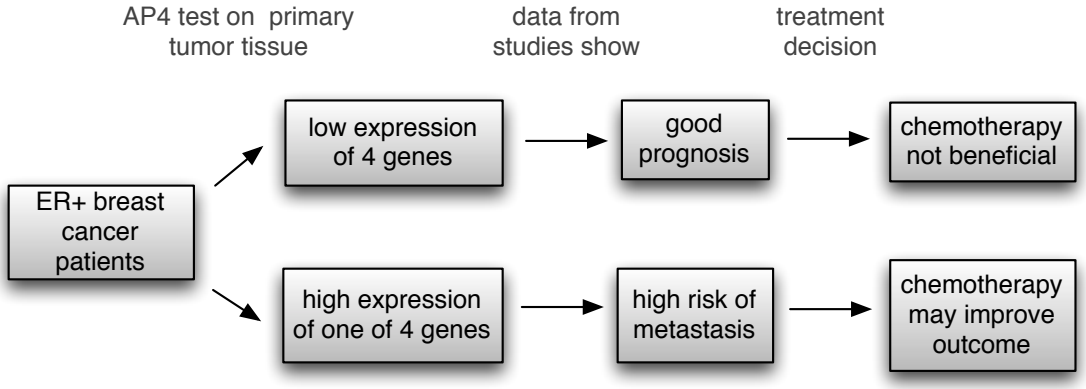
Cancer Prognosis Through Gene Expression Analysis

Steven Buechler, Applied and Computational Mathematics and Statistics,
buechler.1@nd.edu

Clinical Problem. Identify the breast cancer patients who can avoid chemotherapy without increasing the risk of recurrence.

Background. Following the initial surgery, many breast cancer patients will remain free of the disease even without chemotherapy. While standard pathology tests fail to identify these good prognosis patients with adequate precision, genomic tests in primary tumors have resulted in successful diagnostic tests.

Accelerated Progression Solution (AP4)[1]*.* An estrogen receptor positive breast cancer patient with low expression of four specific genes can safely avoid chemotherapy.



Clinical translation. A version of the AP4 test that can be used in a standard clinical pathology laboratory is under development.

Breast cancer as multiple diseases. The AP4 test and its precursor, Oncotype DX (Genomic Health, Redwood City, CA) were developed for the group of breast cancer patients who are estrogen-receptor positive (ER+) and lymph-node negative. Different subgroups of breast cancer follow their own disease pathways and require their own prognostic tests. Buechler is validating a novel prognostic test for the ER+, lymph-node positive, breast cancer patients. Buechler's long-term goal is to discover new features of the deadly "triple-negative" form of breast cancer that can lead to more effective drugs.

Family of tests. The mathematical algorithm underlying the AP4 test can derive tests in other "homogeneous" forms of cancer that can guide treatment decisions. This algorithm has also identified a prototype prognostic test in colon cancer that can potentially save 50,000 colon cancer patients a year from unneeded chemotherapy.

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[1] Buechler S., Low expression of a few genes indicates good prognosis in estrogen receptor positive breast cancer. *BMC Cancer* 2009;9: 243.