

UJI KESesuaIAN PENGUKURAN VOLUMETRIK TUMOR MENGGUNAKAN ARTIFICIAL INTELLIGENCE (AI) SYNAPSE 3D DAN METODE MANUAL PADA PENCITRAAN COMPUTED TOMOGRAPHY KARSINOMA HEPATOSSELULAR

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INTISARI

Latar belakang. Perkembangan AI radiologi memungkinkan perhitungan volumetrik tumor 3D serta penilaian respons pengobatan menggunakan parameter volume tumor.

Tujuan. Mengetahui kesesuaian pengukuran volumetrik AI Synapse 3D dibandingkan rumus volume manual (sphere dan elipsoid) serta kesesuaian hasil klasifikasi respons pengobatan RECIST 1.1 dibandingkan penilaian respons pengobatan menggunakan *cut off* volumetrik tumor.

Bahan dan Metode Penelitian. Dilakukan rekonstruksi 3D volumetrik pada 135 MSCT Abdomen pasien KHS selama April 2017 - Juni 2021 untuk selanjutnya dilakukan analisa komparasi pengukuran volumetrik AI dengan rumus manual (*sphere* dan elipsoid) terhadap 252 nodul tumor, serta perbandingan klasifikasi respons pengobatan berdasarkan RECIST 1.1 dan *cut off* volumetrik tumor.

Hasil. Ketiga metode pengukuran volume tumor memberikan hasil berbeda signifikan dengan $p=0.00$ ($p<0.05$). Pada analisis perbandingan penilaian respon pengobatan didapatkan *Kappa* tertinggi pada kriteria RECIST 1.1 dengan volume rumus *sphere* sebesar 0.978; $p = 0.000$, serta pada RECIST 1.1 dengan volume Synapse 3D (*cut off* parameter *sphere*) sebesar 0.914 ; $p = 0.000$. Klasifikasi respon pengobatan pada ketiga kelompok tersebut memberikan yang hasil tidak berbeda signifikan dengan $p= 0.317$ dan 0.59.

Pembahasan dan Kesimpulan. Hasil pengukuran volumetrik dengan AI dan rumus manual memberikan hasil yang berbeda signifikan memperlihatkan bahwa KHS cenderung ireguler, tidak murni berbentuk sphere ataupun elipsoid. Pertambahan atau penyusutan tumor tidak hanya terjadi secara *unidimensional/bidimensional*. Volumetrik tumor AI Synapse 3D dapat lebih akurat mencerminkan ukuran tumor yang sebenarnya. Klasifikasi respons pengobatan berdasarkan *cut off* volume tumor *sphere* dapat digunakan pada praktik klinis sehari-hari.

Kata Kunci: *Artificial Intelligence, AI, Synapse 3D, volumetrik, sphere, elipsoid, tumor, KHS*

CONCORDANCE OF VOLUMETRIC TUMOR MEASUREMENTS USING ARTIFICIAL INTELLIGENCE (AI) SYNAPSE 3D COMPARE TO MANUAL FORMULA QUANTIFICATION IN COMPUTED TOMOGRAPHY OF HEPATOCELLULAR CARCINOMA

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ABSTRACT

Background. Recent development of AI technology in radiology, has enabled 3D tumours volumetric calculations as well as treatment response assessment.

Objectives. To seek concordance between volumetric measurement of AI Synapse 3D compared to manual (sphere and ellipsoid) quantification, and assessing classifications of treatment response according to RECIST 1.1 compared to tumours volumetric parameters.

Materials and methods. 3D tumours volumetric reconstruction were conducted for 135 Abdominal MSCT of HCC patients during April 2017- June 2021. Further comparative analysis of AI volumetric measurements with manual formulas on 252 tumor nodules, as well as comparison of treatment response classification based on RECIST 1.1 and tumor volumetric cut-off were performed.

Result. Volumetric comparison between AI and manual quantification (sphere and ellipsoid formulas) methods were significantly different with $p=0.00$ ($p<0.05$). Highest Kappa value were found between RECIST 1.1 and volumetric tumor using sphere formula (0.978; $p = 0.000$), and Synapse 3D volume (cut off sphere parameter, 0.914; $p = 0.000$). Classification of treatment response in those groups were not significantly different with $p = 0.317$ and 0.59 .

Discussions and Conclusions. HCC is proved to be more irregular in shape and not purely spherical or ellipsoid form. Tumor growth or shrinkage does not only occur in a unidimensional/bidimensional manner. Therefore, Synapse 3D AI tumor volumetrics can more accurately reflect the actual tumor size. Classification of treatment response based on the cut-off parameter spherical assumption can be used in daily clinical practice.

Keywords. *Artificial Intelligence, AI, Synapse 3D, volumetric, sphere, elipsoid, tumor, HCC*