

KRAS discussion

Adapted from [yourgenome.gov](http://yourgenome.org)

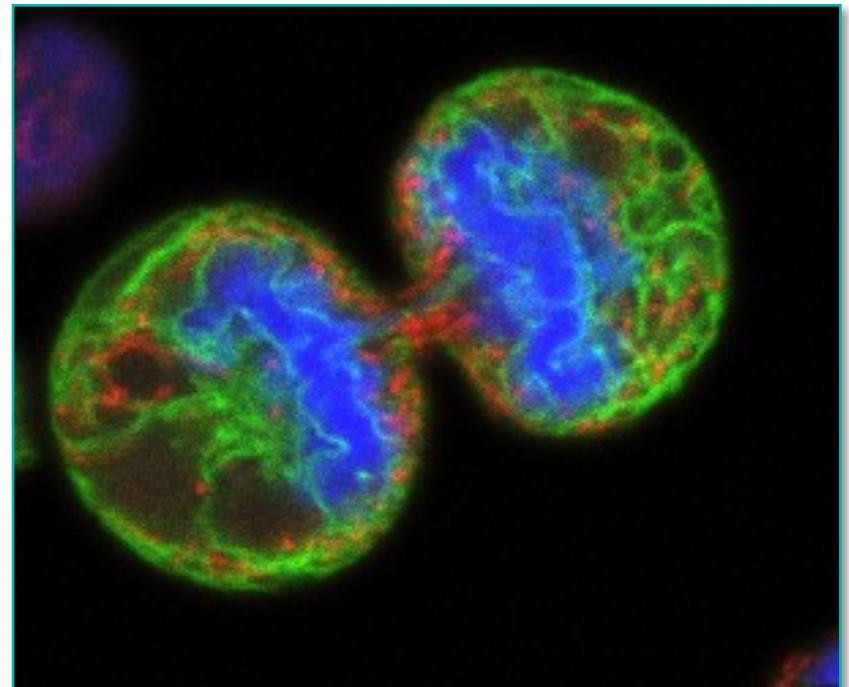
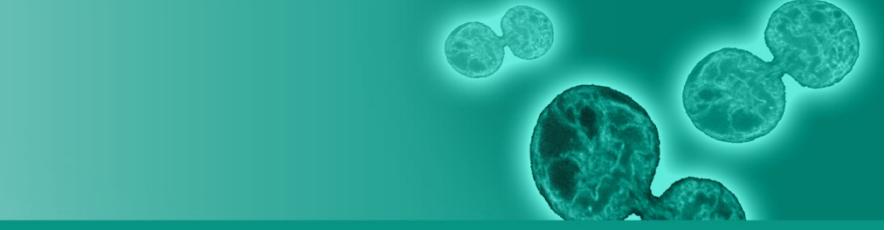


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What is cancer?

- All cancers are genetic diseases
- All cancers derive from single cells that continually divide in an unrestrained manner
- Cancer cells behave in this abnormal way because of changes in the DNA sequence of key genes, which are known as cancer genes

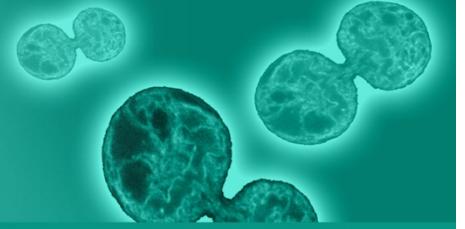


Human melanoma cell undergoing cell division

Image credit: Paul Smith & Rachel Errington, Wellcome Images



Key cancer facts



- 1 in 3 people will develop cancer
- 1 in 8 people will die from cancer
- There are approximately 200 types of cancer, each with different causes, symptoms and treatments
- 309,527 people were newly diagnosed with cancer in the UK (504 cases for every 100,000 people)
- An individual's risk of developing cancer depends on many factors, including age, lifestyle and genetic make-up

