Prostate Cancer Research

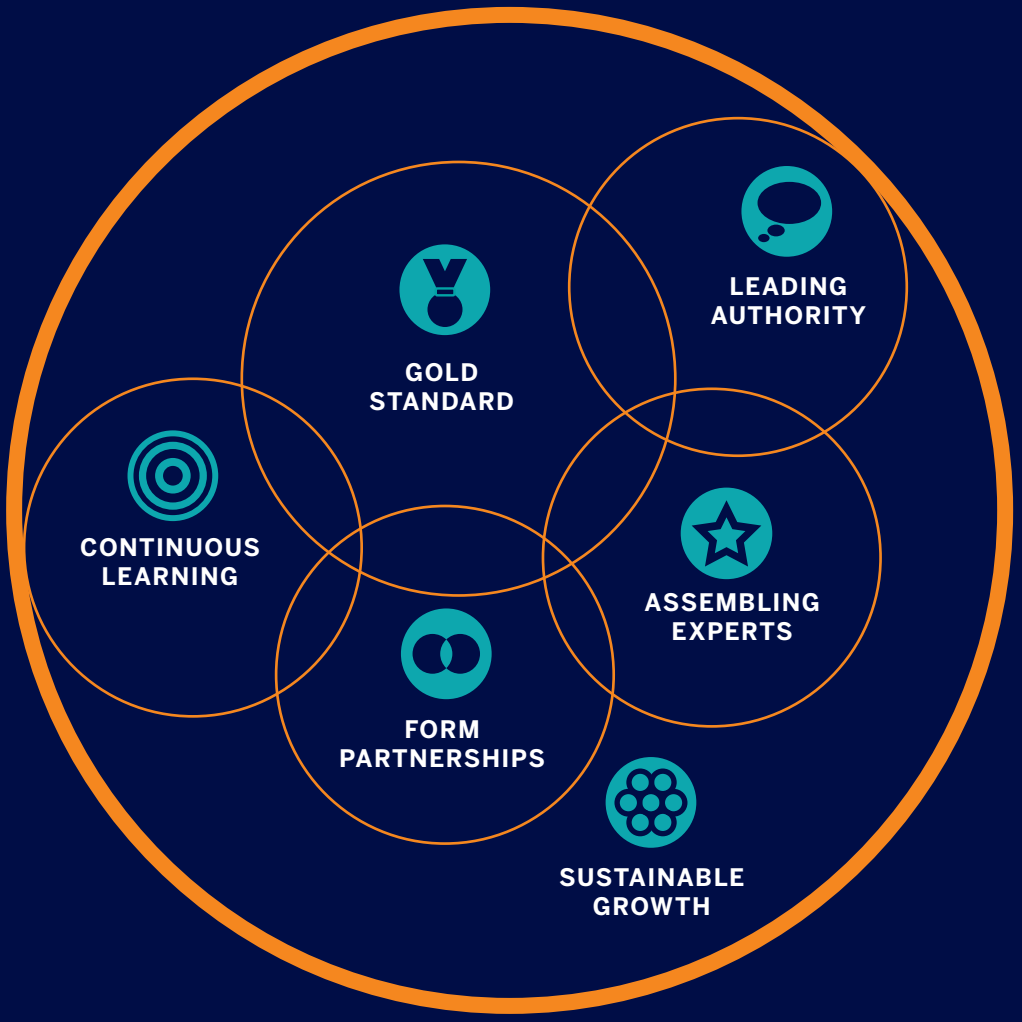
Accelerate innovation

A review of the funding and knowledge gaps in prostate cancer research across the UK: 2020

6 strategic goals

PCR STRATEGY FOR 2020-2023

Our six strategic goals guide all of our decisions towards helping secure a better future for families affected by prostate cancer. Our strategy aims to shift perspectives and combine scientific excellence with a patient-centric approach.



GOLD STANDARD
Fostering innovation through research

LEADING AUTHORITY
Positioning PCR as a thought leader

FORM PARTNERSHIPS
Leveraging partnerships

ASSEMBLING EXPERTS
Strengthening internal structure and processes

CONTINUOUS LEARNING
Learning and connecting

SUSTAINABLE GROWTH
Increasing our unrestricted funding capacity

Cancer is one of the most important challenges of our time. There is now an abundance of cancer charities working to meet this need. With this breadth of effort and diversity of organisation there is a risk of duplication and the probability that the more obvious challenges are already being tackled.

Prostate cancer accounts for 26% of male cancer diagnoses and is now the most commonly diagnosed cancer in the UK.

