

Alpha Defensin-1 Level Correlates with Peri-Prosthetic Infection Severity following Implant-Based Breast Reconstruction

Introduction

- Alpha-defensin-1 (AD-1) is an antimicrobial peptide released by neutrophils in response to active infection.
- Proven to be both **sensitive** and **specific** for the identification breast implant infection (qualitative).
- Quantitative analysis of AD-1 as a measure of infection severity remains lacking.
- Hypothesis**: levels of AD-1 within peri-implant fluid samples correlate with degree of infection.

Methods

- Prospectively maintained database (n = 29 patients; 38 breasts).
- Peri-prosthetic fluid was sampled, and AD-1 levels were sent for quantitative analysis.
- Control samples obtained during exchange or revision procedures.
- Modified **Spear score** for infection severity:

	No exposure	Threatened Exposure	Actual Exposure
No Infection	Score = 0	Score = 1	N/A
Minor Infection	Score = 2	Score = 3	Score = 4
Severe Infection	Score = 5	Score = 6	Score = 7

Statistical Analysis:

- Descriptive statistics of patient and management characteristics.
- Evaluation of relationship between AD-1 level and systemic signs of infection.
- Ordinal logistic** regression performed to evaluate the correlation between infection severity and AD-1 level.

Results

- Total of **15** infected breasts (23 non-infected).
- Groups well-matched, except **plane of reconstruction** (DTI → ↑ infection rate, p < 0.01).
- Mean AD-1 Levels (>1 suggests infection):
 - Infected = **3.97** (2.66-5.61)
 - Non-Infected = **0.12** (0.08-0.16)
- Per unit increase in AD-1 correlated with clinical signs of infection.
- Clinical examination (i.e., erythema) less reliable:

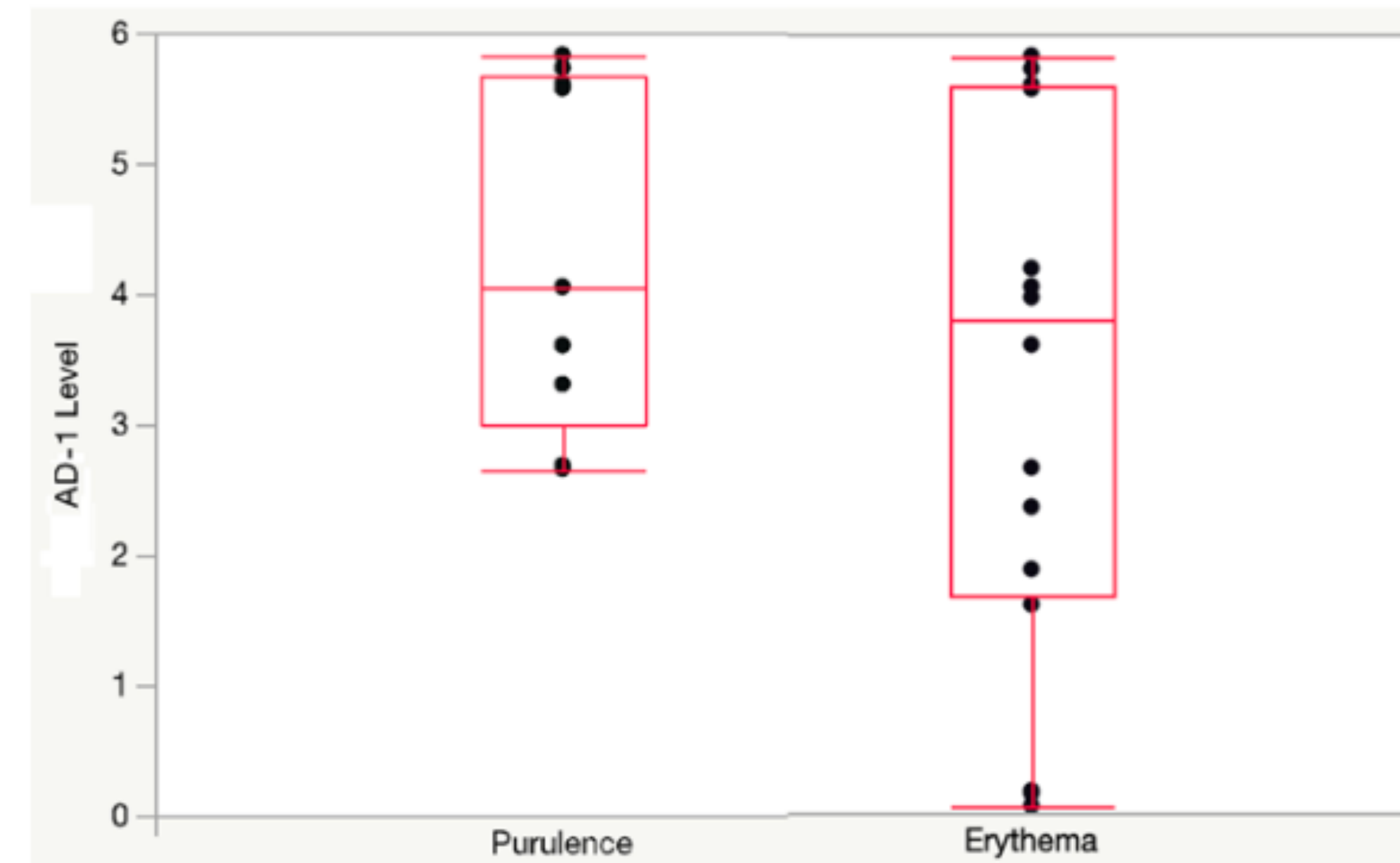
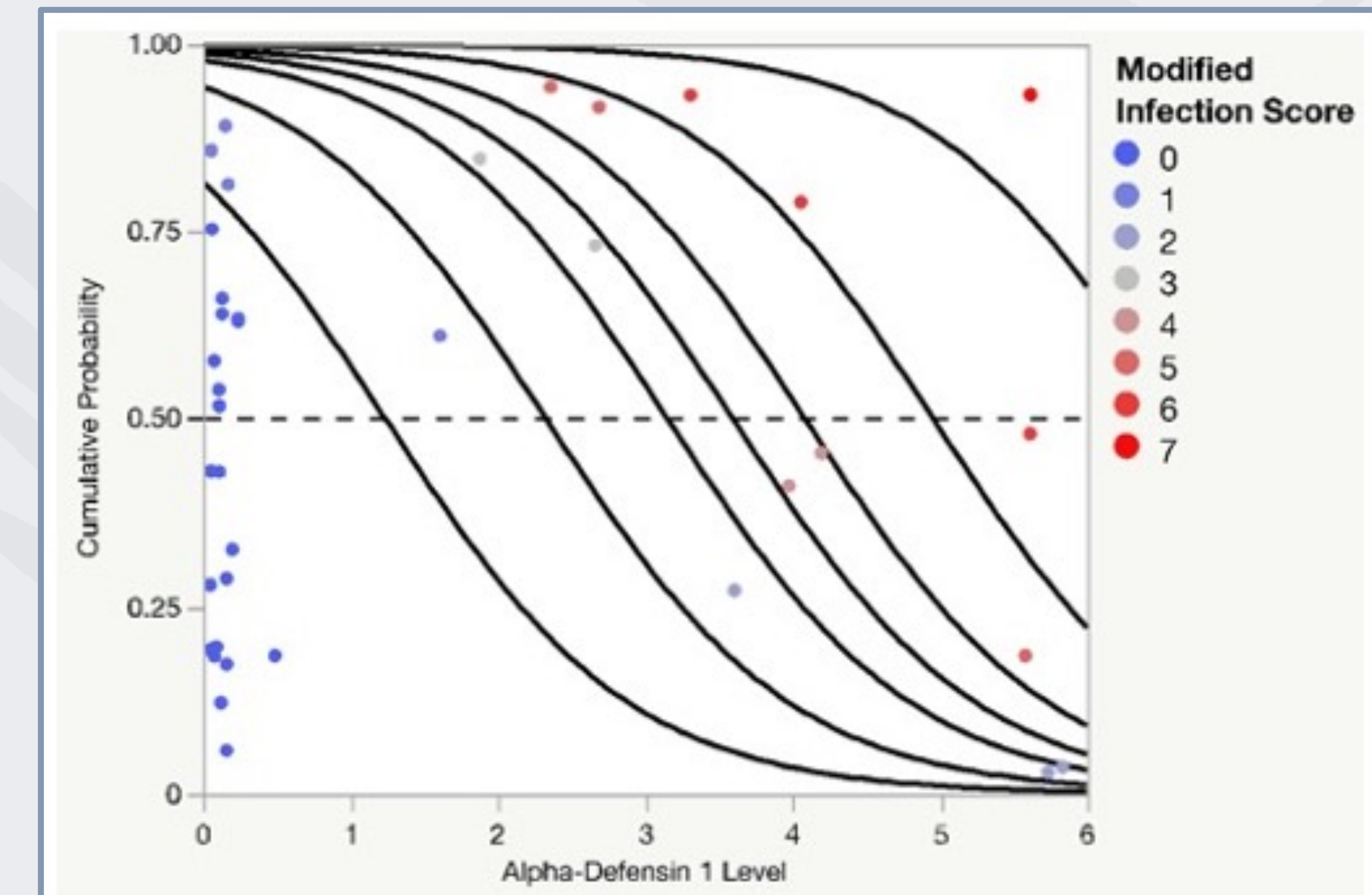


Fig. 1. Box and whisker plots depicting the distribution of AD-1 levels for breasts found to have purulence (right), and those found to be erythema (left). The range of AD-1 level is widely distributed in breasts with erythema (IQR 0.12–5.83), whereas variance in AD-1 is minimal for breasts with purulence (IQR 3.0–5.7). This highlights the broad range of outcomes possible in the erythematous breast, and thus, a limitation of the clinical examination.



Ordinal logistic regression of Alpha-Defensin-1 (AD-1) levels with increasing infection severity. Each curve represents an increasing infection score per the Spear categorization. The x-axis represents quantitative AD-1 levels while the y axis represents the probability of being at or above a given curve. Ordinal logistic regression analysis demonstrated that quantitative AD-1 level was an independent predictor of infection severity ($\chi^2=22.77$, $p<0.01$).

Logistic regression analysis suggests that **infection score rises by 1.20 for every one-unit increase in AD-1 level.**

Conclusion

AD-1 levels **correlate** with infection severity, highlighting its potential to overcome limitations in bacterial culture and non-specific laboratory values.