Cancer Research UK. Accessed April 2012

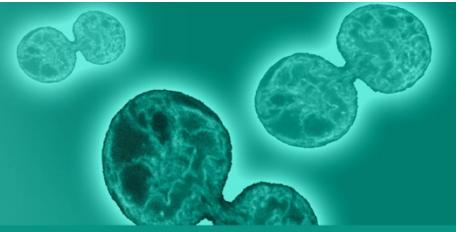
<http://info.cancerresearchuk.org/cancerstats/incidence/?a=5441>



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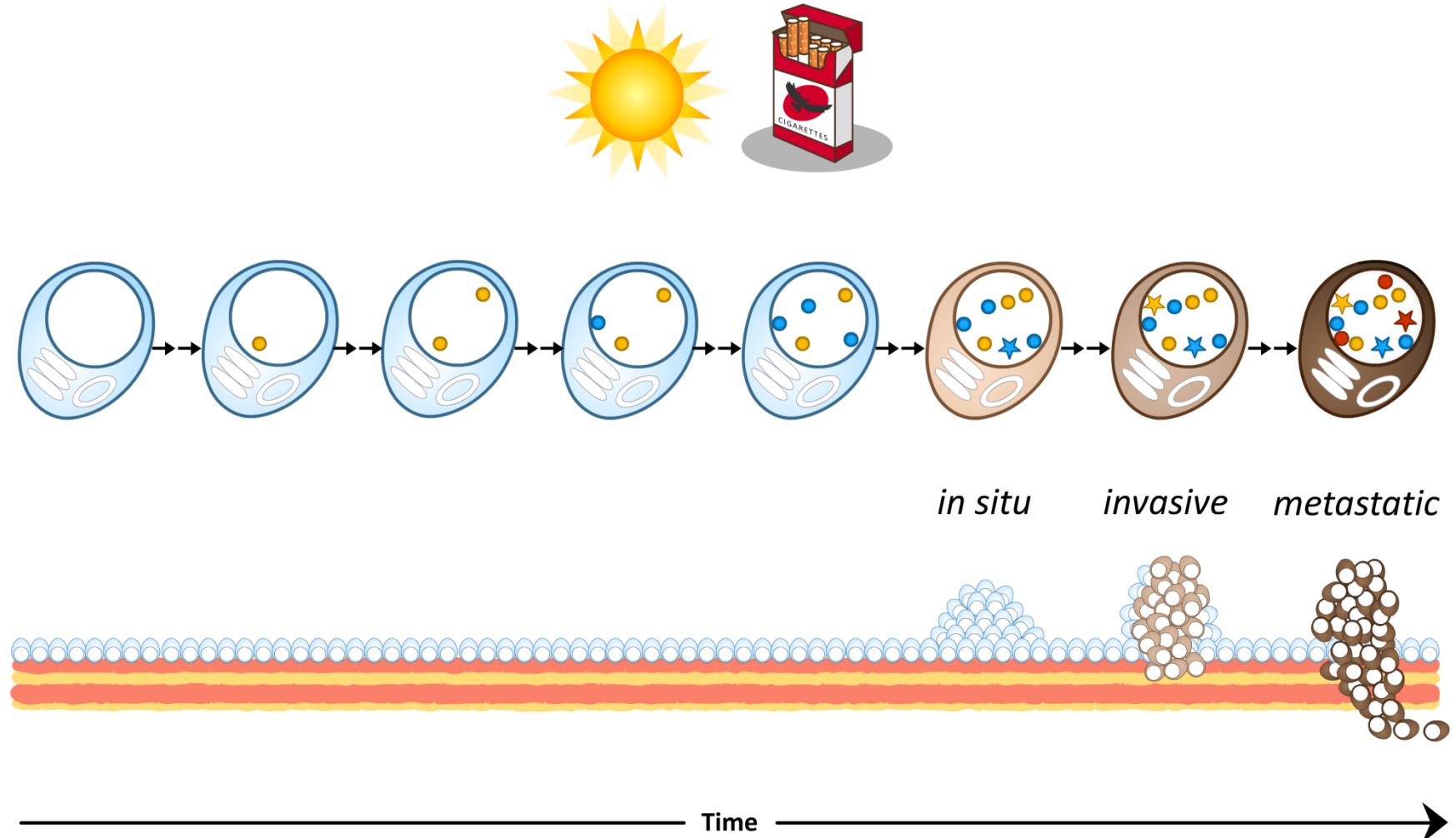
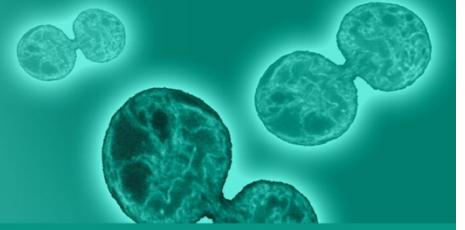
What is a mutation?



