# BBSRC Collaborative Training Partnership in Advanced Bioscience of Viral Products

## Oxford Biomedica, University College London, and University of Oxford

## Supervisor Project Application Form for 2023 entry

# Guidance Notes

### Background

The **Collaborative Training Partnership** (CTP) in **Advanced Bioscience of Viral Products** (**ABViP**) is a comprehensive, multidisciplinary training programme designed and led by Oxford Biomedica in collaboration with academic partners University College London (UCL) and University of Oxford. The aim is to deliver the **next generation of bioscience leaders** who will advance research in viral products for future gene therapies and vaccines. The ABViP-CTP will train a cohort of 24 students over a three-year period (eight students per year) to address the acute viral vector skills shortage.

### Remit

The focus of the ABViP-CTP has been strategically designed by OXB to align with BBSRC’s blue sky research themes and not to encroach on other research areas affiliated with other research councils within UKRI (e.g., MRC and EPSRC). The CTP key objective is to address the fundamental and applied bioscience challenges associated with viral vectors for future gene therapies and vaccines and invite proposals which align with ABViP research themes listed below. A list of suggested project topics is included in Appendix 1. Please note this is not an exhaustive project list and there is no requirement to submit a project that aligns with the proposed project topics. We welcome any novel research ideas that align with the ABViP remit and particularly encourage any new ideas which may span multiple research themes.

**Proposed research themes for the ABViP CTP include:**

* Establishment of suspension adapted packaging / producer cell lines to deliver higher efficiency production – LV, as well as other viral vectors for gene therapies and vaccines, for example, adenovirus (AV) and adeno-associated virus (AAV)
* Viral vector delivery system optimisation and design
* Improved understanding and optimisation of bioprocessing
* Enhanced bio analytics and improved assays for viral vector characterisation
* Application of digitalisation, AI, and machine learning approaches to improve biological understanding and/or enhance productivity
* Application of fundamental bioscience to improve scale-up and production
* Understanding and/or enhancing molecular pathways for vector production and/or assembly
* Generation of biological insights resulting in improved viral vector targeting, tropism and/or tissue specificity.
* Improved viral vector design for gene therapy and vaccine applications
* Understanding the immunological response to viral vectors

To address the interdisciplinary nature of this CTP we require the close involvement of two academic supervisors with complementary expertise.

### The Programme

All students will participate in a variety of training and development activities as outlined in Appendix 2. It is expected that supervisors will ensure that students are fully engaged with the CTP Cohort and attend all CTP training and development activities. Cohort building is a key aspect of the CTP, and all students must participate in all activities which cannot be superseded by local, personal or project demands except in the most exceptional of circumstances.

### Selection Criteria

Projects will be assessed and selected by the ABViP CTP Management Board. Assessment will be based on scoring according to the following criteria:

1. Fit to remit of ABViP CTP and BBSRC
2. Scientific excellence
3. Research Methodology
4. Project Impact
5. Proposed Timeline
6. Project Risks
7. Cost and Resource Considerations
8. Supervision Arrangements

### Queries

For any queries, please contact the local University Postgraduate team, see details below.

**University College London:** Emily Kostas, Graduate Programmes Manager [e.kostas@ucl.ac.uk](mailto:e.kostas@ucl.ac.uk)

**University of Oxford:** David Hyland, Assistant Registrar (Graduate School) [david.hyland@medsci.ox.ac.uk](mailto:david.hyland@medsci.ox.ac.uk)

**Oxford Biomedica:** [ABViP@oxb.com](mailto:ABViP@oxb.com)

### Appendix 1: List of Oxford Biomedica Proposed Topics

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| **Project No.** | **Proposed project** |
| 1 | Studying and characterising molecular mechanisms associated with lentiviral and AAV vector production |
| 2 | Research into the biology of the viral/vector production environment (to inform the development of in-process PAT tools [or correlates] for real-time monitoring of vector production) |
| 3 | Understanding and exploiting the biology of viral products (or vectors) to guide efficient downstream processing (for increased viral/vector recovery and maximising purity) |
| 4 | Exploitation of viral / vector characteristics for use in rapid analytical tests (for functional titre determination) |
| 5 | Understanding the biological limitation(s) or rate-determining steps to lentiviral vector hepatocyte cell transduction |
| 6 | Identify optimal retargeted envelopes using novel technology to modify and tune viral/vector tropism |
| 7 | Understanding the biological limitation to *in vivo* lentiviral vector transduction of T-cells |
| 8 | Understanding the cellular and humoral immune response to viral vectors (use of *in vitro* models and *in vivo*) |
| 9 | Understanding the fundamental biology to help improve *in vivo* HSC vector transduction |
| 10 | Identification of minimal chromosomal retention signal (minimal Mammalian Ori for episomal maintenance of virally delivered nucleic acid sequences)? |
| 11 | Understanding mRNA stability elements for virally-delivered genes – identification of ways to enhance or prolong expression |
| 12 | Understanding signalling circuits: developing virally delivered synthetic Glucose-sensing circuit coupled to insulin production and release |
| 13 | Understanding the biology of viral nucleic acid trafficking and dis-assembly (*could help design and develop fully synthetic enhanced gene delivery systems*) |
| 14 | Application of multi-omics and AI to better understand the cellular machinery that is exploited during virus or viral vector production |
| 15 | Understanding of virus/vector production and scale-up to support process consistency and intensification |
| 16 | Multiscale modelling approaches to virus/vector formation and bioprocessing to inform process economics and decision making |

### Appendix 2: ABViP CTP Training & Development Activities

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