Determining presence of GB virus type C in HIV positive subjects

Carmen J. Smith

Advisor: Kathryn Chaloner

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Outline

- Background

- Objectives

- Data Preparation and Analysis

- Results

- Conclusions

- Future work

- Acknowledgments

Background

- Studies show HIV positive individuals infected with GB virus type C (GBV-C) live longer than HIV positive individuals without GBV-C.
- No gold standard for detecting the presence of GBV-C in blood samples.

Background

- Four ELISA tests (Enzyme-Linked ImmunoSorbent Assay) on 100 stored blood samples
  - Roche - commercial
  - GNA
  - M5
  - M6

Objectives

- Determine relationships between tests using bivariate and multivariate analysis
- Determine if tests can be used to classify samples as GBV-C positive or negative

Data Preparation and Analysis

- Data scaled so minimum for each test is 1 and logarithm taken
- Graphical Exploration
  - Smoothed Histograms – Univariate
  - Scatterplots - Bivariate

Results
Scatterplot and smoothed histograms

Scatterplot of Scaled Data for four ELISA tests (GNA, Roche, M5, M6)
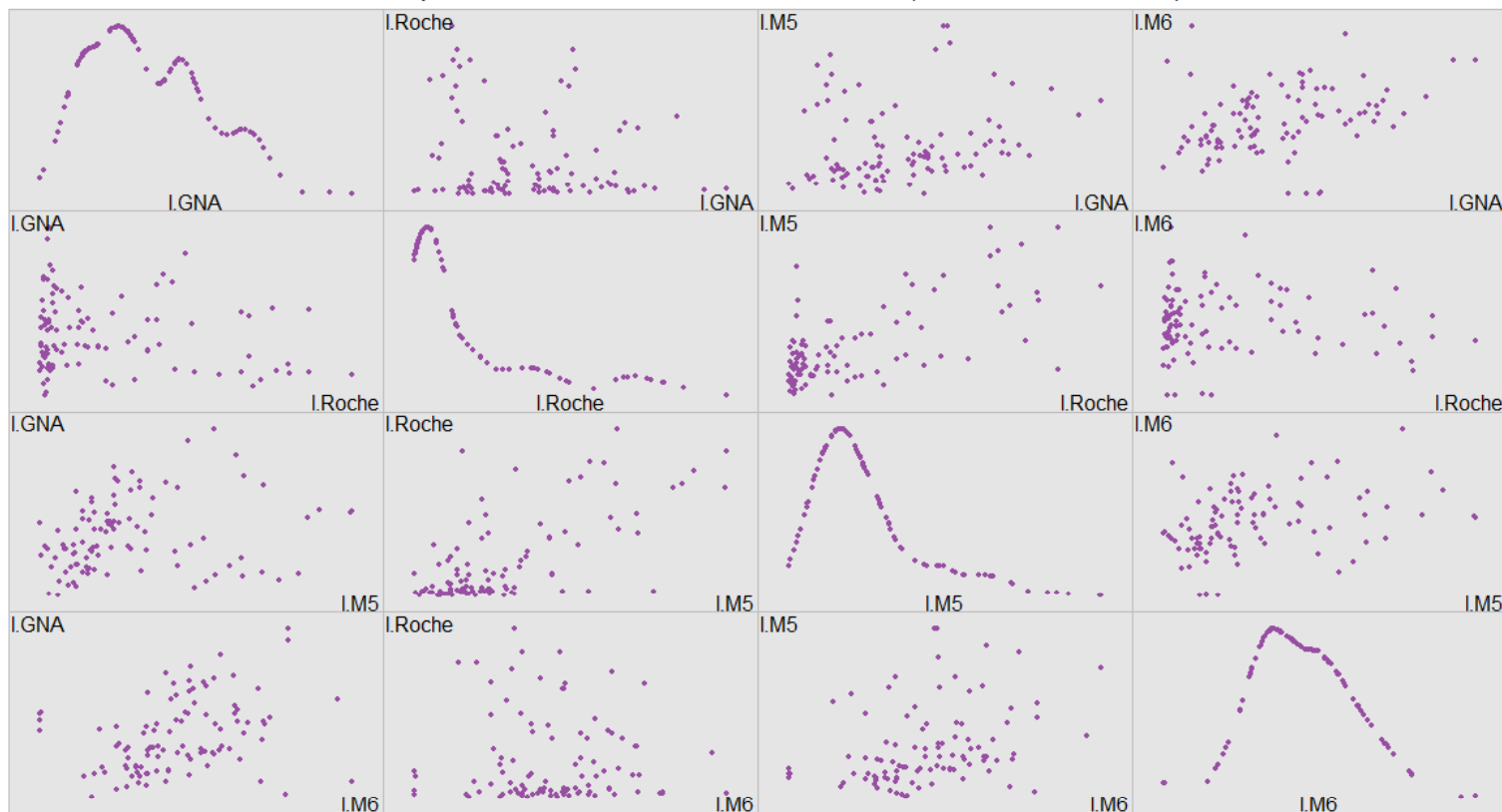
Data Preparation and Analysis

