THE CENTRE FOR

Core Biotechnology Services (CBS)

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Core Biotechnology Services

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CBS Introduction

The Centre for Core Biotechnology Services (CBS) brings together a set of state-of-the-art facilities to give researchers the tools they need to undertake world-class research. Its mission is to provide internationally competitive core facilities open to all researchers within the College of Medicine, Biological Sciences and Psychology.

CBS aims to facilitate delivery of the College's research strategy in line with the research themes and departments. CBS is led by Professor Andrew Fry (amf5@le.ac.uk) and managed by Mrs Illa Patel (ip14@le.ac.uk).

Each facility is managed by a dedicated team of highly skilled staff that not only maintain the equipment but also offer services and training as appropriate. Details of the services that they provide and how to get in contact are contained within this brochure. There are also a number of affiliated services that CBS staff can put you in touch with that include:

- Structural Biology
- Biomarkers

The provision by CBS of first-class technical services is achieved through enabling access to the latest technologies and equipment that would normally be beyond the scope of small individual laboratories. CBS operates within a financial framework that seeks to maximize cost recovery in order that the services offered remain at the forefront of biomedical research. Most facilities operate via standard charges that can be built into grant applications via LUcre costing. However, researchers are strongly encouraged to discuss their needs with facility managers, and schemes are in place to support new projects with limited funds. Similarly, CBS facilities can be accessed by postgraduate and undergraduate students under specific agreements. External customers are also offered access but ensuring that all internal objectives are supported first. Finally, CBS plays a crucial role in enriching the undergraduate teaching experience and for promoting the University's biomedical research activities during visits from potential sponsors and on University Open Days.

At CBS, we trust that we provide you with an outstanding service and sincerely hope that this enhances your research output in terms of publications, research grants, collaborations, enterprise activities and outreach events. However, we are always keen to hear your views on how the services can be improved and welcome your input on any aspect of our activities.

The University of Leicester is part of the M5 consortium of Midlands-based research intensive universities, that include Aston, Birmingham, Leicester, Loughborough, Nottingham and Warwick. CBS maintains close interactions with the biomedical core facilities at these institutions for cataloguing and sharing of specialized equipment and expertise, and coordination of new applications for larger infrastructure funding.
Leicester Imaging Technologies (L.I.T.E.)

LITE encompasses imaging ultrastructures through cellular processes to pre-clinical and animal models.

Advanced Imaging Facility (AIF)

Light microscopy provides non-invasive imaging of cellular and molecular processes, including dynamic live-cell interactions key for identifying immunological responses and cellular communication. The facility allows researchers and students to carry out research on state of the art imaging equipment and image analysis software to quantify and validate results.

Microscopes available:

- Leica TCS SP5, Nikon C1Si and Olympus FV1000 confocal laser scanning microscopes
- Zeiss MP7 multi photon laser scanning microscope
- Nikon Eclipse Ti-E microscope with LEDs and EMCCD camera
- Nikon Eclipse Ti-E microscope with LEDs, lasers for TIRF and EMCCD camera
- Nikon TE300 inverted fluorescence microscopes
- Olympus ScanR screening station/CellR cell imager
- Olympus BX61 automated microscope with spectral imager
- Olympus LV200 bioluminescence imaging system

Other imaging systems:

- Typhoon Trio+ Imager
- Fujifilm LAS4000 luminescence imager

All users will receive basic training on the systems as well as advice for experimental designs and grant applications. The facility staff can assist you with your research, collaborations are possible but training is strongly encouraged.

Locations: Adrian Building, Henry Wellcome Building, Maurice Shock Medical Science Building, Robert Kilpatrick Clinical Sciences Building

Contact: Dr Kees Straatman, krs5@le.ac.uk; Henry Wellcome Building 3/65. 0116 229 7085 / 252 2263

Academic Lead: Dr Kayoko Tanaka, kt96@le.ac.uk

Website: www.le.ac.uk/cbs-advancedimaging
Pre-Clinical Imaging Facility

Ultrasound

The ultrasound facility creates high-resolution, real-time images for pre-clinical research. The non-invasive nature of this system allows repeatable imaging of single subjects. Fast, label-free data acquisition, in conjunction with analysis software, provides accurate quantitative measurements.

Four major imaging modes can give insights to a variety of biological questions:

- **B-Mode and M-mode** generate high spatial- and temporal-resolutions respectively.
- **Colour Doppler-mode** visualises flow rates and direction within vessels by applying colour maps to live images for faster identification of major vessels and flow dynamics.
- **Pulsed Wave Doppler-mode** quantifies flow velocities and wave forms for analysis of arterial obstructions such as plaque build-up. It can also be used to analyse the function of developing organs or major blood vessels.

