UCL Cancer Institute and ‘UCL Cancer Domain’

Summary and Strategy 2011

Strategy:

To develop a cancer presence and excellence, which rival other major national and international hubs for cancer research

- To integrate basic and clinical cancer research across UCL and affiliated Hospitals
- To develop our core cancer strengths (Diagrams 1 & 2) into centres of excellence and the largest research hubs in Europe
- To foster, promote and articulate to external stakeholders our basic research strengths and programs
- To provide the best possible ‘MSc Cancer’ course
- To provide an integrated learning experience, with laboratory and clinical exposure, to all our postgraduate and Clinical PhD and trainee Fellows
- To expand our biobanks, and molecular pathology services, supporting personalised cancer care
- To further significantly increase our industrial and philanthropic efforts, supporting infrastructure, recruitment and education

Abbreviations

CRF: Clinical Research Facility
GEE: UCL Research Department of Genetics, Evolution, Environment
GOSH: Great Ormond Street Hospital for Sick Children
HCA: Hospital Cooperation of America
I&I: UCL Division of Infection and Immunity
ION: UCL Institute of Neurology
ICH: UCL Institute of Child Health
LMCB: MRC Laboratory for Molecular and Cell Biology
Nano: London Centre for Nanotechnology
NLCN: North London Cancer Network
IoWH: UCL Institute of Women’s Health
RFH: Royal Free Hospital NHS Trust
SMB: UCL Research Department of Structural and Molecular Biology
SCRI: Sarah Cannon Research Institute (US)
SCR London: Sarah Cannon Research UK
UCLH: University College London Hospital NHS Foundation Trust

Background:

The UCL Cancer Institute is located in the heart of London, and part of UCL [University College London]. UCL is consistently ranked within the top 20 global universities. The Cancer Institute is part of the Faculty of Biomedical Sciences, which is the largest concentration of biomedical researchers in Europe. The Cancer Institute hosts the majority of cancer research at UCL and other significant activities across the campus are incorporated by a new Cancer Domain within the School of Life- and Medical Sciences (incorporating UCL Medical School).
The Cancer Institute is affiliated with a number of teaching and specialist hospitals in central London, including University College London Hospital (UCLH); Royal Free Hospital; and Great Ormond Street Hospital for Sick Children. The Cancer Institute is also the nucleus for the UCL Cancer Research UK Centre and the Experimental Cancer Medicine Centre. The Institute’s activities and space are spread across 5 buildings and 2 campuses, the new Paul O’Gorman Building being the central research hub, with ~300 scientists studying basic and translational aspects of cancer research. The UCL Cancer Institute is now fully established with 50 scientific Group leaders, 32 clinical scientists, 50 honorary clinical consultants and a total FTE staff of 317. Across the new UCL Cancer Domain there are currently over 70 Group leads. Of the current Group leaders affiliated with cancer, there are 4 FRS and 10 with FMedSci.

During the past 3 years, the number of enrolled postgraduate students has increased from 75 to 105, and the total number of Career Development Research Fellows (including clinical and non-clinical) from 6 to 15 (funded by MRC, CR-UK, Wellcome Trust, BBSRC and LLR). We have also significantly strengthened the foundations of basic cancer research at the UCL Cancer Institute by recruiting both internationally known scientists, as well as new group leaders with the potential to become international leaders in their respective fields. Particular areas of strengths include stem cell biology, transcription factors, cell cycle, translational immunology, genomics and bioinformatics and mechanisms of chromatin regulation. Additionally, a number of cancer researchers were recruited to the Faculty of Life Sciences, but are affiliated with the Institute, together with established basic researchers at the MRC Laboratory for Molecular and Cell Biology (LMCB).

Our current total grant income is over £85 million. We will focus on strengthening our key areas of international competitive research, continue to build upon our core facilities and infrastructure, and support and mentor the newly recruited non-clinical and clinical researchers.

A major enterprise will be to link the translational research activities at the UCL Cancer Institute with the clinical activities at the new £100 million ambulatory Cancer Centre (opening 2012), directly opposite the Institute. A priority will be to integrate research and clinical central document management systems for biobanking, whole-genome tumour analysis, circulating tumour cell data, treatment, response, and outcome (HTA, GCLP, GMP and MHRA compliant).

**Research Themes:**

(All Groups leads are part of the UCL Cancer Institute, except where their main UCL Affiliation is indicated in brackets). MD indicates medically qualified (MB, MBBS, MBChB or equivalent), and not necessary an ‘MD degree’.