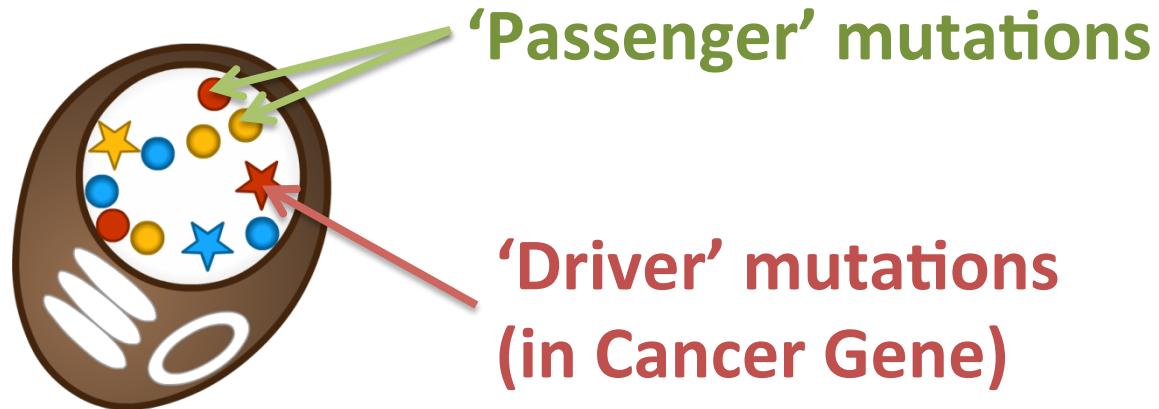
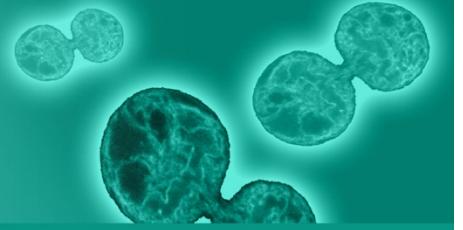
- Germline mutation
 - A change in the DNA sequence that can be inherited from either parent
- Somatic mutation
 - A change in the DNA sequence in cells other than sperm or egg
 - The mutation is only present in the cancer cell and its offspring (not in the patient's healthy cells)



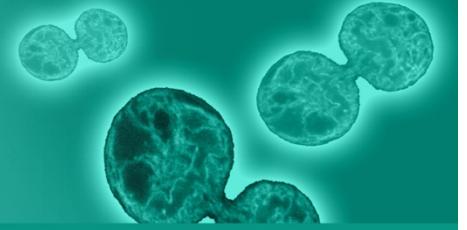
How do somatic mutations cause cancer?



