Numeric Embryo Quality Scoring Index (NEQsi) is Predictive of IVF Cycle Outcome at any Endometrial Thickness.

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Background

Endometrial Thickness (ET) Assessments

ET is widely utilized to assess the quality of endometrial preparation in IVF cycles. The connection between endometrial thickness and cycle outcome is divided in the literature; some studies report correlation between ET and cycle outcome while others find no relationship between the two. Regardless, the statistical interactions between ET and embryo quality remain understudied.

Numeric Embryo Quality Scoring Index (NEQsi)

NEQsi was recently developed as a method for converting Gardner embryo grades to interval variables for use in statistical modeling. Conversion of Gardner grades to NEQsi scores follows:

Step 1: Retain number from Gardner's grade. 6

Step 2: Conversion of letter portion of score.

AlphaCon		TE A	TE B	TE C
ICM	A	AA +5	AB +4	AC +3
	B	BA +4	BB +3	BC +2
	C	CA +3	CB +2	CC +1

AA = +5

Step 3: Summation of results of steps 1 and 2.

Gardner # + AlphaCon = NEQsi Score 6 + 5 = NEQsi score 11

- The relationship between NEQsi score and probability of pregnancy is a tight linear positive correlation.
- Full description of the NEQsi system is published : *A novel system for rapid conversion of Gardner embryo grades to linear scale numeric variables. Pierson et al., RBMO 46:5, 2023*

Study Question

Is it possible to use NEQsi to determine the statistical contributions of embryo quality and endometrial thickness (ET) to IVF cycle outcome?

Study Design & Duration

Retrospective non-interventional analysis including IVF cycles conducted at a Canadian multi-clinician fertility care centre (n=1711). Data were acquired from a chart review of deidentified patient files from 2014 – 2021.

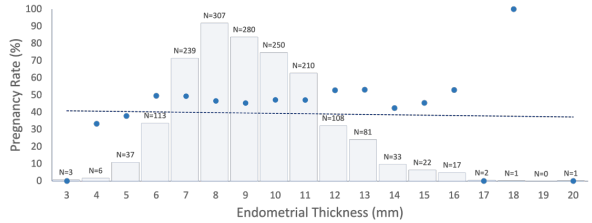
1711 ET cycles (single embryology lab) → Gardner → NEQsi → Logistic Regression & Modelling

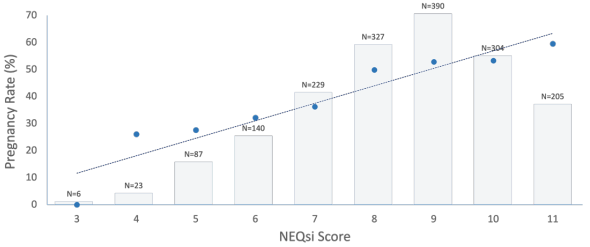
Patient Demographics

Per-Transfer Patient / Embryo Cohort Descriptive Statistics	
Number of cycles (n)	1711
Mean Patient Age (years)	36.3
Patient Age Range (years)	25.0 – 52.8
% Cycles with Fresh Embryo Transfer	12.0
% Cycles with Frozen Embryo Transfer	88.0
Mean Endometrial thickness (mm)	9.7
Mean NEQsi Score	8.3
Median NEQsi Score	9
NEQsi Score Range	3-11
Gardner Range	2CC-6AA
Female Factor Infertility Diagnosis (%)	799 (46.7%)
Male Factor Infertility Diagnosis (%)	329 (19.2%)
Male & Female Factor Infertility Diagnosis (%)	182 (10.6%)
Idiopathic Infertility Diagnosis (%)	401 (23.4%)
Embryo Hatch Assisted (n)	1141
PGT Conducted (n)	465
No PGT Conducted (n)	1246

Results

Multivariate logistical regression: NEQsi score was a significant predictor of cycle outcome ($p<0.001$); endometrial thickness was not ($p=0.585$).





A strong positive linear correlation was observed between NEQsi score and observed pregnancy rate ($R^2 = 0.8998$).

Conclusions

- This work confirms the utility of the NEQsi in conducting statistical analyses with embryo quality as a covariate.
- Cancellation of embryo transfers based on ET measurements alone is not warranted.

Resources

- Web-based NEQsi calculator can be found at: https://matrisart.com/neqsi-calculator/

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