- Basic Research  
- Translational Research  
- Applied Research  
- Clinical Research  

- Cell Cycle

Jurg Bähler PhD (Cancer/GEE)  
Kazunori Tomita PhD  
Kai Stoeber PhD  
Gareth Williams MD PhD  
Hiro Yamano PhD
- **Tumour Initiating Cells & Epigenetics**
  
  Stephan Beck PhD  
  Sebastian Brandner PhD (ION)  
  Tariq Enver PhD  
  Sue Hadjur PhD  
  Alison Lloyd PhD (Cancer/LMCB)  
  Steen Ooi PhD  
  Steven Pollard PhD  
  Paolo Salomoni PhD  
  Martin Widschwendter MD PhD (IoWH)

- **Transcription Factors, Signaling & Mitochondrial Biology**
  
  Tracy Barrett PhD (SMB)  
  Michael Duchen PhD (GEE)  
  Christina Gewinner PhD  
  Ivan Gout PhD (SMB)  
  Alexander Hergovich PhD  
  Barbara Jennings PhD  
  Richard Jenner PhD  
  Salvador Moncada FRS (WIBR)  
  Pablo Rodriguez-Viciana PhD  
  Claudio Stern FRS (GEE)  
  Gyorgy Szabadkai PhD (Cancer/GEE)  
  Gabriel Waksman PhD (SMB)

- **Tumour Immunology, Gene Therapy and Immunotherapy**
  
  Mary Collins PhD (I&I)  
  Benny Chain (I&I)  
  Olivier Danos PhD  
  Adele Fielding MD PhD  
  Emma Morris MD PhD  
  Amit Nathwani MD PhD  
  Karl Peggs MD PhD  
  Martin Pule MD PhD (Cancer/Nano)  
  Sergio Quezada PhD  
  Hans Stauss PhD (I&I)  
  Yasu Takeuchi PhD (I&I)  
  Adrian Thrasher MD PhD (ICH)  
  Robin Weiss FRS (I&I)

- **Bioinformatics and Systems Biology**
  
  Buzz Baum PhD (cancer/LMCB)  
  Anthony Finkelstein PhD (Engineering)  
  Stephen Henderson PhD  
  Andrew Teschendorff PhD  
  Elia Stupka PhD  
  Alexey Zaikin PhD (Maths)
- **Translational Haemato-Oncology**

  Clare Bennett PhD  
  Ronjon Chakraverty MD PhD  
  Rosemary Gale PhD  
  Raj Gupta MD PhD  
  Derralynn Hughes PhD  
  Asim Khwaja MD PhD  
  David Linch MD PhD  
  Stephen Mackinnon MD PhD  
  Elisabeth Nacheva PhD  
  Kwee Yong MD PhD

- **Experimental Medicine, Drug Development & Early Phase Clinical Studies**

  John Anderson MD PhD (ICH)  
  Margaret Ashcroft PhD (Medicine)  
  Tobi Arkenau MD PhD (UCL Cancer Inst/SCRI)  
  John Bridgewater MD PhD  
  Hilary Calvert MD PhD  
  Martyn Caplin MD PhD  
  Kerry Chester PhD  
  Adrienne Flanagan MD PhD  
  Martin Foster MD PhD  
  Stephen Harland MD PhD  
  John Hartley PhD  
  Daniel Hochhauser MD PhD  
  Peter Isaacson FRS  
  Patrick Maxwell MD PhD (Medicine)  
  Tim Meyer MD PhD  
  Sam Janes MD PhD (Medicine)  
  Barbara Pedley PhD  
  Kathy Prichard-Jones MD PhD (ICH)  
  Susan Short MD PhD  
  Sandra Strauss MD PhD  
  Chrissie Thirlwell MD PhD

- **Surgical and Investigative Oncology**

  Michael Baum MD (Surgery)  
  Stephen Bown MD PhD (Surgery)  
  Brian Davidson MD PhD (Surgery)  
  Mark Emberton MD PhD (Surgery)  
  Steve Halligan MD PhD (Medicine)  
  Colin Hopper MD (Eastman)  
  John Kelly MD PhD (UCL Cancer Inst/Surgery)  
  Laurence Lovat MD PhD (Surgery)  
  Massimo Malago MD (Surgery)  
  Stephen Pereira MD PhD (Medicine)  
  Mark Winslet MD (Surgery)
• Clinical Trials, Epidemiology and Behavioural Sciences

CR-UK UCL Clinical Trials Centre (Jonathan Ledermann, Alan Hackshaw)

This is the largest CR-UK Clinical Trials Centre in the UK, supporting and steering national and international Phase II and III studies.

