

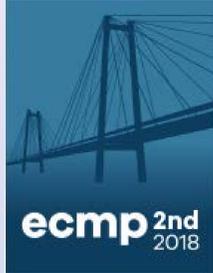
Analytical anisotropic algorithm vs Acuros algorithm comparison

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Purpose

The aim of this work is to compare Acuros and Analytical Anisotropic Algorithm (AAA), focusing on tissue interfaces.

Methods

27 head and neck pathology treatment plans were calculated with both algorithms. Density heterogeneities and air tissue interfaces in the lungs and oral cavity have been analysed. Radiotherapy Treatment Planning System (TPS) Eclipse version 13.7 was used. The grid size set was 0.25 cm.

Dose matrix were exported from the RTP and compared with gamma 3D evaluation method with different distance and dose parameters using the software VeriSoft version 5.1.

For every treatment plan gamma 3D global analysis (Γ) was performed in two dose planes (head and lung) to check dose differences. Values under 20% of the maximum dose are excluded of the comparison.

The difference of points in regions of interest was analyzed using the software imageJ v1.50i.

$\Gamma(3/1)$ and $\Gamma(1/3)$ were also performed to evaluate dependence on dose and distance.

Results

The $\Gamma(2/2)$ in 92.59% of cases between both dose distributions was higher than 95%. $\Gamma(3/3)$ was higher than 95% for all the cases tested in both locations, head and lung.

No correlation was found between ROI size and dose difference for all comparisons in head ()

$\Gamma(3/1)$ Vs. $\Gamma(1/3)$ averages were 97.28% Vs. 98.28% for head and 97.39% Vs. 97.93% for lung.

Results for head:

	$\Gamma(5/3)$	$\Gamma(3/3)$	$\Gamma(2/2)$	$\Gamma(1/1)$	$\Gamma(3/1)$	$\Gamma(1/3)$
Mean	99.84	99.62	98.13	85.69	97.28	98.28
Median	99.90	99.70	98.90	87.40	98.10	99.30
Sd	0.21	0.39	1.89	7.99	2.13	2.16

Results for lungs:

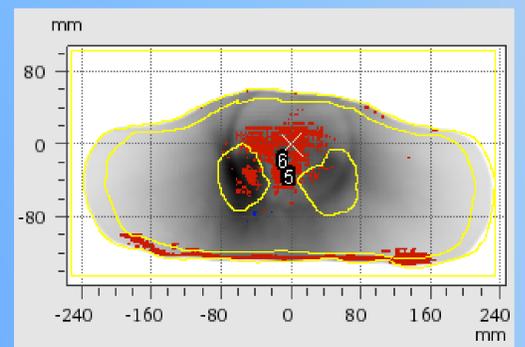
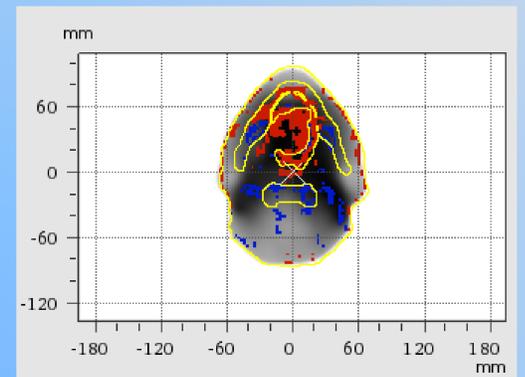
	$\Gamma(5/3)$	$\Gamma(3/3)$	$\Gamma(2/2)$	$\Gamma(1/1)$	$\Gamma(3/1)$	$\Gamma(1/3)$
Mean	99.82	99.58	98.26	85.58	97.39	97.93
Median	99.90	99.80	98.80	87.40	97.80	98.60
Sd	0.23	0.57	2.22	7.63	1.74	2.16

Conclusions

Dose difference is more dependent on the distance of the points than on the dose under the Γ criteria.

Main differences are obtained at the skin, dose calculated with the Acuros algorithm is higher than the values with AAA algorithm, nevertheless dose values are higher for higher density structures when AAA algorithm is used.

Dose difference in lungs has shown a similar dependence as dose difference in skin.



Dose difference:
Red: Higher dose in Acuros, Blue: Higher dose in AAA

