

# A Multi-Marker Test for Identifying Kids Without Appendicitis

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## Abstract

- Abdominal pain is the 4<sup>th</sup> leading cause of emergency department (ED) visits in children.
- Acute appendicitis (AA) is a common disease (peak incidence in teens), yet is difficult to diagnosis, particularly in children.
- We examined biomarker results of 503 patients presenting with suspected AA as training data and future data from a trial of about 2000 patients will be used as validation data for the algorithm of the APPY1™ Test, an [adjunctive](#) test to help identify children at low probability for AA.

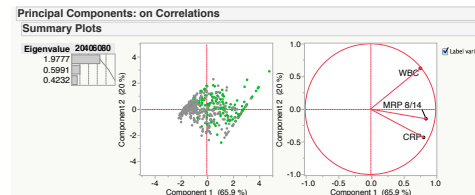
## Technology

- JMP® statistical software
- APPY1 Test Cassette (for sample)
- APPYReader™ Instrument
- Software with algorithm for determining APPY1 Test result.



## Algorithm Development

- Goal was to determine a rule to identify children who are AA-.
  - Y = nominal (AA+ or AA-)
  - X = continuous (multiple X's were screened)
  - Early work also considered categorical factors such as elevated temperature, pain duration, and specific physical findings.
- JMP Platforms Used in exploration:
  - [Partition](#)/Bootstrap Forest (nominal Y and any mix of X types)
  - Logistic Regression (nominal Y and any mix of X types)
  - [Discriminant Analysis](#) (nominal Y and continuous X's)
  - [Principal Component](#) (PC) Analysis (looks only at the X's)
- Logistic Regression based on PCs.

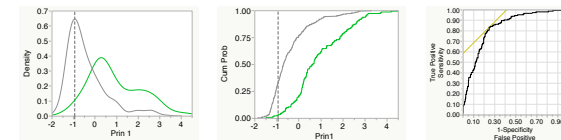


## Algorithm

- The First PC of 3 markers (final coefficients based on [cross validation](#) in the training set N=503) with a cut-off to define the test result.

## Cut-off and Performance

- The [cut-off](#) was established to optimize negative test utility and minimize false negatives (set at the 4<sup>th</sup> percentile of scores of the AA+ subjects).
  - [NPV](#) = 96.5% (92.1, 98.5)
  - [Sensitivity](#) = 96.5% (92.1, 98.5)
  - [Specificity](#) = 43.2% (38.2, 48.3)



## Conclusion

- JMP, with its depth and breadth of tools, was used to successfully develop an algorithm for a multi-marker adjunctive test to be used to help identify children at low risk for appendicitis .

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