

## **Cancer Network Research Strategy 2021-2026**

### **Executive Summary**

#### ***Vision***

The Cancer Network's vision is to enable high-impact cancer research that will improve early cancer detection and diagnosis, identify new cancer prevention targets, and bring transformative new treatments for cancer patients.

#### ***Background***

The Cancer Network at the University of Bristol is highly interdisciplinary, bringing together clinical academics with population health-based and basic researchers across four faculties (Health Sciences, Engineering, Life Sciences and Science). The Network strongly promotes the development and progression of early career researchers and clinical academics, who are actively involved in leading network activities. It has regular meetings with cancer researchers at Cardiff University.

The Network was formed in 2014, building on our existing strengths in cancer research. The Network is currently led by Prof Anne Ridley (cancer biology), Prof Richard Martin (population health) and Dr Helen Winter (clinical research), with a Steering Group crossing multiple faculties, disciplines, and career stages.

#### ***How we work***

The Network promotes interdisciplinary working through regular workshops organised across scientific disciplines and cancer sites. We provide pump-primed funding to enable members to start new areas of research, build underpinning methods, and generate supportive data to enable us to respond rapidly to emerging research questions and funding streams.

#### ***Outputs***

The Network's interdisciplinary ethos has led to exciting new collaborations, which were essential to the success of the large £7.7m Cancer Research UK-funded Integrative Cancer Epidemiology Programme (2020-2025), and a £500K Cancer Research UK-funded early glioma detection grant (2020-2023) that involves research groups from 3 faculties (Health Sciences, Engineering, and Science) and a collaboration with industry. The Network collaborates with the nation-wide NIHR Oncology Translational Research Centre, with a focus on developing biomarkers for early diagnosis of cancers within the new Rapid Diagnostic Centres. It successfully facilitated high-impact cross-disciplinary outputs and peer reviewed papers. For example, the outcomes of the CAP prostate cancer screening RCT and the ProtecT prostate cancer treatment trials were both submitted to REF2021 because of their substantial impact on public health policy and clinical practice, both in the UK and internationally.

#### **What makes Bristol Cancer Research distinctive**

Bristol is internationally recognised as being at the forefront of population-based cancer research. The Network has facilitated cross-disciplinary meetings between early and mid-career researchers from population-based, laboratory-based, engineering, behavioural psychology, and veterinary sciences, who have then worked together to bring their distinctive approaches to answering important research questions. We have uniquely promoted training in 'population to mechanism' so that early and mid-career researchers from both population and laboratory backgrounds understand the approaches each brings and can forge strong collaborations. The sections below illustrate our distinctiveness with various metrics.

### **Achievements: Supporting high quality research**

- *Funding successes:* Bristol cancer researchers together are supported by cancer-specific grants totalling over £60m from many sources including UKRI and cancer charities. Recent successes include the renewal of the Cancer Research UK (CRUK)-funded Integrated Cancer Epidemiology Programme (£7.7 million 2020-2025, on top of £4.2 million 2015-2020), CRUK funding for an Early Diagnosis in Brain Cancer Project (~£500K), and several World Cancer Research Grants. Translational research in the NHS is supported by the Cancer Workstream of the NIHR Bristol Biomedical Research Centre.
- *Interdisciplinary research:* The Network has successfully integrated researchers spanning four faculties (Life Sciences, Health Sciences, Science, Engineering) and is now highly cross-disciplinary. This intentional interdisciplinary focus has attracted early-career fellows specifically to work across wet lab cancer biology and population health research and has led to successful cross-Faculty grant funding and publications.
- *Pump priming funds:* The Network has successfully leveraged the University Cancer Research Fund to provide £5k pump priming grants, leading to new external grants. We are proud of how these awards have helped people build their careers. For example, Dr Carole's pump priming grant led to the successful award of a Sir Henry Dale Fellowship. Dr Kurian's pump priming grant led to the successful award of an interdisciplinary Cancer Research UK early detection grant.
- *Clinical training:* The Network has attracted 4 Academic Clinical Lecturers (Robinson, Chambers, Edmunds, Merriel), 4 Academic Clinical Fellows (Kirk, Gullick, Ball, Owen), and 2 Wellcome/GW4CAT PhD students (Dudding and Gormley). Importantly, they are staying in Bristol, progressing from ACFs through to doctoral studentships to Lecturers, thus providing a foundation for future capacity building.
- *Non-clinical training:* PhD students have been recruited to work across the Cancer Network, several with co-supervision from different Faculties and disciplines. We have recently been awarded £1m from CRUK for 8 studentships on a 4-year PhD programme in Cancer Epidemiology. We have supported successful research training fellowships (currently Yarmolinsky and Wright), first grant, and early programme grant applications, building capacity and strengthening the cancer research pipeline.
- *MiniMD:* Non-clinical PhD students are introduced to clinical cancer medicine to give them an understanding of the problems faced by clinicians treating patients. Participants are exposed to a variety of clinical settings and tumour types over 2 weeks at University Hospitals Bristol. The programme typically attracts 5-6 PhD students. It inspired two PhD students to apply successfully for clinical trainee scientist positions, and PhD student James Yarmolinsky, who chose to investigate the impact of statins on ovarian cancer risk for his research.
- *Clinical academic partnerships:* The Network has forged new links with clinical academic staff across UHBW and North Bristol Trust, who now play central roles in the Cancer Research Network. This has been facilitated by our clinical cancer steering group members and by running three cross-disciplinary workshops/year at different sites across the university. For example, the Network supported Dr McCarthy in her MRC Clinical Academic Research Partnership application, facilitated Dr Kurian's cross-Faculty CRUK project grant (~£500K), and recruited 480 patients at the Bristol Cancer Institute for Dr Sabina Sanghera's NIHR Postdoctoral Fellowship investigating quality of life on chemotherapy (£322K).