Training is encouraged for long term projects and will be provided to allow researchers to acquire images independently. Support staff are available to take images for short-term and one off projects.

MRI

The 9.4 Tesla pre-clinical MRI scanner at the Central Research Facility utilizes ultra-high magnetic field strength to generate high resolution images with excellent soft tissue contrast. The multipurpose capabilities of the scanner are enhanced through the use of application-specific gradient and radiofrequency coils. Accurate physiological monitoring of anaesthetized specimens facilitates cardiac and respiratory gating of image acquisitions. We can therefore offer a broad range of MRI techniques including high resolution structural imaging, micro-imaging, cardiac imaging, spectroscopic imaging, diffusion imaging and functional MRI. The scanner is equipped with an extensive pulse sequence library. Development of in-house custom sequences will also be possible where necessary.

The Quantum CT images bone anatomy by using low dose (13-300 mGy) X-ray scans, which generate >10μm resolution of osteolytic lesions and other abnormalities, as well as providing a reference point for bioluminescent signals collected by the IVIS Spectrum system.

**Location:** Central Research Facility (CRF)

**Contact:** Dr Michael Kelly
mk450@le.ac.uk, 0116 252 3175

**Academic Lead:** Dr Mark Horsfield
mah5@le.ac.uk

IVIS Spectrum Bioluminescence and Quantum MicroCT scanners:

These scanners provide high resolution bioluminescence, fluorescence or CT images. The two systems can generate 3D datasets of molecular and anatomical processes which can then be merged into one image. Marked or tagged cells are imaged using the IVIS Spectrum to deduce T-cell responses, localisation and trafficking. This is a useful way to test novel drug combinations and or track disease models (e.g. neurodegeneration).

**Location:** Level 1 Hodgkin Building

**Contact:** Dipti Vashi, dv47@le.ac.uk
Lisa Ntemou, en67@le.ac.uk

**Academic Lead:** Dr Don Jones
gdj2@le.ac.uk

**Website:** www.le.ac.uk/cbs-preimaging

X-Ray Irradiator

The irradiator can be used for both cell and animal irradiation.

**Location:** Level 1 Hodgkin Building

**Contact:** Dipti Vashi, dv47@le.ac.uk
Lisa Ntemou, en67@le.ac.uk

**Academic Lead:** Dr Don Jones
gdj2@le.ac.uk

**Website:** www.le.ac.uk/cbs-preimaging
Electron Microscopy Facility (EMF)

Providing high resolution imaging, the facility contains a JEOL JEM-1400 Transmission Electron Microscope (TEM) to undertake studies of cell ultra-structure, macromolecules, bacteria and virus particles and a Hitachi S3000H Scanning Electron Microscope (SEM) for surface topographical studies.

Routine ultra-thin section sample preparation for TEM, including immuno-localisation techniques, after resin embedding, is achieved using Leica or RMC ultramicrotomes. Depending on project requirements other techniques available and frequently employed include; metal shadowing, negative staining and vacuum-coating techniques for both SEM & TEM.

Previous projects include; bacteria & biofilms, bacteriophage, cultured cells, algae, chloroplast development, diatoms, pollen, microparticles plus many more – no job too small!

Projects can be undertaken:

- By the project initiator; where training will be provided (particularly when decisions may require the investigators specific scientific knowledge during data acquisition)
- In collaboration with laboratory staff
- On a service basis (e.g. one-off experiments)

Project feasibility, guidance on appropriate methodologies and costs should first be discussed with the Lead Technician. It is the responsibility of the client to ensure that the agreed samples are delivered to the Laboratory on the date/time arranged. Where a specific/suspected health hazard is presented, a fully completed COSHH form must accompany the sample – acceptance of such samples will be at the discretion of the facility.

Location: LG27/31, Adrian Building, 0116 252 3370
Contact: Stefan Hyman (Manager), emlab@le.ac.uk
Academic Lead: Professor David Twell, twe@leicester.ac.uk
Website: www.le.ac.uk/cbs-em
Histology Facility

Providing a comprehensive range of histological techniques, the facility includes a cut-up area, processor and embedder.

Cutting is generally undertaken on standard blocks but megablocks can also be cut. H&E staining is performed on a linear stainer ensuring consistent results as assessed by the NEQAS quality assurance scheme. Immunohistochemistry can be performed using a variety of techniques to fit the researcher’s needs.