This review aims to provide a better understanding of the strengths and weaknesses in current research and identify the gaps that need filling. Using this report and other analysis – including continuous monitoring of the impact of the coronavirus crisis on the sector and more research into the inequality of outcomes for black men – we can better fulfill our 6 strategic goals and increase our impact to patients.

KEY OBJECTIVES OF THE REVIEW

1. To identify critical gaps in our knowledge of prostate cancer
2. To identify critical prostate cancer research funding gaps
3. To identify other barriers to high quality prostate cancer research

Who we are and what we do

We are the only UK prostate cancer charity solely focused on research, because it is only through research that we can build a future in which no family will have to fear losing a loved one to prostate cancer.

It is often said that many men die with prostate cancer rather than of prostate cancer. But while for many men it is a slow growing disease, it becomes life-limiting and potentially life-threatening when cancerous cells spread around the body. Prostate Cancer Research exists for those men. We are here to find better ways to prevent and treat advanced prostate cancer.

When selecting projects to back, we use the expertise of our internal research team and our Scientific Advisory Committee to ensure a project is scientifically world-class. We use our Patient Voice Groups to ensure a project is relevant to people with prostate cancer. We encourage and support innovation with the understanding that the more innovative something is, the more risk comes with it.

Once we make an award to a scientist, the relationship doesn't stop. We monitor and evaluate that project's performance the whole way. We help our researchers maximise their impact by connecting them with patients, so that they gain a deeper understanding of patient challenges. We help our scientists build new collaborations and partnerships with other scientists and industry, so they can share ideas, resources, and expertise.

By working in this way, we have the best chance of saving and improving lives.

THE SCIENTISTS WE HAVE FUNDED IN 2020:

01	Dr Christine Galustian	Immunotherapy
02	Dr Aamir Ahmed	Prostate cancer stem cells
03	Dr Magali Williamson	The spread of prostate cancer
04	Professor Matthew Smalley	Modelling prostate cancer
05	Professor Iain J McEwan	Hormone therapy
06	Dr Luke Gaughan	Hormone therapy
07	Dr Daniel Brewer	Classifying prostate cancer
08	Professor Gerhardt Attard	STAMPEDE Clinical Trial
09	Dr Bart Cornelissen	Radiotherapy
10	Dr Harveer Dev	DNA damage
11	Dr Jorge de la Rosa	Tumour suppressor genes

Summary review findings

1. Researchers at all career stages struggle to get funding for innovative ideas

2. Significant gaps in our scientific knowledge of prostate cancer include:
   - Predicting a prostate tumour's likely aggressiveness and therapy response
   - How to stop tumours spreading to bone
   - Understanding the wider role of specific signalling pathways in prostate cancer and treatment resistance

3. Most funding, and the majority of clinical trials, are heavily concentrated within the 'Golden Triangle' of London-Oxford-Cambridge

4. Early Career Researchers (ECR) face significant challenges in getting funding, establishing their careers, transitioning to the next stage, and establishing collaborations and networks

What we plan to do to respond to these findings and improve our impact for patients is on the next pages. For the detailed review findings see the relevant pages listed below.

CONTENTS

What we will do to improve our impact

Funding decisions are made on the quality of the science presented and the relevance to patients. While these will continue to take precedence in our decision-making, we may need to take some of the additional factors highlighted by this analysis into consideration, to better fill the gaps left by the current ecosystem.

AREAS OF FOCUS

- **Innovation means taking risks**
- **Filling the gaps**
- **Breaking out of the Golden Triangle**
- **Keeping talent in the field**
- **A better funding system**

INNOVATION MEANS TAKING RISKS

Scientists at all levels of their careers find it difficult to get funding for innovative ideas.

What we are doing

Last year, we designed our pilot grants, where we funded high-risk proposals for a year to 18 months, with the understanding that when the pilot project was 75% complete, we would assess it again and give a quick turnaround decision on whether to extend the funding for up to another 4 years. We are now prepared to support more ambitious ideas in the hope of bigger breakthroughs, accepting that may mean more failures along the way.

Our plan

Fostering innovation and high-risk, high-reward research is possibly our greatest challenge in an established sector which can be risk-averse. We will commit to continually assessing our grant calls to ensure they are compatible with high-risk, high-reward proposals.

There is a clear need for greater clarity on the level of evidence required for grant applications. We will continue to discuss this with our Scientific Advisory Committee, and we recommend that the sector as a whole engages in discussion around this issue.

... there are researchers with bright ideas willing to tackle these knowledge gaps, if funding is made available for them to do it.