Somatic mutations in cancer



Types of cancer gene



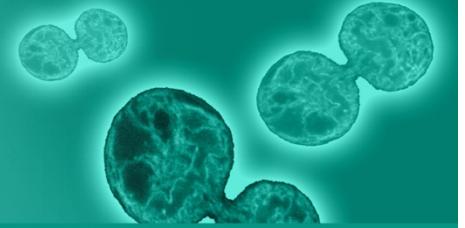
- There are two main types of cancer genes:
 - tumour suppressor genes
 - oncogenes
- At present there are over 400 known somatic cancer genes*

*Source: COSMIC. Accessed April 2012.

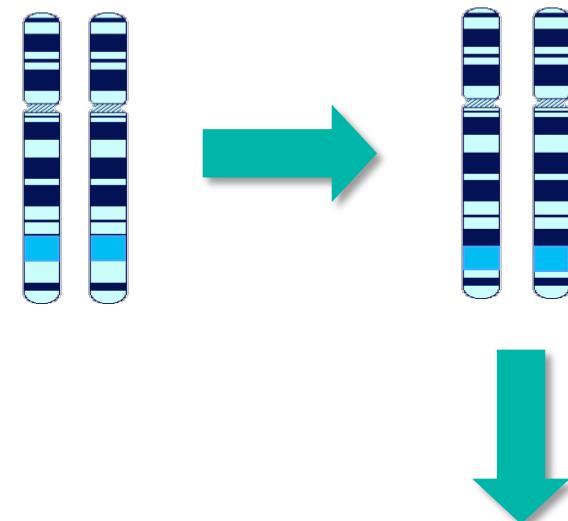
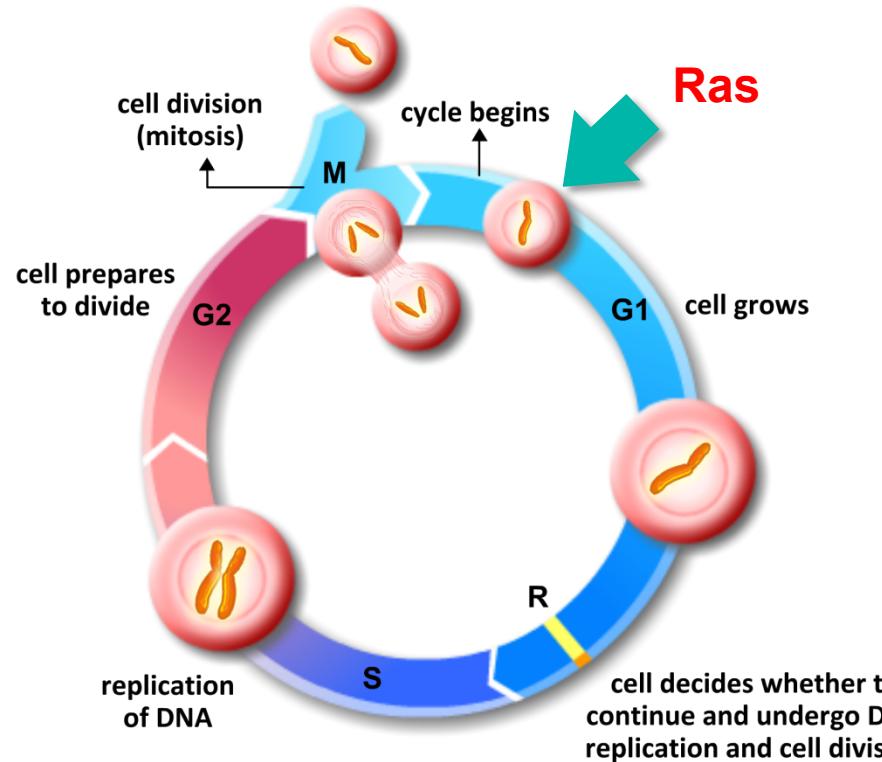
<http://www.sanger.ac.uk/genetics/CGP/cosmic/>



