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Dr Falk/Guts UK Awards 2022

F1/F2 RESEARCH AWARD WINNER: Dr Edward Arbe-Barnes

PROJECT:
Single Cell RNA Sequencing of Pancreatic Ductal Adenocarcinoma (PDAC) Epithelial Cells.



Dr Arbe-Barnes is undertaking this research at the Department of Oncology, University of Oxford. He is currently working as a Foundation Year One Doctor at Buckinghamshire NHS Foundation Trust.

Dr Arbe-Barnes explains:

'Pancreatic ductal adenocarcinoma (PDAC) is a common cancer with a dismal prognosis. It is notable for the high proportion of non-malignant cells which make up a tumour. We hypothesise that this dense stroma might mask some of the biology of malignant cells when studying whole tissue using bulk techniques. We anticipate that using newer techniques to investigate epithelial cells at the single cell level will yield valuable insights into how malignant cells drive PDAC progression.

'We will use a technique called single cell RNA sequencing (scRNA seq), which shows which genes each individual cell is expressing. This means you can characterise each cell, and study how they behave, in very high resolution. We have a scRNA seq dataset of epithelial cells from 7 patients who had PDAC resected, in addition to 43 samples from two published scRNA seq datasets.

'We will annotate which types of epithelial cells are found in PDAC using known gene signatures. Malignant cells will be identified by gene expression patterns which represent chromosomal abnormalities which occur in cancer (inferred copy number variations). Differences in gene expression can then be compared between malignant and non-malignant cells to identify molecular targets. In addition, we can analyse the interactions between cells to understand the cellular signalling networks which drive PDAC progression.

'I hope that this study will yield insights into the biology of PDAC and may identify potentially druggable targets to be further studied in PDAC.'

Dr Arbe-Barnes's Project Supervisor, Dr Shivan Sivakumar, Honorary Hepatopancreatobiliary Medical Oncologist comments:

'I have known Eddy since he was a young medical student, and he has shown a great deal of intellect and enthusiasm since then. He has been working with me for several years on the biology of the tumour microenvironment of pancreatic cancer and he has been impressive.

'As well as completing his medical studies at Oxford, he has learnt coding from scratch to perform complex computational experiments in tumour immunology. This project is a natural progression of the work we have been doing, which is to understand at a single cell level the heterogeneity of pancreatic cancer cells, which I hope will contribute to our understanding of this disease.'

Dr Arbe-Barnes states:

'I am delighted to have won the Dr Falk/ Guts UK F1/F2 Research Award to study pancreatic cancer cells at the single cell level. I aspire to a career as an academic clinician, and I am particularly interested in cancer immunology. I hope use novel techniques, including single cell RNA sequencing (scRNA seq) to study the interplay between immune cells and cancer.

'I decided to apply to for this award to continue research I have done using scRNA seq to characterise immune cells which infiltrate pancreatic tumours. This award gives me the opportunity to take ownership of a study for the first time, and I hope to develop skills which will help me towards a career in translational research. I am very grateful for the support of my supervisors Rachael Bashford-Rodgers and Shivan Sivakumar for their continued mentorship.'



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Dr Falk Pharma UK Ltd
Unit K, Bourne End Business Park
Cores End Road
Bourne End SL8 5AS
Tel: +44 (0) 1628 536 600
Email: office@dralkpharma.co.uk

Company Registration Number: 2307698

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