**Impact of hereditary multigene panel testing for cancer survivors.**

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**Background:** Recently, genetic testing for hereditary cancer syndromes has seen numerous advances in testing spectrum, capability, and efficiency. This may have important implications for cancer survivors and their families. The purpose of this study is to evaluate the impact of reflex genetic testing with newer multi-gene panels on patients with prior negative BRCA1/2 tests.

**Methods:** Data was collected retrospectively from patients who underwent multi-gene panel testing at one of three sites from a single institution between 8/2013-6/2015. Those with a personal history of breast or ovarian cancer and a prior negative BRCA1/2 test were included.

**Results:** Of 914 patients who underwent multi-gene panel tests, 187 met study inclusion criteria. Ten patients (5.3%) were found to carry 11 pathogenic mutations, including 6 patients with mutations in *CHEK2*, 2 patients with mutations in *PTEN*, and 1 patient each with mutations in the following genes: *BARD1, NF1*, and *RAD51C*. One patient had two pathogenic mutations identified—*CHEK2* and *BARD1*. Of 10 patients with mutations, 9 had a personal history of breast cancer diagnosed at a median age of 43 (range 35-52) and 1 had ovarian cancer diagnosed at age 65. A majority of mutation carriers underwent panel testing years after their cancer diagnosis (median 6 years, range 0.5-32 years) and none with delayed testing had undergone prophylactic contralateral mastectomy prior to the discovery of their gene mutation. All patients with mutations had a family history of at least one cancer, with most having a variety of cancer diagnoses in multiple relatives. Positive panel testing results altered clinical management in most patients, including addition of breast MRI, colonoscopy, or thyroid ultrasound depending on the gene mutation. After discovery of a PTEN mutation 19 years after her initial cancer treatment, one woman underwent bilateral prophylactic mastectomy and was found to have occult ductal carcinoma in situ.

**Conclusions:** Cancer survivorship must incorporate advances in technology that may be beneficial even years after treatment has ended. Multi-gene panel testing can be applied in survivorship settings as a useful tool to guide screening recommendations.