracker (sensor bracket) and the probe used is Convex 5-1.

The steps taken for this fusion examination (1) the volume of CT/MRI data must be archived in DICOM format (2) the thickness of the slices must be 3mm (3) CT or MRI data is transferred to the Ultrasound machine (4) the magnetic sensor mounted on the probe must properly installed to detect changes in the location, direction and rotation of the probe.

Then we combine the images or hybrid imaging by:

1. Connect ultrasound tracker and patient tracker
2. Place the patient tracker not snugly against the bone
3. Send patient data to ultrasound
4. Position the patient and match the target
5. Choose Percunav
6. Select CT/MRI/PET
7. Select the patient's CT/MRI/Pet image
8. And choose fusion

**Results and Discussion**

After performing a hybrid imaging (fusion imaging) examination on HCC patients, it was found that by using fusion imaging we are able to see a nodule in real time with ultrasound combined with other modalities such as CT/MRI/PET.

Diagnosis can be made quickly. With hybrid imaging we can see a target or mass on a CT/MRI/PET image moving simultaneously. So the sonographer can also work with the oncologist to perform a biopsy.

Focal nodules can be seen in real-time contours with hybrid imaging, and can compare the diameter of the lesion between the two modalities. In addition, with realtime ultrasound, we can see metastases by looking at vascularization using Doppler.

That means that in subsequent treatment we can see metastatic changes in masses or lesions that have been treated using fusion imaging alone. As well as doing a real-time biopsy with the right target because the CT/MRI image will move in realtime and simultaneously on ultrasound.

**Conclusion**

Fusion imaging (hybrid imaging) is able to help establish the diagnosis quickly because it combines the advantages of all modalities, assisting in biopsy. The fused CT/MR images show the same plane and move synchronously. So in this 4.0 era, fusion imaging (hybrid imaging) plays an important role in both diagnosis, staging and follow-up during treatment. Fusion imaging allows good control during the review of liver lesions so that no re-exposure to radiation is used.

## REFERENCES


1. S-Fusion : An intuitive multi-modality fusion imaging method with high precision**.** Samsung Medison. 2015.
2. Percunav. Fusion (Manual Method) QuickGuide. Phillips Ultrasonografi medical Corporation 2017.
3. Automatic registration brings new levels of simplicity to image fusion – advancing patient care ; Netherlands, 2015
4. Daniela Larisa Sandulescu, Daniela Dumitrescu, Ion Rogoveanu, Adrian Saftoiu. Hybrid ultrasound imaging techniques (fusion imaging). *World J Gastroenterol* 2011 January 7; 17(1): 49-52.
5. Caroline Ewertsen, Hanne Sønder Grossjohann, Kristina Rue Nielsen, Søren Torp Pedersen, Michael Bachmann Nielsen. Biopsy Guided by Real-Time Sonography Fused with MRI:A Phantom Study. 2008
6. Kawasoe H, Eguchi Y, Mizuta T, Yasutake T, Ozaki I, Shimonishi T, Miyazaki K, Tamai T, Kato A, Kudo S, Fujimoto K.
7. Radiofrequency ablation with the real-time virtual sonography system for treating hepatocellular carcinoma difficult to detect by ultrasonography. *J Clin Biochem Nutr* 2007; 40: 66-72
8. Minami Y, Kudo M, Chung H, Inoue T, Takahashi S, Hatanaka K, Ueda T, Hagiwara H, Kitai S, Ueshima K, Fukunaga T, Shiozaki H. Percutaneous radiofrequency ablation of sonographically unidentifiable liver tumors. Feasibility and usefulness of a novel guiding technique with an integrated system of computed tomography and sonographic images. *Oncology* 2007; 72 Suppl 1: 111-116
9. Minami Y, Chung H, Kudo M, Kitai S, Takahashi S, Inoue T, Ueshima K, Shiozaki H. Radiofrequency ablation of hepatocellular carcinoma: value of virtual CT sonography with magnetic navigation. *AJR Am J Roentgenol* 2008; 190: W335-W341
10. Kitada T, Murakami T, Kuzushita N, Minamitani K, Nakajo K, Osuga K, Miyoshi E, Nakamura H, Kishino B, Tamura S, Hayashi N. Effectiveness of real-time virtual sonographyguided radiofrequency ablation treatment for patients with hepatocellular carcinomas. *Hepatol Res* 2008; 38: 565-571
11. Sandulescu L, Saftoiu A, Dumitrescu D, Ciurea T. Real-time contrast-enhanced and real-time virtual sonography in the assessment of benign liver lesions. *J Gastrointestin Liver Dis* 2008; 17: 475-478
12. Bruix J, Sherman M. Management of hepatocellular carcinoma. *Hepatology* 2005; 42: 1208-1236
13. Claudon M, Cosgrove D, Albrecht T, Bolondi L, Bosio M, Calliada F, Correas JM, Darge K, Dietrich C, D'Onofrio M, Evans DH, Filice C, Greiner L, Jäger K, Jong N, Leen E, Lencioni R, Lindsell D, Martegani A, Meairs S, Nolsøe C, Piscaglia F, Ricci P, Seidel G, Skjoldbye B, Solbiati L, Thorelius L, Tranquart F, Weskott HP, Whittingham T. Guidelines and good clinical practice recommendations for contrast enhanced ultrasound (CEUS) - update 2008. *Ultraschall Med* 2008; 29: 28-44