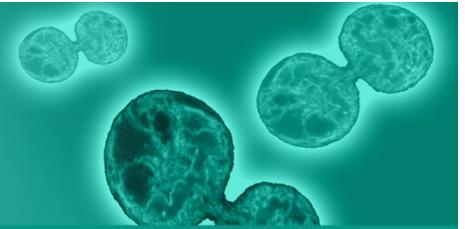
Oncogene



Genes which normally function to PROMOTE cell growth and division in a controlled manner



Malignant melanoma



- Malignant melanoma originates in melanocytes, specialised pigment cells found in the skin
- Melanoma accounts for 4-5% of all skin cancers but is responsible for 80% of deaths
- New treatments are needed

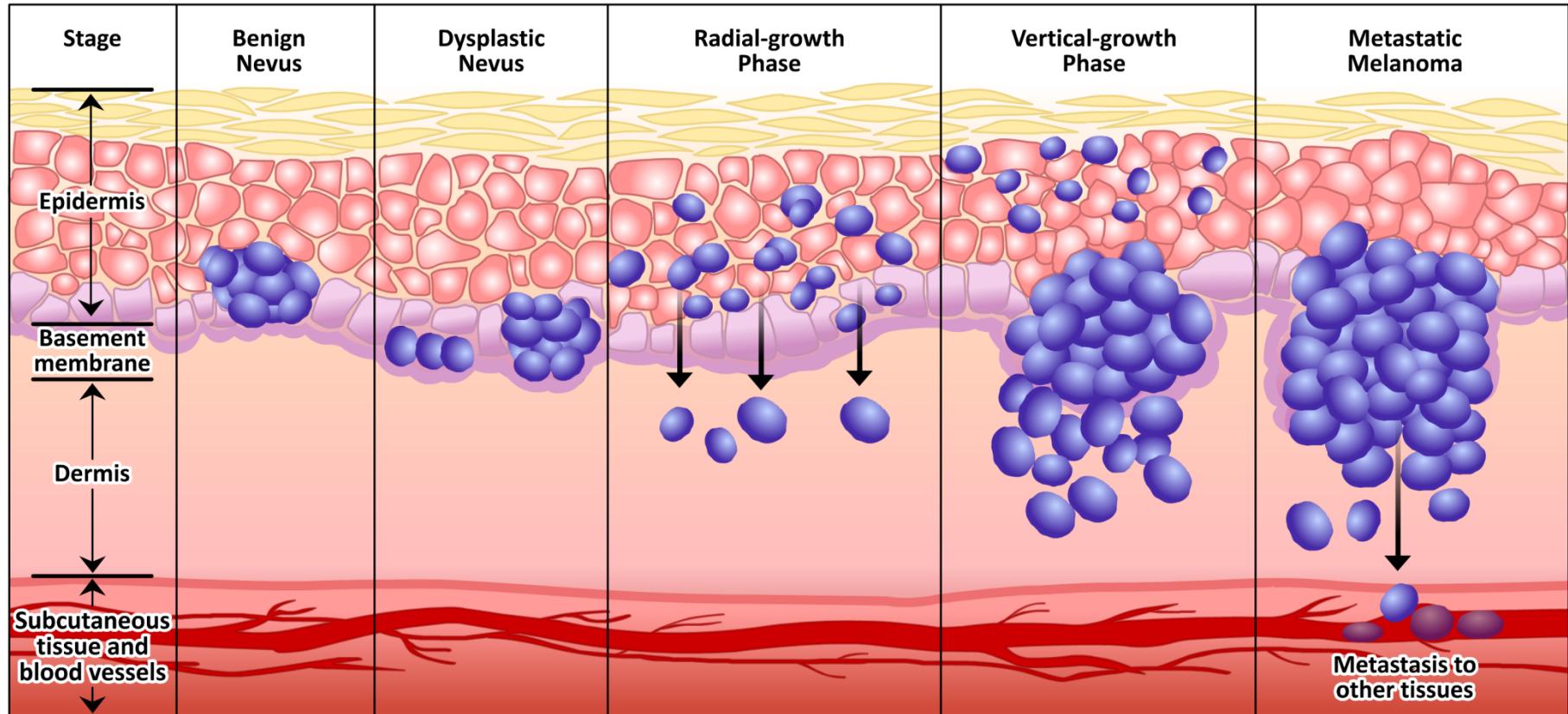
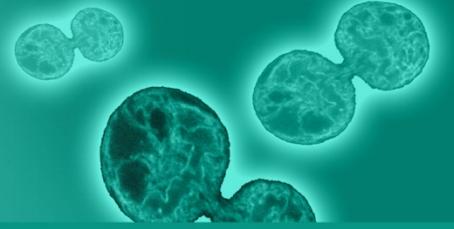


