Comparison of Quantitative Ejection Fraction from MUGA Scintigraphy amongst Three Analyzing Methods

Monica Chu [*1], **K. L. Chiu**[1], Chris **Chan**[1], **Keith Kwan**[2], **Martin Law**[2], **B.F. Yeung**[1], **Charles Chow**[1], **Vivian Ma**[1]

[1] Department of Radiology and Nuclear Medicine, Tuen Mun Hospital, Hong Kong

[2]Department of Clinical Oncology, Tuen Mun Hospital, Hong Kong

Objectives:

To compare and discuss quantitative results of ejection fraction obtained from MUGA scintigraphy using Cadmium Zinc Telluride (CZT) crystal gamma camera with three analyzing methods including a vendor-neutral software.

Materials and methods:

- Thirty two patient (10 males and 22 females, mean age = 62 with range: 33-88 years) underwent planar MUGA scintigraphy with the DSPECT (Spectrum-Dynamics, Israel) and a SPECT-670 system (GE, USA) during March/2025 to July/2025. Images from DSPECT were analyzed with the DSPECT MUGA software to obtain the ejection fraction (EF) and with the FUGA software (Stockholm, Sweden). After the DSEPCT imaging, the same patient also underwent the SPECT-670 MUGA scan, the EF of which was analyzed by the software of the SPECT system. Therefore three quantitative values of EF were obtained for each patient.

Results

The average values of EF, as obtained by the DSPECT software and a vendor-neutral software FUGA, were 56% (95% CI= 52%, 60%) and 61% (95% CI: 58%, 65%) respectively. The average value of EF, as obtained by SPECT-670 was 64% (95% CI: 62%, 67%). Due to the non-normality distribution of DSPECT EF, Mann-Whitney test (SPSS, USA) was used and there was no statistically significant difference in EF between FUGA and DSPECT (p=0.09) and there was statistically significant difference in EF between SPECT-670 and DSPECT analysis (p=0.003). However, there was no statistically significant difference in EF between SPECT-670 and FUGA (p=0.23) using Student t-test, implying that values of EF as analyzed by FUGA were in good accord with those analyzed by DSPECT and SPECT-670. These findings suggest that FUGA produces EF values comparable to both DSPECT and GE670, supporting its potential importance as a vendor-neutral software for MUGA scans

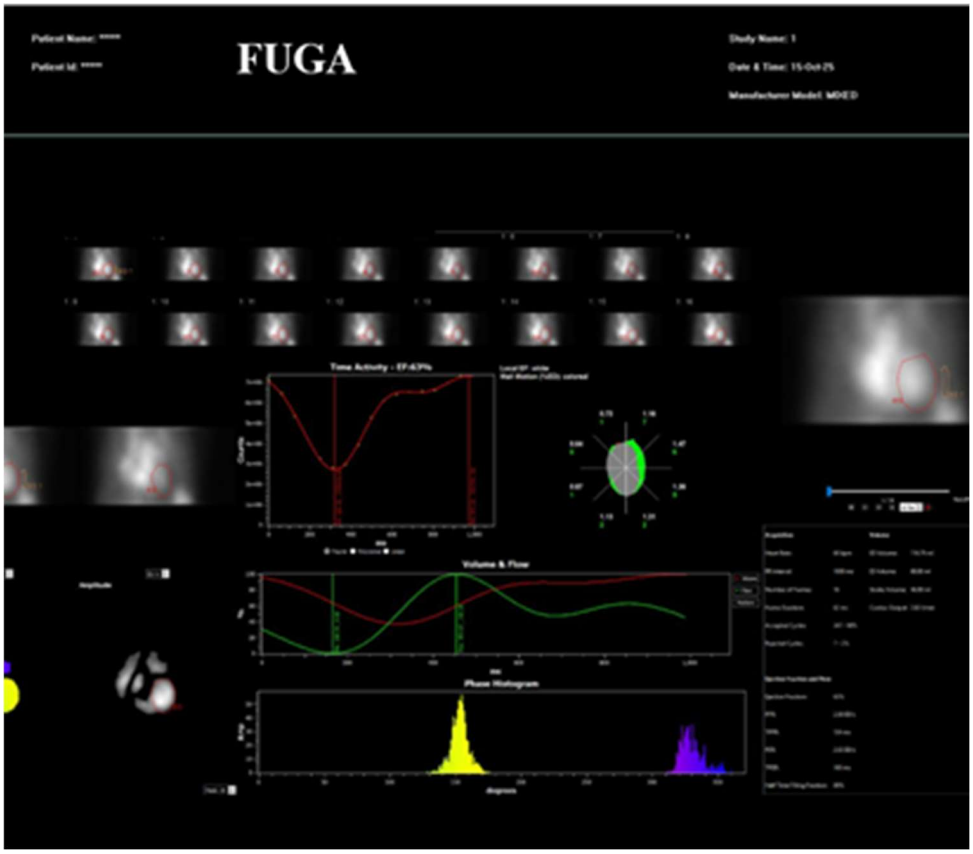
.

