

Advanced training on the science of targeted therapies and immunotherapies for cancer

An overview of how targeted treatments and new immunotherapy approaches work, focusing on the science behind them. Descriptions of which treatments are relevant to each of the most common solid tumours and haematological cancers.

Course overview

This five-day course (mornings only) covers the biology and mechanisms behind the diverse range of targeted drug treatments and new immunotherapies for cancer. [Dr Elaine Vickers](#) – a leading independent educator on the science of new cancer treatments – translates complex and often overwhelming topics into easily digestible and understandable knowledge.

The course comprises a series of **five morning sessions** (3 hours each) delivered online via Microsoft Teams:

- **Morning One:** Cancer Cell Biology and Genetics & Introduction to Modern Systemic Cancer Therapies
- **Morning Two:** Targeted treatments for solid tumours
- **Morning Three:** Immunotherapy for solid tumours
- **Morning Four:** Targeted therapy & immunotherapy for haematological cancers – part 1
- **Morning Five:** Targeted therapy & immunotherapy for haematological cancers – part 2

Detailed description

Morning One: Cancer Cell Biology and Genetics & Introduction to Modern Systemic Cancer Therapies

Cancer genetics

- How cells work: DNA, chromosomes, RNA, proteins, epigenetics
- The causes of cancer part 1: DNA damage
- Types of DNA damage found in cancer cells and their consequences
- Patterns of damage found in cancer cells – introducing mutational signatures
- How cancer cells evolve and change with time and why this matters

Cancer biology

- The causes of cancer part 2: the immune system
- The cancer microenvironment
- The role of white blood cells in cancer
- How cancer spreads

Modern systemic cancer treatments – how do they work and how far have we got?

- What treatments do we have at our disposal and how do they work?
- What would we like to be able to target and why – introducing the hallmarks of cancer

- How do we know what treatment is best for each patient?

Morning Two: Targeted Treatments for Solid Tumours

Targeted cancer treatments for solid tumours – what have we got?

- What are targeted cancer treatments?
 - What are we trying to target?
 - Antibody-based cancer treatments
 - Small molecule treatments

Targeting cell communication pathways

- A refresher of how cell communication pathways work
- Targeting growth factor receptors such as EGFR and HER2
- B-Raf & MEK inhibitors for melanoma skin cancer, bowel cancer and lung cancer
- Progress with PI3K & mTOR inhibitors
- K-Ras inhibitors for non-small cell lung cancer

Other targets and treatments

- Angiogenesis inhibitors
- PARP inhibitors
- CDK inhibitors
- When is a targeted therapy or immunotherapy more likely to work?

Morning Three: Immunotherapy for Solid Tumours

Cancer's relationship with the immune system

- A brief introduction to the immune system
- How cancer's relationship with the immune system changes over time
- How the immune system can recognise and react to the presence of cancer in the body
- How cancer cells avoid destruction by the immune system
- Introduction to immunotherapy and the importance of T cells
- Reasons why immunotherapy sometimes does work and sometimes doesn't

Immunotherapy with checkpoint inhibitors

- Introduction to T cells and checkpoint proteins
- Mechanism of action of checkpoint inhibitors
- Spot the difference: CTLA-4 and PD-1/P-L1 targeted checkpoint inhibitors
- Examples of results and lessons learned from clinical trials

Cancer treatment vaccines, CAR T cell therapy, TCR-engineered T cells

- Cancer vaccines: peptide, DNA, dendritic cells, oncolytic viruses
- CAR T cell therapy for solid tumours, are we making progress?
- Other options: TCR-engineered T cells & Tumour Infiltrating Lymphocytes (TIL therapy)
- What's the future of immunotherapy for solid tumours, and how do we get there?

Morning Four: Targeted Therapy & Immunotherapy for Haematological Cancers – part 1

Introducing the biology and genetics of haematological cancers

- Cell of origin of different cancer types
- The importance of B cells as the cell of origin of most haematological cancers
- Types of DNA damage in haematological cancers
- Consequences of common chromosome translocations and other mutations
- Understanding the incidence of blood cancers in infants and children

Unique properties of B cell-derived cancers

- Why most haematological cancers are derived from B cells
- The general pattern of mutations in B cell cancers
- Mutations and their consequences in CLL, B-cell NHL and myeloma

An overview of all the treatments

- Antibody-based treatments: naked antibodies, conjugated antibodies, BiTEs, bi-specifics and other T cell engagers
- Small molecules as cancer treatments
- An introduction to cell-based therapies

Morning Five: Targeted Therapy & Immunotherapy for Haematological Cancers – part 2

Targeted treatments for chronic lymphocytic leukaemia, non-Hodgkin lymphoma (NHL) and acute lymphoblastic leukaemia (ALL)

- CD19 and CD20-targeted antibody therapies (e.g. rituximab, obinutuzumab, tafasitamab)
- T cell engagers (BiTEs, bi-specific antibodies, and other designs)
- Drug-conjugated antibodies (e.g. Inotuzumab ozogamicin)
- B cell receptor signalling pathway inhibitors (targeting BTK, PI3Kδ, CD79B)
- Bcl-2 inhibitors (e.g. venetoclax)

Treatments for myeloma, acute myeloid leukaemia, Hodgkin lymphoma and chronic myeloid leukaemia (CML)

- Treatments for multiple myeloma: proteasome inhibitors, immunomodulators, monoclonal antibodies
- Treatments for acute myeloid leukaemia: focus on FLT3 inhibitors
- Kinase inhibitors for CML (and Ph+ ALL)
- Targeting CD30 and PD-1 for Hodgkin lymphoma

CAR T cell therapy for ALL, NHL, myeloma

- An overview of the CAR T cell process
- CAR protein design – what each bit does and why it matters
- Reasons for side effects of CAR T cells
- Reasons for resistance and relapse
- An overview of the results so far, the lessons learned, and what the future might look like



About Elaine Vickers

Dr Elaine Vickers, PhD of [Science Communicated Ltd](#) has worked as a cancer educator for over twenty years and has previously acted as science communicator for three of the UK's leading medical research charities, including four years in the Science Information team at Cancer Research UK.

She is passionate about demystifying the science behind cancer biology and the latest cancer treatments such as kinase inhibitors, monoclonal antibodies and immunotherapies. Elaine is experienced in teaching people with any level of scientific or medical knowledge from cancer patients through to medical oncologists.

Her book, A Beginner's Guide to Targeted Cancer Treatments, was commended by the British Medical Association book awards. A second edition is due out in 2024.