Advanced melanoma

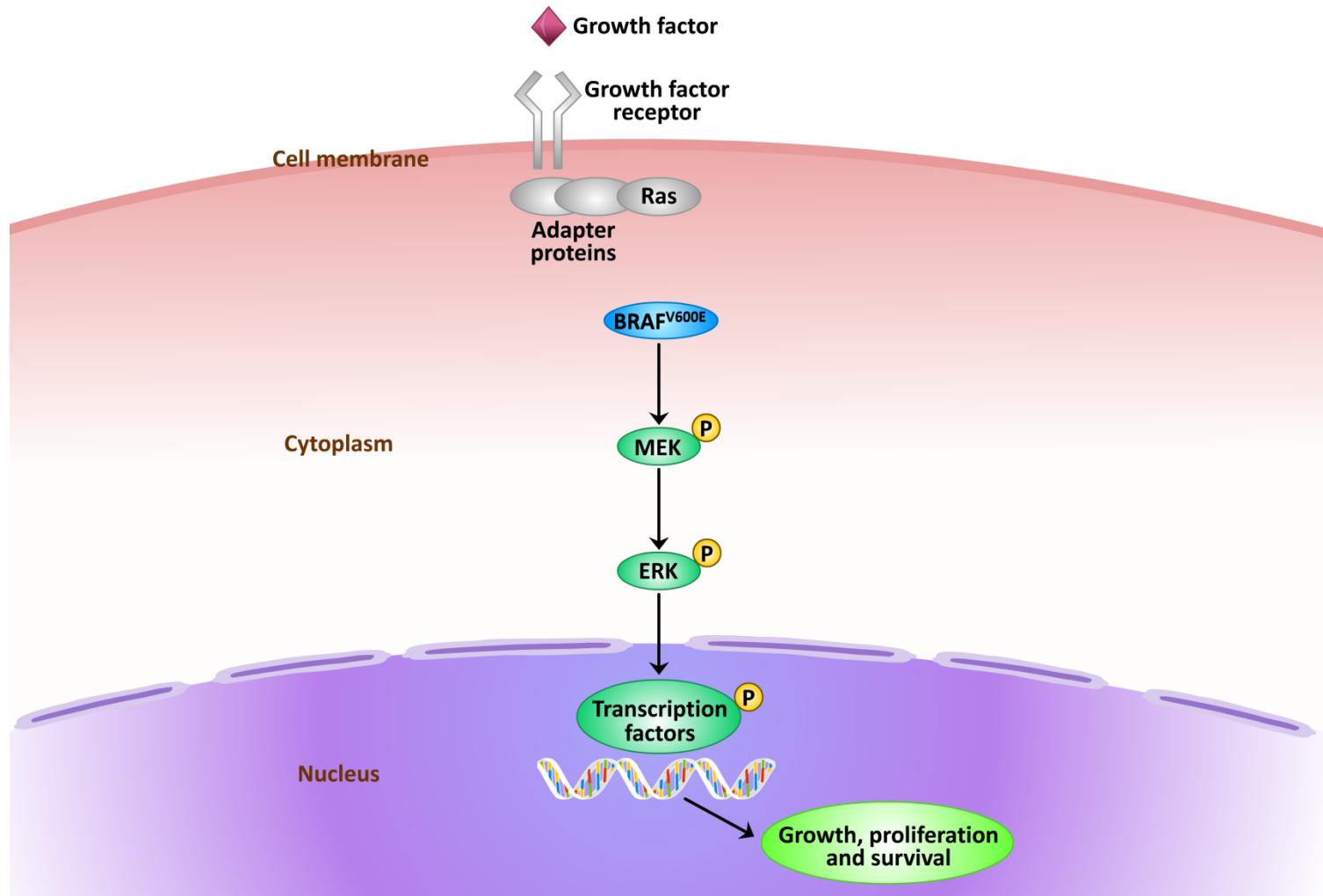
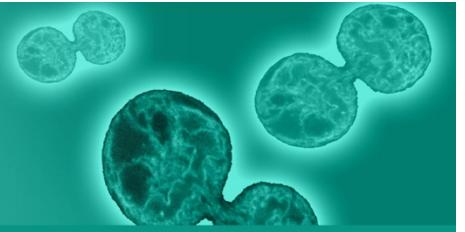
Image credit: National Cancer Institute