- Maximum Likelihood Estimation for fitting normal distributions
  - BIC (Bayesian information criterion) – accounts for number of observations
  - AIC (Akaike information criterion)
  - ROC (Receiver Operator curve)

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Likelihood Ratio Test for Testing the Number of Normal Distributions in Mixture Model

	log(likelihood)			
	log(GNA)	log(Roche)	log(M5)	log(M6)
1 Normal	-19.9551	-38.8232	-17.6111	-13.5934
2 Normals	-13.8402	26.9897	7.1160	-11.9375
3 Normals	-12.7828	37.9297	8.1886	-11.3905

BIC = -2*log-likelihood + npar*log(nobs)

AIC = -2*log-likelihood + 2*npar

|	One Normal Distribution			
	log(GNA)*	log(Roche)*	log(M5)*	log(M6)*
BIC	**49.1205**	86.8568	44.4326	**36.3972**
AIC	43.9101	81.6464	39.2222	**31.1868**
	Two Normal Distributions Mixture			
BIC	50.7063	-30.9535	**8.7938**	46.9009
AIC	**37.6805**	-43.9793	**-4.2321**	33.8750
	Three Normal Distributions Mixture			
BIC	62.4070	**-39.0180**	20.4641	59.6224
AIC	41.5657	**-59.8593**	-0.3773	38.7810