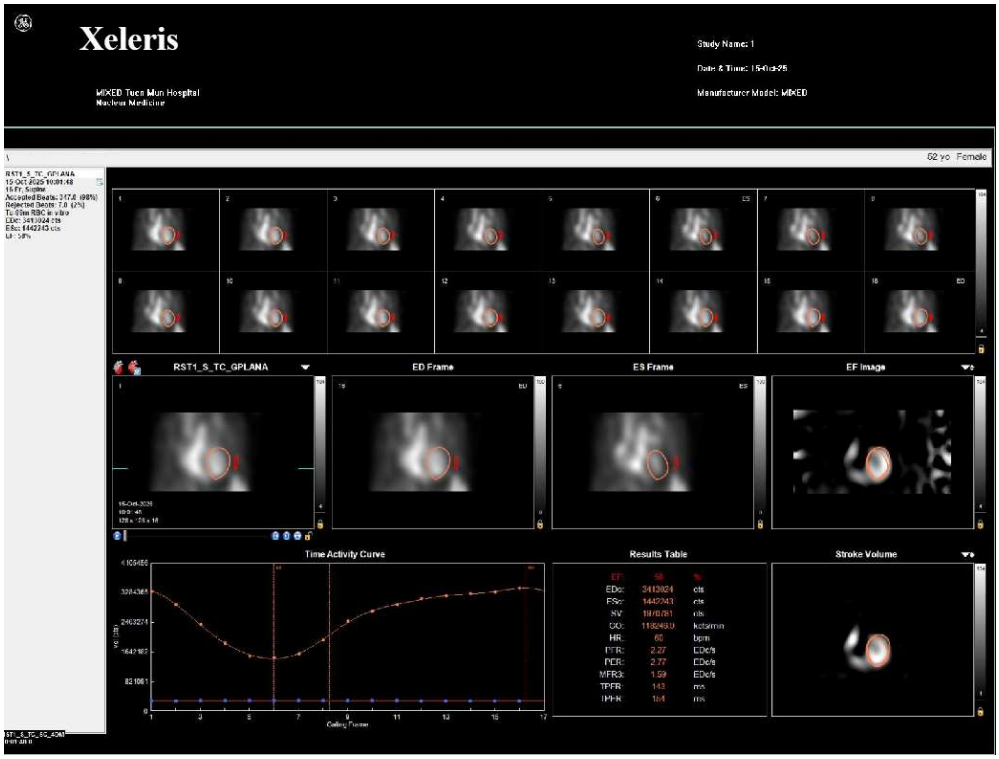
	Valid N	Mean	Confidence	Confidence	Minimum	Maximum	Std.Dev.
column_D_4DM EF CZT (%)	32	**56.15625**	52.10910	60.20340	25.00000	70.00000	11.22529
column_E_FUGA EF on CZT (%)	32	**61.59375**	57.95611	65.23139	36.00000	83.00000	10.08947
column_F_GE670 Planar EF analysis (%)	32	**64.46875**	61.76454	67.17296	49.00000	80.00000	7.50047
GSPECT CZT (%)	31	**73.51613**	68.77233	78.25993	42.00000	92.00000	12.93283

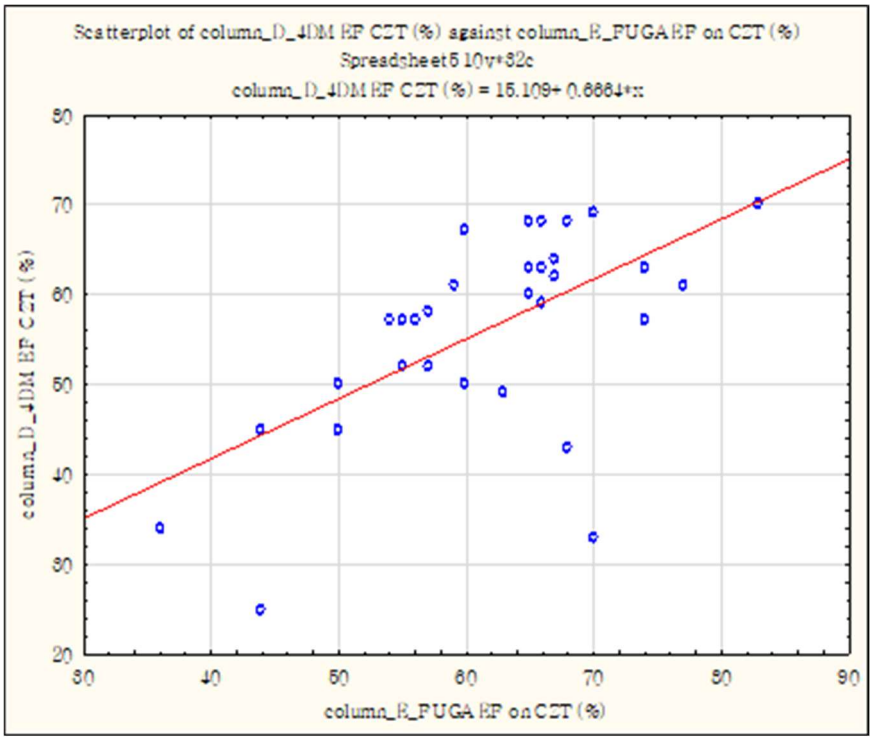
	Mean	Mean	t-value	df	p	Valid N	Valid N	Std.Dev.	Std.Dev.	F-ratio	p
column_D_4DM EF CZT (%) vs. column_E_FUGA EF on CZT (%)	56.15625	61.59375	-2.03795	62	**0.045827**	32	32	11.22529	10.08947	1.237822	0.556110