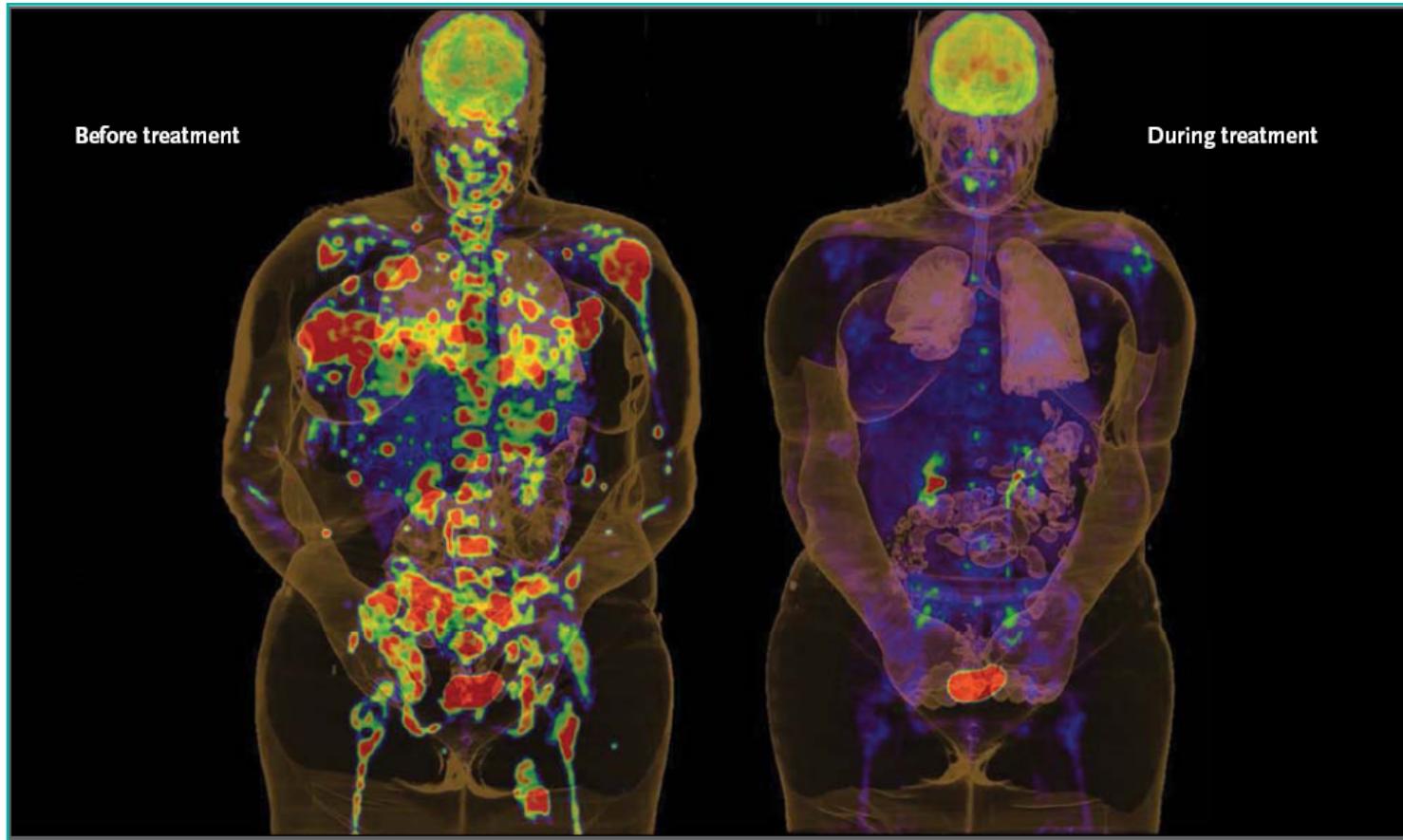
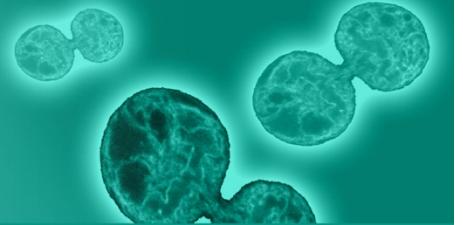
Melanoma progression