Mixture of two Normals of Scaled M5
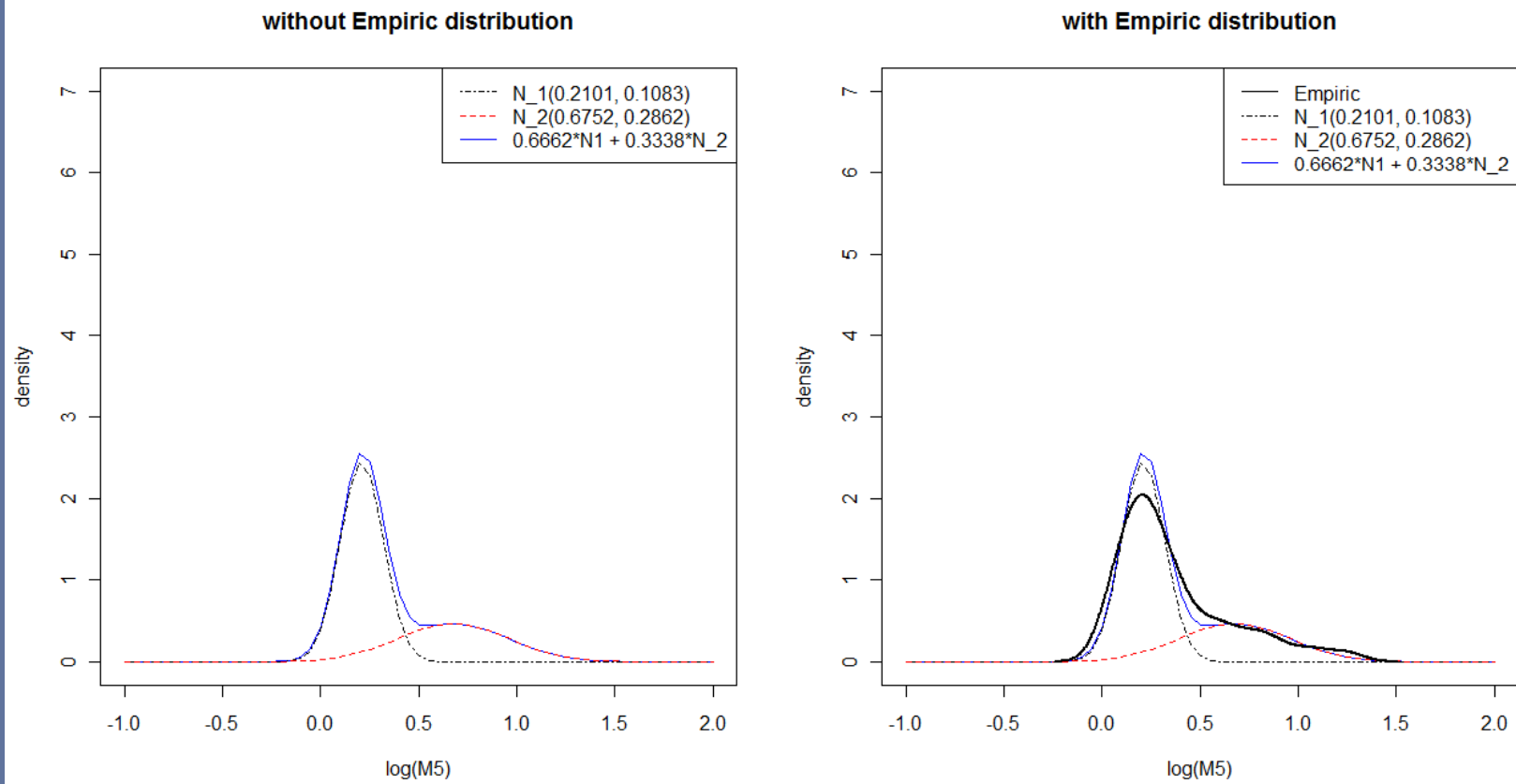
Mixture of two Normals of Scaled GNA
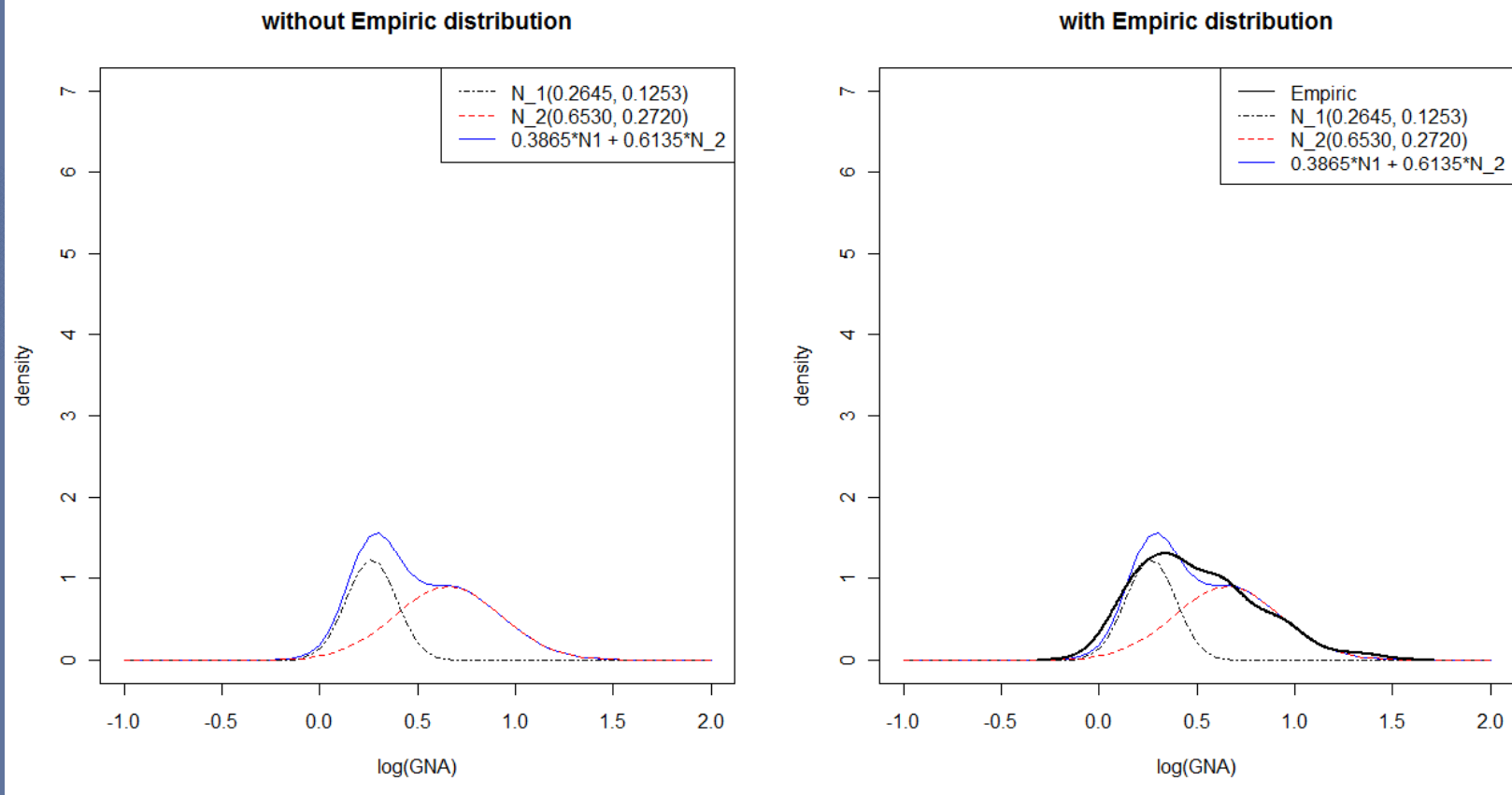
Mixtures of Two Normals of scaled Roche and M6