Project logistics should first be discussed with the lead technician.

Services provided include:

1. **Sample Preparation**
   - Fresh tissue for freezing or nitrogen storage; tissue for fixing 10% formalin
   - Embedding in paraffin wax

2. **Cutting Facility produces unstained sections on treated slides**

3. **Staining available with**
   - H&E
   - Immunohistochemistry
   - Tinctorial stains (e.g. Perls, Elastic-Van Gieson)

4. **Access Diagnostic Archives on your behalf.**

**Location:** Level 3, RKCSB, LRI

**Contact:** Angie Gillies (Histology Manager) akg8@le.ac.uk,
Karen Kulbicki (Cancer Biobank) kjk3@le.ac.uk, 0116 252 3235

**Academic Lead:** Prof John Le Quesne

**Website:** www.le.ac.uk/cbs-histology

Haematoxylin and Eosin (H+E) on human spleen
Flow Cytometry

The flow cytometry facility gives users basic training and access to cytometry equipment to conduct their own experiments.

Equipment available includes:

The FACSCanto(tm) II which allows for flow cytometric analysis of fluorescently labelled cells using its blue (488-nm, air-cooled, 20-mW solid state) and red (633-nm, 17-mW HeNe) lasers.

The BD FACS Loader carousel that can accommodate up to forty 12 x 75-mm tubes and automatically loads them on the BD FACSCanto(tm) II system without operator intervention.

BD FACSDiva(tm) software is used for both acquisition and analysis.

A miniaturised flow cytometer – the Muse Cell Analyser from Millipore – is also available for rapid quantitative analysis of cell cycle profile, cell viability and apoptosis.

Information about pricing and availability available upon request

Contact: Tara Hardy, th25@le.ac.uk, 0116 229 7065

Academic Lead: Dr. Salvador Macip, sm460@le.ac.uk, 0116 229 7113

Website: www.le.ac.uk/cbs-flowcytometry

Containment Level 3 Facility

The Containment Level 3 suite provides a facility to work with ACDP Category 3 microorganisms.

The Containment Level 3 suite contains four individual laboratories. They have two class I and two class II microbiological safety cabinets, a CO2 incubator for tissue culture and other equipment essential for working with microorganisms and their safe storage and disposal.

A second Containment Level 3 suite is available in the Central Research Facility (CRF), equipped for work with rodent models of infection.

Anyone who wishes to work in the facility must discuss their plans with the management team at the earliest possible opportunity. Unless documentation is already in place, it is necessary to submit an HBA2 form and code of practice for the organisms you wish to work with (examples of these are available via c3facility@le.ac.uk). These documents must be discussed and approved at the Containment Level 3 Users Group meeting (three per year) before work in the suite can commence. Further project-specific documentation will also be required. Once documentation is approved, all users must undergo a period of training before being approved for work within the laboratory.

Contact: c3facility@le.ac.uk

Website: www.le.ac.uk/cbs-c3
Biomedical Joint Workshops

The Biomedical Joint Workshops provide an efficient, cost-effective, service in the design, manufacture and repair of routine and specialised equipment required for Teaching and Research.

With over 28 years experience in the materials and techniques used when manufacturing equipment for Life Science usage from laboratory equipment to more sophisticated microscope innovations, our team of highly skilled Mechanical and Electronic Engineers look forward to discussing your requirements whether they be simple repairs or more complex bespoke projects.

The workshops have extensive experience in prototype development that have led to commercial interest and various patents.

For visits, discussions and quotations please contact:

Location: Mechanical Workshop LG50, Adrian Building, 0116 2523320

Location: Electronics Workshop Room 232, Maurice Shock Building

Contact: DW Jones (Workshops Manager), dwj1@le.ac.uk, 0116 252 3320

Contact: G. Gutteridge (Electronics Technician), 0116 252 2977

Academic Lead: Dr Martine Hamann 0116 2523074, Email: mh86@le.ac.uk

Website: www.le.ac.uk/cbs-bmjworkshop
Protein and DNA Facility

The Protein and DNA facility implements DNA sequencing, proteomics, high resolution mass spectrometry (PNACL); custom cloning and small scale protein expression trials (PROTEX).

Protein and Nucleic Acid Chemistry Laboratory (PNACL).

PNACL implements DNA sequencing, proteomics and intact protein mass spectrometry.

