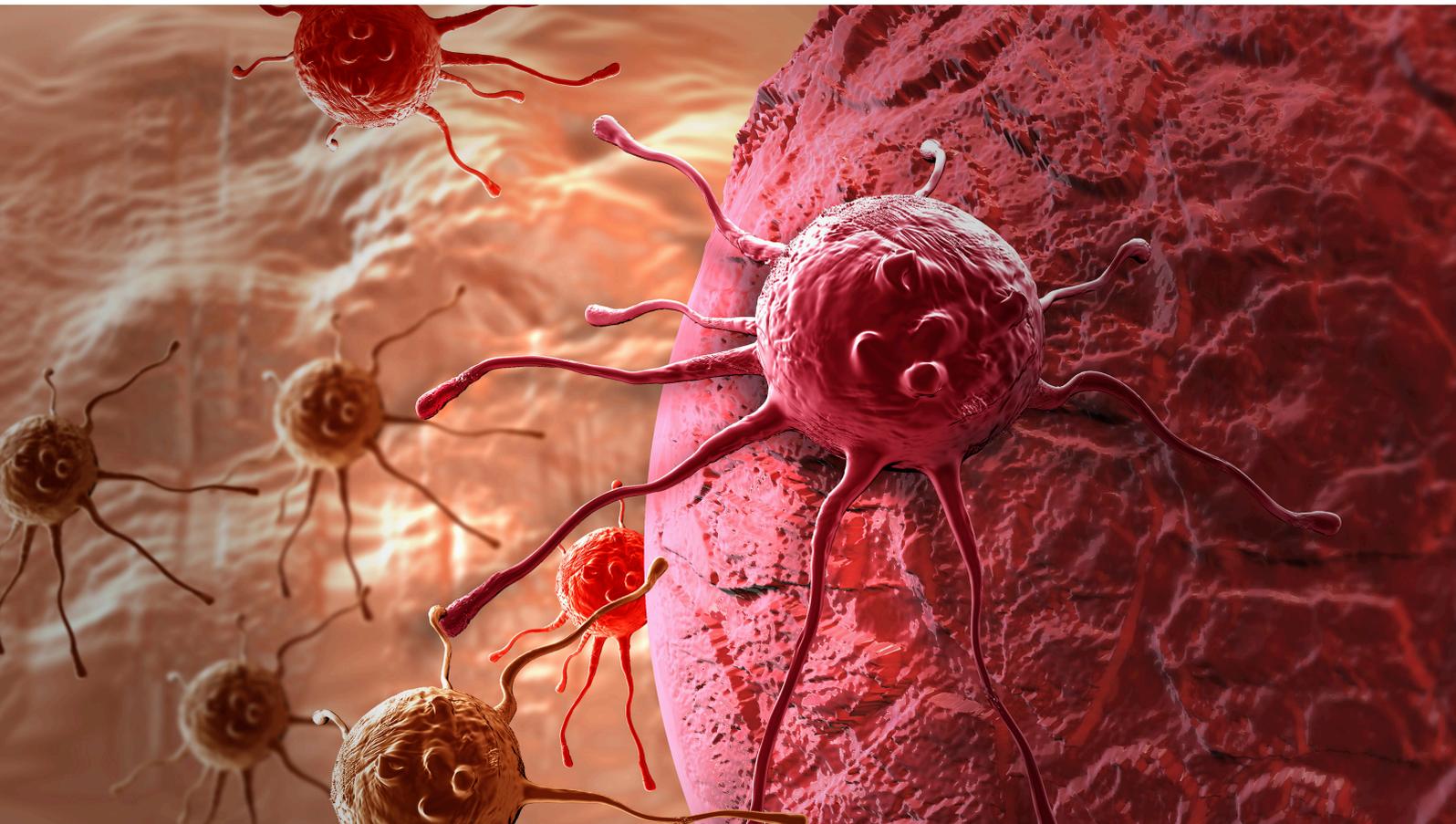


# CANCER GENETICS



A complete advanced undergraduate/graduate course with:

- 16 online lectures by leading authorities
- Resources for workshops, tutorials, journal clubs, projects and seminars
- Suggested exam questions and model answers
- Multiple choice questions and answers
- Recommended reading: original papers and review articles



View the content of the course on our  
website: [hstalks.com/CancerGenetics](https://hstalks.com/CancerGenetics)



View our in-depth HSTalks:  
[hstalks.com/CoursesBrochure](https://hstalks.com/CoursesBrochure)

**Course module with video lectures, material for tutorials (case studies, projects, workshops and recommended reading), multiple choice questions and suggested exam questions with model answers. A comprehensive course on a subject of major importance.**

The material is especially designed to support research and teaching staff when presenting a comprehensive course at graduate or advanced undergraduate level with seminars, journal clubs, laboratory exercises, data workshops, online tests and end of course examinations.