ROC curve for each of 4 tests t by .01
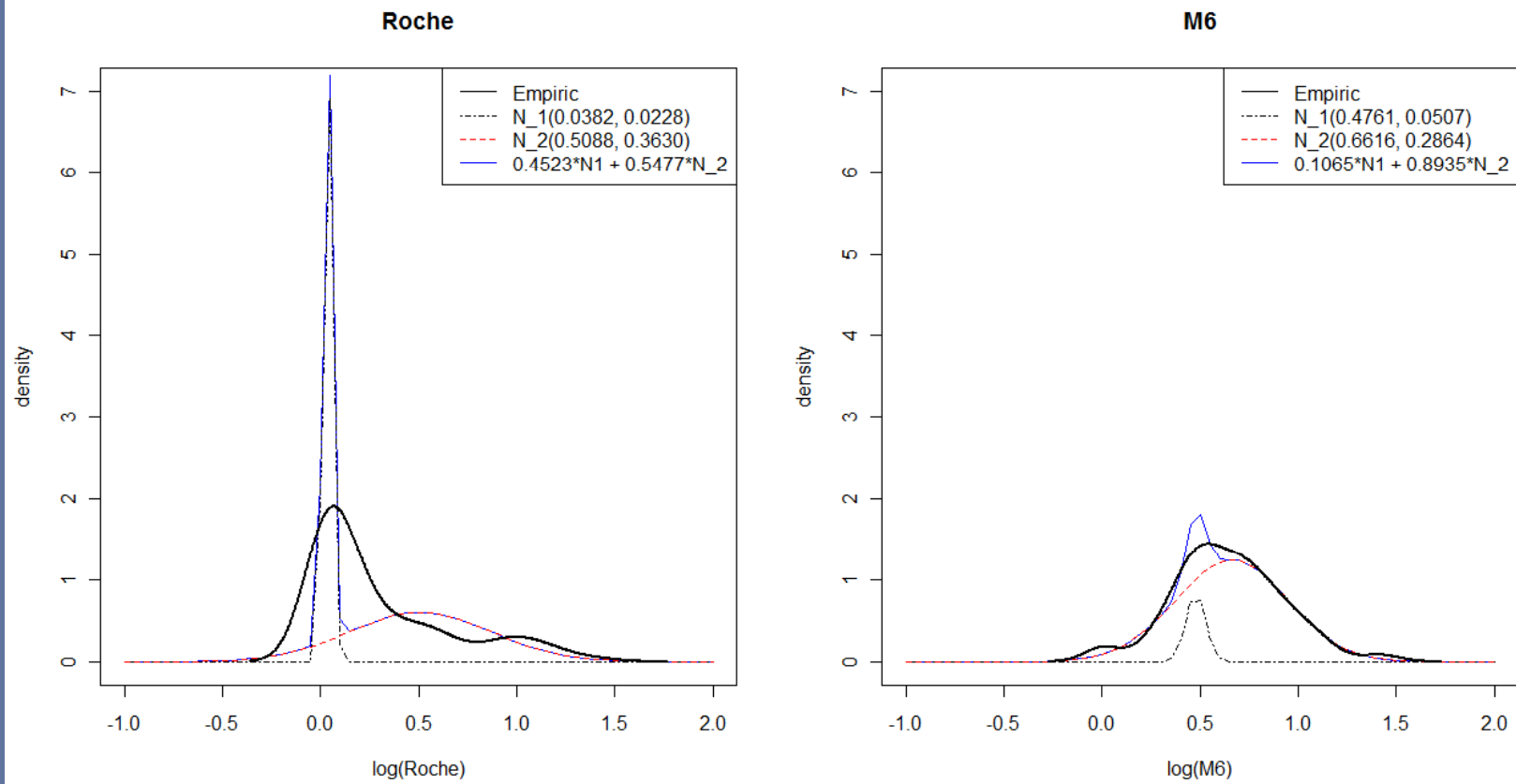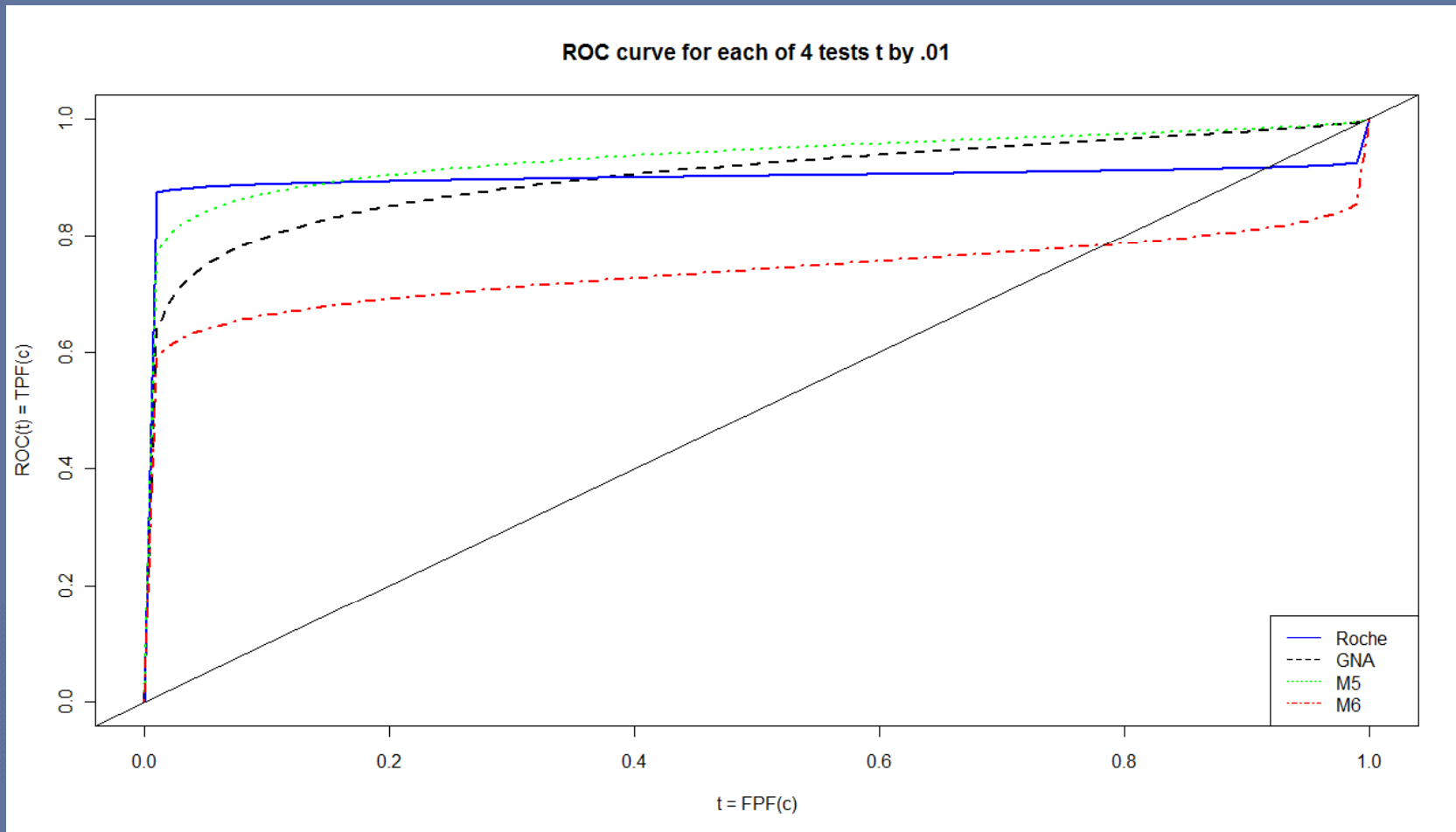
Conclusions

- Results for each test contain noise
- Analysis indicates that Roche and M5 are most promising
- More analysis is needed before tests can be used

Future Work

- Examine bivariate relationships
- Examine multivariate relationships

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