Sanger DNA sequencing from full template preparation, down to simple low-cost analysis of completed sequence reactions are available. The facility is equipped with a high-throughput Applied Biosystems 3730 Genetic Analyser for running up to 48 samples concurrently. In addition, samples can be submitted for DNA fragment analysis for applications such as microsatellite analysis or Amplified Length Polymorphism (AFLP) analysis.

Proteomics facilities for carrying out protein identification, quantification and determination of post-translation modification are available. The facility is equipped with mass spectrometry platforms, enabling high resolution analysis utilising an LTQ-Orbitrap instrument and high sensitivity diagnostic validation using a 4000Q-Trap mass spectrometer. Advanced data analysis using a variety of proteomic software platforms can be carried out.

• Peptide Mass Fingerprinting. Pure proteins (from gel or in-solution) can be identified by trypsin digestion followed by MALDI-ToF mass spectrometry and database searching.

• LC-MS/MS can be used to identify multiple proteins and sites of post-translational modifications. For some samples additional fractionation or modification specific enrichment may be required, and these facilities are available.

• Protein Quantification. Subtle changes in protein abundance can be detected using a variety of labeling techniques (SILAC, iTRAQ, TMT) or via label free approaches (Spectral Counting, SRM).

• Protein Molecular Weight can be determined by either Electrospray mass spectrometry or MALDI-ToF MS.

PNACL services are under-pinned by knowledgeable and helpful staff that can facilitate your analyses and whose experience can help avoid the many pitfalls of sophisticated analytical science.

Location: Lab 204, Hodgkin Building, 116 252 5613
Contact: Dr Sharad Mistry, scm11@le.ac.uk
Contact: Dr. Andrew Bottrill, arb29@le.ac.uk
Academic Lead: Professor Andrew Tobin, tba@le.ac.uk

Website: www.le.ac.uk/cbs-pnacl
Protein Expression Laboratory (PROTEX)

Protein Expression. The Protein Expression Laboratory has been established to provide a high throughput service for the preparation of protein expression vectors and small-scale protein expression trials.

The laboratory is designed to serve the needs of structural biology, enzymology and molecular & cell biology across the College.

The pLEICS vectors, developed by PROTEX, can be used to express proteins in E. coli, mammalian cells, baculovirus, Pichia Pastoris, Drosophila, Xenopus and cell-free systems, with a choice of tags including: His6, S, GST, Trx, MBP, FLAG, TAP, HA, Myc, EG/C/YFP, Cherry, Mistic, FlAsH, luciferase, GB1.

Six types of services are offered by Protex:

- Clone into pLEICS vectors(s) – choice of 72 vectors
- Adaption of customer’s vectors for LIC method
- Clone into customer’s vector(s).
- Preparation of designed mutations in protein coding regions.
- 1ml His-tagged protein expression trials in E. coli.
- Provide KATA purifier equipment and technique support for scale up protein purification

The laboratory will also provide expert advice in protein expression and selection of suitable regions to express.

Generally orders received by Friday 4:00pm will be ready by 5:00pm the following Friday.

Location: Room 1/45, Henry Wellcome Building, 0116 229 7202

Contact: Dr Xiaowen Yang, xy13@le.ac.uk

Academic Lead: Professor John Schwabe: js336@le.ac.uk

Website: www.le.ac.uk/cbs-protex
NUCLEUS Genomics

The Genomics facility is a state-of-the-art facility providing solutions for high throughput projects in genetics.

The facility is currently equipped with platforms for projects involving microarray, next generation sequencing and high throughput quantitative PCR experiments. Robotics for RNA/DNA extraction and quality controls or liquid handling can also be accessed. Users can carry out various applications:

- Sequencing
- mRNA and small RNA Expression Analysis
- SNP Genotyping
- Variant detection
- Copy Number Variation Analysis
- Methylation Analysis
- DNA/RNA/Protein purification, quantification and quality control

The facility accommodates small or large scale projects. Work can be handed over to staff members for completion or performed by the users themselves after training. The team is there to support research in genomics and is meant to help researchers at all stage of their studies, from the experimental design and bench work to article and grant preparations.

Location: Adrian Building, Room G23.
0116 252 3365/3375
Contact: Dr Nicolas Sylvius, ns249@le.ac.uk, Reshma Vaghela, rjb40@le.ac.uk
Academic lead: Professor T. Brookes

Website: www.le.ac.uk/cbs-nucleus
The ES Cell Facility

Gene targeting and transgenics have been used successfully at the University of Leicester for over eighteen years. During this time we have generated numerous transgenic mice which have been used across a broad spectrum of biomedical disciplines to understand gene function within the whole animal model.