Understanding *BRAF* mutation



Vemurafenib



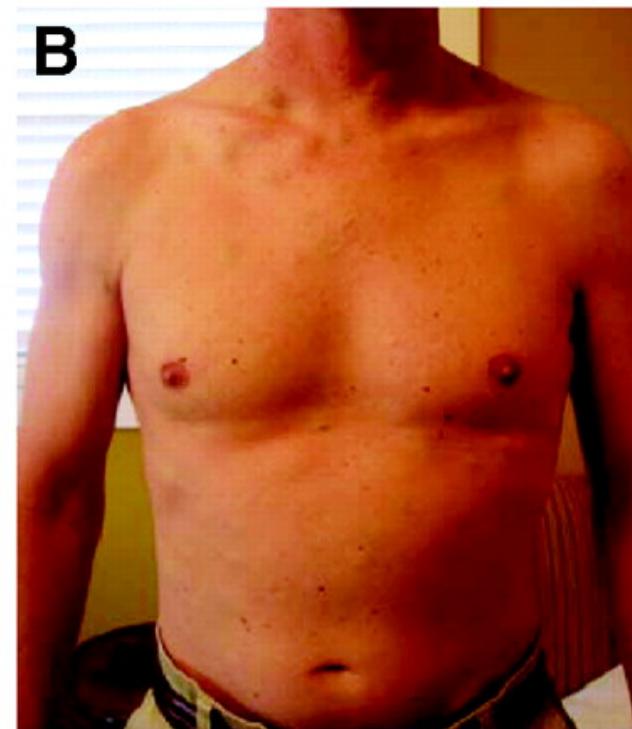
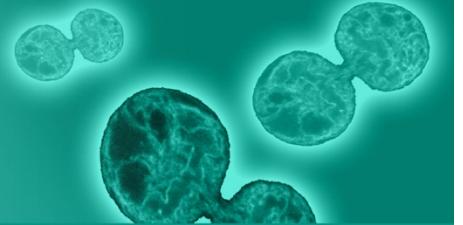
Images courtesy of Grant McArthur, Jason Callahan, and Rod Hicks of the Peter MacCallum Cancer Centre.
McDermott, Downing and Stratton. N Engl J Med 2011;364:340-50.



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Vemurafenib



A 38-year-old man with BRAF-mutant melanoma and miliary, subcutaneous metastatic deposits.
Wagle N et al. JCO 2011;29:3085-3096
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