

|  |  |
| --- | --- |
| **\*Title of studentship** | **SILENT**: **S**tealth-Like **I**nterna**l**isation of Genetic Cargo for **E**x vivo **N**atural Killer Cell **T**herapies |
| **Value / what is covered?** |  |
| **Awarding body** | Department for the Economy (DfE) |
| **Number of studentships** | 1 |
| **\*Summary descriptive text / Example of research project** | Natural killer (NK) cells are highly cytotoxic immune effectors and adoptive immunotherapy with NK cells has emerged as a promising treatment option for a variety of malignancies including carcinomas, myeloma, sarcomas, lymphomas and leukaemia. Genetic modification of immune cells with self-amplifying RNA (saRNA) is advantageous over non-amplifying mRNA due to lower dose requirements, which reduce the burden of manufacturing. Successful CAR-based immunotherapy requires an efficient transfer of the CAR transgene into the immune cells. Viral vectors are currently the transfection agent of choice for ex vivo cellular engineering. However, problems with safety concerns, expensive production and size limitations with genetic cargo warrants the development of novel non-viral delivery systems. NK cells are highly resistant to transfection by conventional non-viral methods such as electroporation and lipofection, and problems with toxicity and lower transfection rates have been well documented. The amphipathic peptide RALA (30 aa) and linear CHAT (15 aa) have been used to successfully deliver nucleic acids to a range of primary and cancer cell lines in vitro, without toxicity. The project will investigate, for the first time, novel peptides for stealth-like delivery of nucleic acids into NK cells for ex vivo cellular and adoptive therapies. |
| **\*Supervisor(s)** | Dr Emma McErlean & Prof Helen McCarthy |
| **\*Eligibility / residence Status** | UK Resident in the UK for 3 years. ROI students are eligible for fees only. |
| **Country** | Northern Ireland |
| **\*Start date and duration** | Sept 2022, 3 years |
| **\*Faculty** | Medicine Health and Life Sciences |
| **\*Research centre / School** | Pharmacy |
| **Subject area** | Nanomedicine, Cancer Immunotherapy, Adoptive Cellular Therapies |
| **Candidate requirements / Key skills required for the post** | Applicants should have a 1st or 2.1 honours degree (or equivalent) in a relevant subject. Relevant subjects include Pharmacy, Pharmaceutical Sciences, Biochemistry, Biological/Biomedical Sciences, Chemistry, Engineering, or a closely related discipline. Students who have a 2.2 honours degree and a Master’s degree may also be considered, but the School reserves the right to shortlist for interview only those applicants who have demonstrated high academic attainment to date. |
| **\*Deadline for applications** |  |
| **\*How to apply / contacts** | Postgraduate Research applicants must have applied to Queen’s, via the Direct Applications Portal.  <https://dap.qub.ac.uk/portal/user/u_login.php> |
| **Relevant links / more information** | <http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/>  <http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/>  <https://www.qub.ac.uk/schools/SchoolofPharmacy/Research/ResearchThemes/>  NanomedicineandBiotherapeutics/  <https://pure.qub.ac.uk/en/persons/emma-dynes>  <https://www.qub.ac.uk/schools/SchoolofPharmacy/Research/find-a-phd-supervisor/professor-helen-mccarthy.html> |
| **Keywords for search filters** | Cell Penetrating Peptides, Gene Delivery, Gene Therapy, Nanomedicine, Targeted Treatments, Ex vivo Adoptive Cell Therapies |
| **Training provided through the research project** | Right from the start the PhD student will be involved in academic research designed to have translational/clinical application. This dual approach spans:  1) Research Skills: the academic supervisors will ensure excellent training in nanoparticle formulation, systematic physical characterisation, *in vitro* cell and molecular biology techniques and potentially *in vivo* skills.  2) Record keeping & monitoring: Monthly meetings with the student will take place with electronic records. Students must also complete a 3-month initial review and annual progress review to proceed to years 2 & 3. The annual progress review involves written work, presentation and/or mini *viva*. However, at each of these meetings, the primary supervisor will also be present ensuring that the maximal training benefit can be derived from these processes.  3) Additionally, there will be opportunities to present at academic meetings, building professional networks, personal development on courses for animal licenses, advanced statistics, skills which are all relevant to subsequent employment opportunities. |
| **Expected impact activities** | Impact activities include but are not restricted to presenting the research to academic and industry peers through scientific conferences and students from different disciplines through the Graduate School. The student will also engage with patients, clinicians and key stake holders through a series of webinars/focus groups to understand how they can feed and shape the research plan. Other impact activities relate to commercialisation though IP protection processes, competitor analysis and engagement with clinical collaborators. |