### **Achievements: High impact research outputs**

- *Policy influence and impact:* Our outputs have directly influenced the UK's National Screening

Committee and the USA Preventative Service Taskforce's prostate cancer screening strategies, NICE prostate cancer treatment guidelines, and policy influencing reports from the International Agency for Research on Cancer. Childhood leukaemia survival rates have increased through new cell preservation methods and an international cell bank developed by Dr Allison Blair and team (submitted REF2021 UoA1 Impact Case Study).

- *REF impact:* Network research was central to the REF2021 UoA1 and UoA2 Environment Statements and could lead to future REF Impact Case Studies. For example, our results showing that statins could reduce the risk of ovarian cancer (JAMA 2020) and increasing levels of physical activity reduce risks of prostate, breast and colorectal cancer by about 50% (Nat Communications 2020) are leading to future randomized controlled chemoprevention and behavioural intervention trials. The biotechnology spin-out company Cytoseek engineers membrane-bound proteins to facilitate targeting of cell therapies to cancers. Led by Prof Adam Perriman, CytoSeek raised £1.1m in 2019 to establish the company. Members of our Network defined the best treatment and screening modalities for prostate cancer (NEJM 2016; JAMA 2018). Bristol researchers used molecular cell biology approaches to elucidate how gene and protein networks control processes including cell growth, division and differentiation (Developmental Cell 2014; Nature Genetics 2015; Nature Communications 2015, 2016; Nature Methods 2017; eLife 2017), understanding how cell competition is controlled during both normal development and cancer (Developmental Cell 2014, 2015; Nature Communications 2016, 2017; Current Biology 2016) and understanding the dynamic pathways that regulate stem cell fate in development and cancer (Nature Cell Biology 2014; Science Signalling 2014; Nature Communications 2016).

## Future Vision

### Impact on cancer diagnosis and treatment

- *Biomedical Research Centre and Clinical Research Facility bids:* Play a central role in the renewal of the NIHR Bristol BRC (2021) including a Cancer Workstream, and the bid for a new Clinical Research Facility, enabling the translational research pipeline from the BRC to the clinic.
- *Global reach:* Become major players in one or more global cancer networks e.g. those funded by the recently launched CRUK/NCI Cancer Grand Challenges programme (2021).
- *Interdisciplinary research:* Continue to grow our cross-cutting research across Faculties leading to successful grant funding and publications, including in areas of strength across the university such as chemistry (drug design), health data science, robotics, and artificial intelligence.
- *Integrative Cancer Epidemiology Programme:* Bid successfully for a programme renewal in 2025.
- *Public patient involvement (PPI):* Continue to build and benefit from close interactions with cancer patient networks so they are active participants in developing our research priorities.

### Capacity building for future cancer research

- *Clinical trainees and translational research:* Continue to strengthen the clinical academic pipeline at Bristol, attracting clinical academic trainees and supporting them to obtain funding for the next step in their career (ACF to PhD, PhD to ACL, ACL to senior clinical fellowships).
- *Interdisciplinary research training:* Continue to build our interdisciplinary cross-Faculty research training at Master's and PhD level, including the new MSc programme in Bioinformatics (starting 2020/21) and the new CRUK PhD programme (2020-2025).
- *Clinical Research Facility (CRF):* successfully bid for an NIHR CRF to build on the existing paediatric Experimental Cancer Medicines Centre and facilitate future early phase oncology trials and drug development.
- *Starter grants for early- and mid-career researchers:* Through the University Cancer Research Fund, provide grants (as prizes) of up to £30K to support the development of novel research

ideas of our most promising early career cancer researchers, so they can position themselves to apply for large, external grants.

- *Regional collaborations*: Build a cohesive regional cancer network to support large collaborative programme and infrastructure grants.