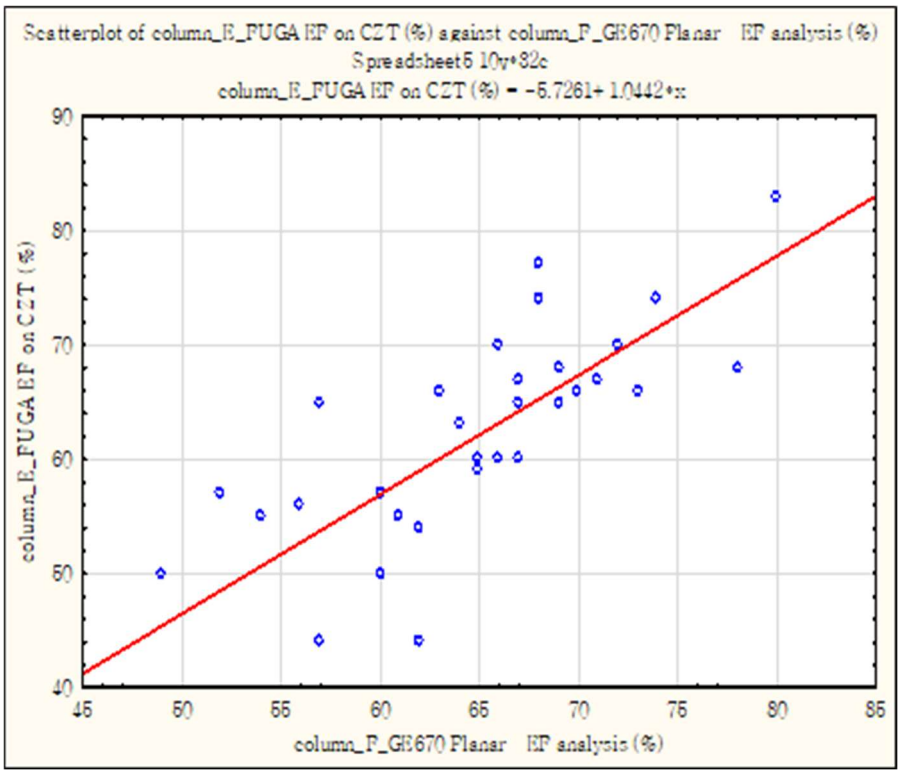
	Mean	Mean	t-value	df	p	Valid N	Valid N	Std.Dev.	Std.Dev.	F-ratio	p
column_E_FUGA EF on CZT (%) vs. column_F_GE670 Planar EF analysis (%)	61.59375	64.46875	-1.29363	62	**0.200593**	32	32	10.08947	7.500470	1.809504	0.103937

	Mean	Mean	t-value	df	p	Valid N	Valid N	Std.Dev.	Std.Dev.	F-ratio	p
column_D_4DM EF CZT (%) vs. column_F_GE670 Planar EF analysis (%)	56.15625	64.46875	-3.48302	62	**0.000915**	32	32	11.22529	7.500470	2.239844	0.027947


FUGA
Time Activity - EF:63%
Volume & Flow
Phase Histogram


Xeleris
MIXED Tuca Mun Hospital
Nuclear Medicine
Study Name: 1
Manufacturer Model: MIXED
62 yo Female
RST1_S_TC_GPLANA
ED Frame
ES Frame
EF Image
Time Activity Curve
Results Table
Stroke Volume


Scatterplot of column_D_4DM EF CZT (%) against column_E_FUGA EF on CZT (%)
Spreadsheet5 10v*32c
column_D_4DM EF CZT (%) = 15.109+ 0.6664*x
column_D_4DM EF CZT (%)
column_E_FUGA EF on CZT (%)
20
30
40
50
60
70
80
90


Scatterplot of column_E_FUGA EF on CZT (%) against column_F_GE670 Planar EF analysis (%)
Spreadsheet5 10v*32c
column_E_FUGA EF on CZT (%) = -6.7261+ 1.0442*x
column_E_FUGA EF on CZT (%)
column_F_GE670 Planar EF analysis (%)
40
50
60
70
80
90
45
50
55
60
65
70
75
80
85

Conclusion

While it is necessary to further improve the MUGA image quality for every imaging system, their analyzing tools for quantitative EF should also be further optimized. The FUGA software is an independent platform to compare with MUGA scintigraphy from DSPECT and SPECT-670, and it is observed that the resulting values of MUGA EF as obtained by FUGA were matched with MUGA scintigraphy as acquired by DSPECT and SPECT-670 and their analyzing tools.