Gynaecological Cancer Research Centre (Ian Jacobs, Usha Menon, IoWH)

Currently storing and analysing the largest number of sera and tumor samples from prospective clinical studies in the world. Over 100,000 samples are part of large MRC and CR-UK supported cohort studies.

CR-UK Health Behaviour Research Centre (Jane Wardle, Robert West, UCL Epidemiology)

This Centre undertakes research aimed at advancing our understanding of behaviours that impact on health and cancer risk. Three main areas of research are dietary choice, participation in screening programmes, and tobacco smoking.

Cancer Types

Clinical and Translational Research is being conducted in all cancer types. However, a number of cancer types have been identified where we have, or will develop, international competitive programs in basic and translational research, underpinning large clinical trial activity, and international referral practices. For these cancer types our partner tertiary referral hospitals already have, or are aiming to establish, the largest referral practices in London.

![Diagram 1 Disease Site Based Research Strengths, and affiliated Hospitals](image)

For these tumour types, we are investing in biobanking matched with genotyping/genomics analysis, and access to infrastructure that will link molecular and genomics data with outcome/treatment response.
Diagram 2 Disease Site Based and Approached Based Integration, allowing greater collaboration between basic science activities and clinical research

**Infrastructure:**
A number of cross-cutting research Centres and Themes support cancer research and facilitate cross-cutting collaborations:

- **UCL Cancer Research U.K. Centre** (David Linch)
The first CR-UK Centre in London. This is the overarching Centre bringing together translational and clinical cancer research between UCL, and partner hospitals UCLH, GOSH and RFH. This Centre provides the vehicle for CR-UK to invest in research, training and education at UCL and partner Hospitals.

- **UCLP Cancer Theme** (Kathy Prichard-Jones)
UCLP brings together the largest Academic Health Science Centre in Europe, with an annual budget over £2 billion. The principal objective of the Cancer Theme at UCLP is to establish a model clinical care provider network across Central and North London. UCLP is also aiming to bring research advances to the community, to enhance clinical trial participation at non-teaching hospitals, and to reduce the cancer burden in central and north London, through prevention and education.

- **UCL Experimental Cancer Medicine Centre** (Tim Meyer & John Hartley)
This Centre provides the resources and infrastructure for drug development, early phase clinical trials and molecular pathology and diagnostics.

- **UCL/UCLH Clinical Research Facility** (Tim Meyer)
This Facility is a physical and administrative structure, part of the UCL/UCLH CRF, and leads all Phase 0 and I cancer clinical trials at UCL. Five clinicians are currently dedicated to clinical trials at the Cancer CRF. Recently, we have formed an alliance with SCRI, one of the most successful phase I centres in the US, and are co-developing our Cancer CRF with Sarah Cannon Research UK (Harley Street, London).

- **UCL/UCLH Comprehensive Biomedicine Research Centre** (CBRC)(cancer is represented by two themes, David Linch & Daniel Hochhauser)
‘Cancer’ and ‘Gene & Cellular Therapy’, together are the largest themes within the CBRC, and we have obtained significant funds towards recruitment, clinical research infrastructure and translational studies.
Of note is the investment in the Cancer CRF, the recruitment of new non-clinical and clinician scientists, the infrastructure for cellular and gene therapy, the investment in next generation sequencing, cancer imaging and molecular pathology.

- **Kings/UCL Comprehensive Cancer Imaging Centre** (Tony Ng, Kings; Richard Begent, UCL)
  Cross-cutting infrastructure and staff support for multimodality experimental and clinical imaging. This initiative is funded by an EPSRC/CR-UK Grant of £10 million over 5 years

- **UCL-AD (UCL Advanced Diagnostics)**
  UCL-AD is an integral part of the UCL Cancer Institute, and one of the largest pathology services providing specialist NHS services and research support (incl HER2 testing, KRAS, BRAF, EGFR and cKIT etc). The major strength of UCL-AD is high-throughput immunohistochemistry and FISH. Their remit is being expanded to include molecular diagnostic tests for central and North London, including to our private partners (HCA and The London Clinic).

**Significant initiatives impacting cancer research at UCL:**

1. The opening of the **UCLH MacMillan Cancer Centre** in 2012
   This £100 million ambulatory cancer centre, opposite our main research facility in Huntley Street, will be the U.K.’s largest and most advanced out-patient cancer care facility. This is a 50,000sq ft facility, with roof garden, dedicated clinical research and imaging facilities including the first UK MRI-PET. The Cancer Institute and our GCLP Laboratories will directly be linked to the new Centre.