The course is also suitable for continuing professional development/education programmes.

This brochure provides brief details of the complete module, including the lectures, lecturers and additional learning material.

## Who is the course for?

The comprehensive material is especially suitable for teachers and researchers who wish to offer courses on specialist subjects to small groups of students (or even a single student) when it is not possible to justify the time and expense of preparing, internally, a course or there is not the range of expertise available locally to do so. All the lecturers are highly regarded experts in their fields and few institutions are likely to have a comprehensive group of faculty members with a similar range of experience and knowledge of the subject matter.

The course material is designed to be used by local faculty and staff acting as course directors, tutors and mentors.

The material is suitable for flipped classroom, blended, team and distance learning courses.

New courses are time consuming and expensive to create. These modules cut both the cost and the time, enabling a wider range of options to be offered on specialist topics. Graduate students can take the courses, mentored by their supervisors, while pursuing their research.

## Ideal for Virtual Learning Environments (VLE)

All course material, including the additional learning material, is arranged in a standard format that allows easy embedding into virtual learning environments such as Moodle, Blackboard or your institute's own system.

## Supporting learning and teaching goals

In an age when faculty and staff face ever greater demands on budgets and time, these lectures and additional learning material will be of great help when preparing and delivering graduate and advanced undergraduate courses.

# Course Summary

Cancer is a genetic disease because it is caused by mutations. Cancer Genetics is the discipline of understanding the genetic processes underlying tumor development. Genetics play a unique role in the laboratory and in the clinic in understanding the mechanisms of transformation of a normal cell to cancer, prediction of the risk of developing cancer, early detection, prevention, prognosis and therapy. Nearly all cancers arise from a single cell harboring a combination of inherited and/or somatic alterations in genetic material. Once initiated, cancer cells continuously evolve by acquiring additional and complex mutations in the genetic material leading to uncontrolled cell proliferation (cell cycle deregulation) and spreading to other organs (metastasis). The complexity of genetic aberrations includes changes in chromosome number and structure, single nucleotide changes, DNA methylation and modifications in non-coding RNA, among many others. These mutations affect protein coding genes, non-coding DNA and epigenetic modifications.

In the recent decades we have witnessed dramatic developments in the technologies available for analyzing genomes. Recent advances in genomic technologies and bioinformatics are providing crucial tools to understand the role of genetics in mechanisms of transformation, progression, and metastasis of cancer cells. These advances are paving ways to achieve the goal of personalized treatment of cancer. The course on Cancer Genetics will address most of these cutting-edge developments in cancer biology.



Editor: Prof. Vundavalli Murty  
Columbia University Medical Center, USA

**The course module is designed for:**

This course is of interest to a wide variety of audiences including life-science students at graduate and postgraduate level, researchers studying the genetics of cancer, and clinicians involved with oncology.

