

The Melanoma Research Alliance (MRA) has invested \$3.7 million in research funding to improve melanoma diagnosis and staging. While very early stage (localized, Stage I) melanoma is greater than 90 percent curable with surgery, patients with disseminated Stage IV melanoma have a median life expectancy of less than one year. These statistics underscore the importance of early detection to increasing survival by catching melanoma before it metastasizes. Furthermore, accurate staging of the disease is necessary to select the most appropriate clinical treatment for patients.

There are significant challenges in diagnosing and staging primary melanoma. The current system based on visual clues and histology is not adequate, particularly in defining metastatic potential, resulting in either over treatment or under treatment of some patients. Current MRA-funded research on melanoma diagnosis and staging includes creating a skin screening program, identifying new biomarkers, and developing better imaging of metastases.

## Detection

Knowledge and skills for melanoma detection remains low in primary care, and performance of thorough skin self-examination is also low. MRA is addressing this problem by funding the creation of a web-based early detection training program for use in primary care delivery. The program will incorporate dermoscopy, which is rarely used in primary care despite its proven ability to improve accuracy of the clinical examination. If successful, this program will provide a key exportable tool for mortality reduction efforts, including large definitive trials and health campaigns.

## Diagnosis and Staging

### Biomarkers

Current diagnostic standards are inadequate in identifying the approximately 30% of primary melanoma patients who have high risk of progression. MRA-funded researchers have recently identified molecular biomarkers associated with risk of metastasis. This work is being clinically developed by a company to build prognostic tests based on the molecular characteristics of early stage melanoma. Another project is focused on identifying and integrating biomarkers into the melanoma staging system to aid in assessment and clinical management of patients with early stage melanoma.

New DNA sequencing tools are being employed to reveal mutations and alterations in melanomas of different stages. The ultimate goal is to establish molecular diagnostic tools in which melanoma tumors will be subjected to a battery of tests that will identify the optimal targeted therapy for individual patients. Additional avenues are exploring whether so-called micro-RNAs (small pieces of genetic information) could be an ideal class of blood biomarkers for the early diagnosis and assessment of melanoma progression.

### Imaging

New imaging technology is needed to aid in the detection of early and small metastatic tumors. In particular, molecular imaging agents are currently limiting the use of positron emission tomography (PET) for melanoma. A MRA-funded study developed PET probes that target the melanin pigment in melanoma cells. The new agents detected lung metastases in mouse models with excellent imaging quality and low accumulation in healthy organs. Continued testing and development will be required before they can enter the clinic.