2. The development of a **Proton Treatment Centre** at UCLH (with UCLP). This is being co-developed with the Manchester facility as national referral centres. This Centre will build on our clinical research strengths in paediatric, neuro-oncology and sarcoma.

3. Establishment of a major initiative in **Molecular Pathology and Genomics** (lead, Adrienne Flanagan). Together with SCRI and The London Clinic, we are developing infrastructure for genome-wide genetic analyses, supporting research and personalised care for our core cancer strengths (Diagram 1).

4. SCR UK/UCL/UCLH agreement to co-develop **Early Phase Clinical Trials**. This initiative is to provide long-term access to new drugs available to SCRI US.

5. **Biobanking**: A number of initiatives are supporting centralised ethics and tumour biobanking. The largest initiative is an investment by The London Clinic, London’s largest private hospital, supporting infrastructure and staff for storing surgical resection specimens from The London Clinic.

6. The re-launching of our Charity, the **UCL Cancer Institute Trust**, new Chairman, four additional new Trustees, new branding and fundraising activities.

**Technologies and Infrastructure:**

The Institute will continue to invest and support core laboratory research and clinical research infrastructure and equipment.

Significant recent investments include:

- Technoplast Xenopus Facility - 720 animal capacity
- MoFlo FACsorter
- Gallios Flow Cytometer (X2)
- Illumina Sequencers (X 3)
• Data store, additional 20TB
• Gene Expression Microarrays (Affymetrix, Illumina and Agilent)
• Whole Genome Lenti-shRNA Library
• Mass-Spectrometers - Kratos AXIMA CFR MALDI-ToF and a Shimadzu LC-MS-ITToF.
• Biacore instrument for measuring protein interactions
• Laser Capture dissection microscope
• Live cell imaging microscope
• Experimental Radiotherapy – Image guided radiotherapy (Small Animal Radiation Research Platform)
• SPECT/CT for pre-clinical imaging (Philips healthcare NanoSPECT/CT scanner)
• GCLP Laboratory – 100 sq.m. for supporting clinical trials
• Clinical Research Facility 70 sq.m. laboratory at UCLH for supporting clinical trials
• Building wide temperature monitoring for HTA, GCLP, GMP and MHRA compliance
• Sample monitoring and storage systems for HTA, GCLP, GMP and MHRA compliance
• Central document management system (QPulse) for HTA, GCLP, GMP and MHRA compliance
• GMP Lab (viral vectors for clinical gene therapy) – 90 sq.m.
• GMP Lab (cellular therapy for clinical trials) – 45 sq.m.
• GMP Lab (antibodies for clinical trials) – 90 sq.m.
• GCLP Laboratory for Molecular Pathology – 150 sq.m.
• Clinical SPECT-CT (GE Discovery 360 SPECT-CT System) (at UCLH)
• Clinical MRI-PET (with UCLH)

Strategic Goals and Action Plans for 2011/2012

➢ Recruitment of Chair in Molecular Pathology and Personalised Cancer Medicine (with UCLH)

➢ Recruitment of Chair in Radiation Oncology (with UCLH, RFH, and HCA)

➢ Recruitment of Chair in Cancer Imaging (with UCL Medicine)

➢ Appointment of new Head for Department of Oncology (with UCLH and RFH)

➢ Focus on the expansion of clinical trials where tumour genotype informs patient stratification (molecular directed clinical trial design/personalised medicine studies)

➢ Increase postgraduate student numbers by 20%

➢ Co-develop the Clinical Fellows (clinical PhD) program and recruitment process with LRI (David Linch & Richard Treisman)

➢ Establishing mentoring program for new Clinical Senior Lecturers and Research Fellows

➢ Development of additional space for Molecular Pathology and Genomics

➢ Increase Industrial Funding by 20%

➢ Increase Philanthropic Funding by 30%

➢ Launch new website
Selected Publications (2009-):


Inhibition of carboplatin-induced DNA interstrand cross-link repair by gemcitabine in patients receiving these drugs for platinum-resistant ovarian cancer. Ledermann JA, Gabra H, Jayson GC, Spanswick VJ, Rustin GJ, Jitlal M, James LE, Hartley JA. Clin Cancer Res. 2010 Oct 1;16(19):4899-905.


Map illustrating central cancer campus, with UCL Cancer Institute, new UCLH MacMillan Cancer Centre, site for Proton Beam Treatment Centre (PBT), Paul’s House (for families with children being treated for cancer) and the new Cancer Clinical Research Facility (CRF). The Cancer CRF is connected to University College Hospital, one of the largest tertiary referral hospitals in the UK, with one of the largest and most advanced intensive care units.