# Course Lectures

*Click  
the lecture title  
to access*

## Genetics and management of inherited cancer predisposition

**Prof. Joshua Schiffman**  
University of Utah, USA



## The cytogenetics of childhood acute leukemia

**Dr. Susana Raimondi**  
St. Jude Children's Research Hospital, USA



## Chromosome translocations and cancer

**Prof. Felix Mitelman**  
Lund University, Sweden



## Acute myeloid leukemia: genetics, prognosis and treatments

**Prof. Stephen Nimer**  
University of Miami Health Care, USA



## Genetic abnormalities in acute lymphoblastic leukemia

**Prof. Ching Hon Pui**  
St. Jude Children's Hospital, USA



## Molecular genetics of non-Hodgkin lymphoma

**Prof. Jude Fitzgibbon**  
University of London, UK



## Genetics of breast and ovarian cancer

**Prof. Jeffrey Weitzel**  
City of Hope, USA



## The genetics and genomics of familial renal carcinoma

**Prof. Eamonn Maher**  
University of Cambridge, UK



16 specially recorded, animated lectures  
by world leading authorities

*Click  
the lecture title  
to access*

→ **Genomics of lung cancer**

**Prof. Ramaswamy Govindan**  
Washington University in St. Louis, USA



**The genetics of glioblastoma**

**Dr. Hai Yan**  
Duke University School of Medicine, USA



**Genetics of tumor metastasis**

**Prof. Robert Weinberg**  
Whitehead Institute for Biomedical Research, USA



**CML: genetic paradigm of targeted therapy**

**Prof. Michael W. Deininger**  
University of Utah, USA



**The non-coding RNA revolution in the cancer society**

**Dr. George Calin**  
MD Anderson Cancer Center, USA



**Role of molecular markers in guiding therapy in cancer**

**Prof. Joe Duffy**  
St Vincent's University Hospital and University College Dublin, Ireland



**Functional cancer genomics**

**Prof. Roderick Beijersbergen**  
Netherlands Cancer Institute, The Netherlands



**Pharmacogenomics in cancer therapy**

**Prof. Sharon Marsh**  
University of Alberta, Canada



# Examples of Course Materials

For each lecture the course offers tutorials, workshops, recommended reading, multiple-choice questions, and suggested exam questions with model answers.



## HST Moodle My Courses ▶ Cancer Genetics

### Tutorial: The genetics and genomics of familial renal carcinoma

Lecturer: Prof. Eamonn Maher - University of Cambridge, UK

Patient X has been diagnosed with renal cell carcinoma (RCC) and subsequently treated with a total nephrectomy. The following year the patient approaches the genetics clinic as they become concerned that their healthy 9 year old child might also be at risk of this type of cancer.

- What factors in the medical history would indicate a greater likelihood of an inherited cause?
- Genetic testing is carried out using a gene panel, revealing a mutation in FH and providing a diagnosis of Hereditary Leiomyomatosis with Renal Cell Carcinoma (HLRCC). What are some of the advantages and disadvantages of gene panel testing in RCC.
- How might this patient's children be managed in light of their parent's diagnosis and what are some of the difficulties with these recommendations?



## Exam Questions and Model Answers

### Question 1

Not yet answered  
Marked out of 1.00

 Flag question

 Edit question

Hereditary papillary renal cell carcinoma type 1 is a rare condition caused by constitutional mutations in the MET gene. What characterizes this condition from a molecular perspective and how does this impact on management?



## Multiple-choice questions and answers

### Question 4

Not yet answered  
Marked out of 1.00

 Flag question

 Edit question

Which of the following is not a recognized cause of inherited renal cell carcinoma?

Select one:

- a) Birt Hogg Dube syndrome
- b) Constitutional SDHD mutation
- c) Von-Hippel Lindau disease
- d) Constitutional BAP1 mutation
- e) Lynch syndrome



## Recommended reading supporting each lecture: Original research papers and review articles

- Eng, C. (2008). SDHB - A gene for all tumors? *Journal of the National Cancer Institute*, 100(17), 1193-1195.
- Escudier, B., Eisen, T., Stadler, W. M., Szczylik, C., Oudard, S., Staehler, M., ... Bukowski, R. M. (2009). Sorafenib for treatment of renal cell carcinoma: Final efficacy and safety results of the phase III treatment approaches in renal cancer global evaluation trial. *Journal of Clinical Oncology*, 27(20), 3312-3318.
- Maher, E. R. (2011). Genetics of familial renal cancers. *Nephron. Experimental Nephrology*, 118(1), e21-6.
- Maher, E. R., Neumann, H. P., & Richard, S. (2011). von Hippel-Lindau disease: a clinical and scientific review. *European Journal of Human Genetics: EJHG*, 19(6), 617-23.
- Menko, F. H., Maher, E. R., Schmidt, L. S., Middelton, L. a., Aittomäki, K., Tomlinson, I., ... Linehan, W. M. (2014). Hereditary leiomyomatosis and renal cell cancer (HLRCC): renal cancer risk, surveillance and treatment. *Familial Cancer*, 637-644.
- Schmidt, L., Duh, F. M., Chen, F., Kishida, T., Glenn, G., Choyke, P., ... Zbar, B. (1997). Germline and somatic mutations in the tyrosine kinase domain of the MET proto-oncogene in papillary renal carcinomas. *Nature Genetics*, 16(1), 68-73.



# How to access the course

Extracts of lectures can be viewed at [hstalks.com/biosci/](http://hstalks.com/biosci/). The full length lectures can be viewed by all members of universities, colleges and medical schools currently subscribing to The Biomedical & Life Sciences Collection. Institutions that do not subscribe to The Biomedical & Life Sciences Collection may take annual licenses at US \$2,000 covering an unlimited number of students.