The ES Cell Facility offers the following services:

- Advice on transgenic project strategies.
- Generation of gene targeted Embryonic Stem (ES) cell clones.
- Handling and verification of imported KOMP and EUCOMM ES cell clones.
- Preparation of ES cells for blastocyst injection.
- Preparation of transgene DNA for pronuclear injection.
- Genotyping.
- Mycoplasma testing.

We are continually expanding our service to encompass the very latest transgenic technologies and will be happy to discuss any specific project you have in mind.

Contact: esfacility@le.ac.uk, 0116 229 7079

Website: www.le.ac.uk/cbs-esfacility
Bioinformatics and Biostatistics Support Hub (BBASH)

The Bioinformatics and Biostatistics Support Hub (BBASH) provide assistance for the design and analysis of biological, clinical and other studies. BBASH staff can either provide consultancy or conduct the analysis on your behalf.

Bioinformatic support is available for research projects including microarray / transcriptome, high-throughput sequencing, large-scale genotyping analysis, proteomics data analysis, experimental design, programmatic and informatics data analysis and storage solutions.

Biostatistics support includes experimental design – sample size and power calculations, analysis of clinical data, survival analysis, analysis of wet-bench data, meta analysis, genome wide association studies (GWAS), basic exploratory analysis using appropriate tests and modelling of clinical or biological data.

BBASH also organises training events for researchers within the college on bioinformatics and biostatistics subjects, including workshops and courses.

BBASH charges depend on the nature and duration of the project.

Location: Room N348, Maurice Shock Building, 0116 252 3350

Contact: Dr Matthew Blades mb492@le.ac.uk (Bioinformatician)
Contact: Dr Maria Viskaduraki mv58@le.ac.uk (Biostatistican)
Contact: Kate Lee kl167@le.ac.uk (Training Co-ordinator)

Academic Lead: Dr Richard Badge rmb19@le.ac.uk

Website: www.le.ac.uk/cbs-bbash

CBS Team
## Core Biotechnology Services (CBS) Overview

**Head – Professor Andrew Fry**  
**Manager – Ila Patel**  
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**Tel:** +44 (0)116 252 5277  
**Email:** ip14@le.ac.uk

### Leicester Imaging Technologies (LITE)

**Advanced Imaging Facility**  
Academic Lead – Dr Kayoko Tanaka  
Manager – Dr Kees Straatman

**Electron Microscopy Facility**  
Academic Lead – Professor David Twell  
Manager – Stefan Hyman, Technician – Natalie Allcock

**Pre Clinical Imaging Facility**  
Academic Lead – Dr Mark Horsfield  
Manager – Dr Michael Kelly, Technician – vacant

**X-RAY Irradiator**  
Academic Lead – Dr Don Jones  
Technicians – Dipi Vashi, Lisa Ntemou

**Histology Facility**  
Academic Lead – Professor John LeQuasne  
Managers – Angie Gillies, Karen Kubicki  
Technicians – Linda Potter, Janine Moreton

**Flow Cytometry**  
Academic Lead – Dr Salvador Macip  
Technician – Tara Hardy

### ES Cell Facility

Academic Lead – Professor Catrin Pritchard  
Manager – Sarah Munson  
Technicians – Lisa Ntemou, Dipti Vashi

### Protein & DNA Facility

**PNACL**  
Academic Lead – Professor Andrew Tobin  
Manager – Dr Sharad Mistry, Dr Andrew Botrill  
Technicians – Shairbanu Ashra, Dr Navdeep Sahota

**PROTEX**  
Academic Lead – Professor John Schwabe  
Manager – Dr Xiaowen Yang

**NUCLEUS Genomics**  
Academic Lead – Professor Tony Brookes  
Managers – Dr Nicholas Sylvius, Reshma Vaghela

### BBASH

Academic Lead – Dr Richard Badge  
Managers – Dr Mathew Blades, Dr Maria Viskaduraki  
Research Assistant – Kate Lee

### Biomedical Joint Workshop

Academic Lead – Dr Martine Hamann  
Manager – Dave Jones  
Technicians – Tony Smith, Andrew Warren, Gerald Gutteridge
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Pricing

The up to date CBS pricing structure and strategy is available on the website www.le.ac.uk/cbs-centre. Potential users are strongly encouraged to contact the relevant facility managers to discuss their research requirements as well as all aspects of cost, access and training.

All information in this brochure was correct at the time of going to press. However, changes and developments are part of the life of the University, and alterations may occur to the programmes and services described in this brochure.