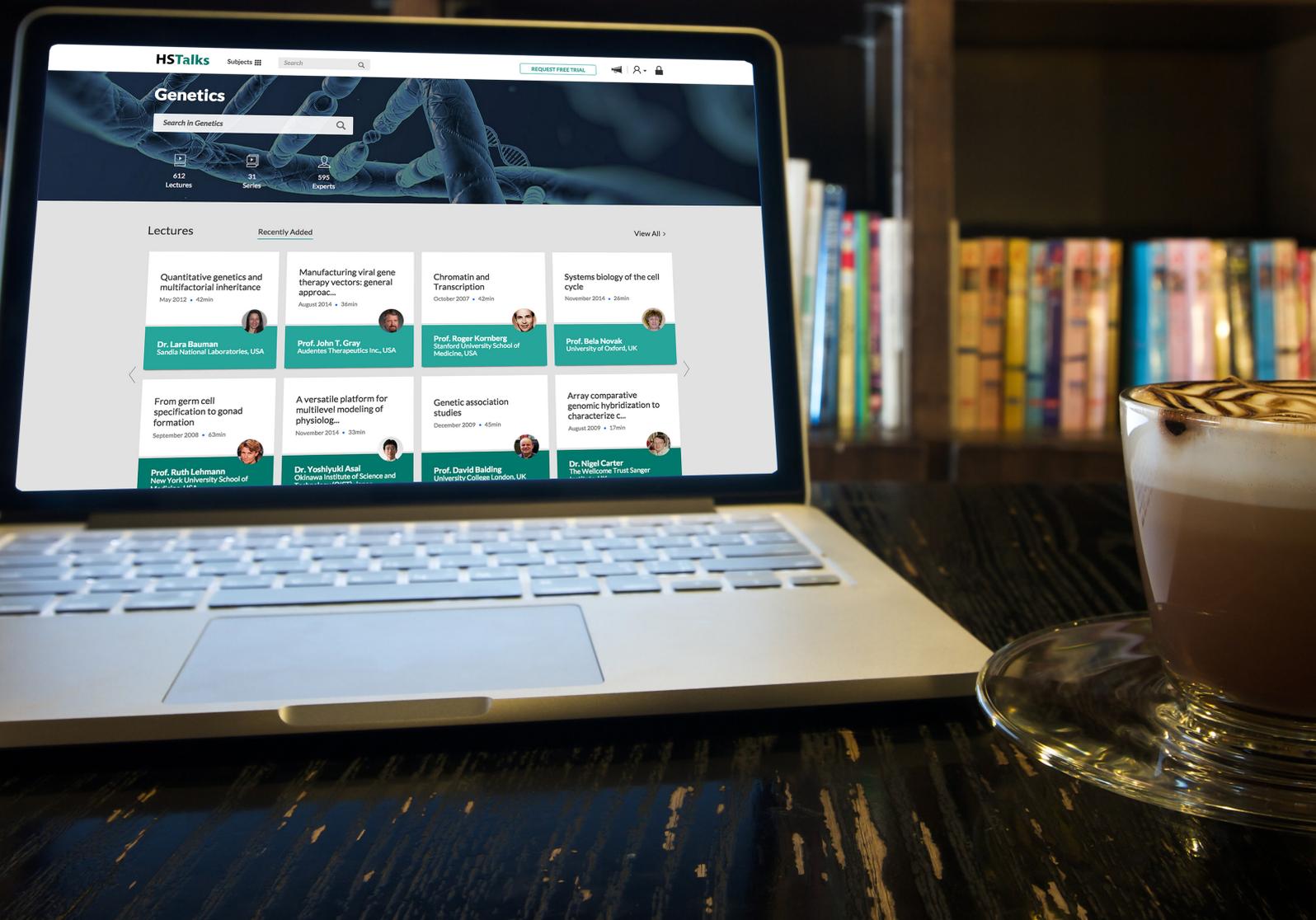
Full supporting material: video lectures, material for tutorials (case studies, projects, workshops and recommended reading), multiple choice questions and suggested exam questions with model answers are provided to faculty members of subscribers.

To subscribe, obtain additional information and/or the additional learning material contact Dr. Eyal Kalie at [eyalk@hstalks.com](mailto:eyalk@hstalks.com).

## Upload to your VLE

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The complete course (lectures and additional learning material) can be loaded into Moodle, Blackboard and other virtual learning environments.



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