FILLING THE GAPS

A number of knowledge gaps are resulting in significant patient needs not being met. Some of these, such as spread of cancer to bone, are unmet needs across several cancer types, whereas others, such as the role of Androgen Receptor Variants (ARV), are specific to prostate cancer.

What we are doing

We were already funding work into disease classification, bone metastasis, and ARVs. We highlighted the knowledge gaps identified by this analysis as particular areas of interest in our 2020 grant call. Almost 40% of applications pertained to one or more of these areas, demonstrating that there are researchers with bright ideas willing to tackle these knowledge gaps, if funding is made available for them to do it.

Our plan

We will continue to monitor knowledge gaps, in a number of different ways. For example, our analysis of the literature revealed that predicting a prostate tumour's likely aggressiveness and therapy response was an unmet need. Better diagnostics and better classification represent approaches to solve this. Subsequent analysis, after we had launched our 2020 grant call, revealed that classification is relatively unfunded. Our attempt to attract social science and quality of life proposals was less successful than we had hoped and we will re-examine whether our process was suitable for this cohort of researchers.

Where prostate cancer shares a knowledge gap or unmet need with another disease, we will seek to develop a partnership to tackle it with other charities in that space. It is clear to us that charities could have much more impact if we worked together, and if we worked together with government.

BREAKING OUT OF THE GOLDEN TRIANGLE

One of the most striking things to come out of this analysis was the extent to which both funding and clinical trials are concentrated within London, Oxford and Cambridge, and the difficulties scientists face attracting collaborations and recruiting when they are based outside of this region. With the exception of Manchester, which has a well-known very good infrastructure for research and development, the only universities to have more than three prostate cancer groups were located within this triangle.

What we are doing

Our 2019 grant call awarded funding to the North-East, Scotland, and East Anglia. Over the past year, we have gained a much stronger understanding of the impact of location on research funding. We are also specifically developing plans for greater patient engagement in regions where patient empowerment has historically been low.

Our plan

The findings of this report recommend that we look in detail at all of our options to make sure we are funding the best scientists and the best ideas, irrespective of where they are based. Grant making organisations such as ourselves should consider place-based funding, weighting funding and countering institution bias to try and ensure that there is equal opportunity for good scientists.

KEEPING TALENT IN THE FIELD

The challenges faced by early career researchers (ECRs)* was a recurring theme: from the results of our survey, the multiple frustrations voiced in our focus groups, to the fact that in our charity portfolio analysis, only two awards were held in the name of an early career researcher. ECRs can struggle to form the collaborations and networks which boost their career, and can find themselves in a 'catch-22' situation where they lack the resources to gather preliminary data for grant applications, and without this preliminary data, can't successfully compete for grants which would bring them the resources to gather data.

What we are doing

One of the core principles of our Research Strategy is fair recognition for the work of scientists at all career stages. Three of the seven awards made in 2019 were pilot projects, and two of these went to early career researchers as stepping stones to them developing an independent area of research.

We recognise that retaining ECRs in science is about more than just funding. To that end, we have significantly tightened up our Grant Terms and Conditions on dignity and respect in the workplace, and fair recognition for the work of ECRs. We also arranged a scientist networking event for our members, and training in the patent system. These benefitted all of our researchers but would particularly benefit scientists early in their career, who have not had the opportunity to develop these networks or skills yet. We are also exploring the possibility of hosting an event for ECRs ahead of the launch of our next grant call, to offer them the opportunity to find potential collaborators with whom they can develop a proposal and apply for funding.

Our plan

There is clearly much more which could be done to promote the careers of young scientists. While many submissions to our 2020 grant call (ongoing at the time of writing) referenced the benefits of their proposal for ECRs, the applications were usually made in the name of senior PIs. Next time we do a grant call, we will make it clear that we particularly welcome proposals with younger scientists as leads or co-leads.

We will continue to run networking events. The launch of our collaboration budget, designed to seed fund collaborations and training, was delayed due to COVID-19, but we will seek to launch this in the future.

We will make sure our pilot awards are of a high enough value to cover the salary and consumables for an ECR, so that they don't have to juggle working on an established scientist's grant for their salary full-time with trying to establish their own research area. In the future, subject to the right type and amount of funding being available, we may also fund fellowships.

> "I very much appreciate your understanding of how difficult it is, especially for early career researchers like me, to gather sufficient preliminary data for such big grant applications.

Dr Jorge de la Rosa
Recipient of a 2019 PCR Pilot Award

* For our purposes an ECR is a researcher who is within a few years of the successful completion of their PhD who has recently become an independent researcher (e.g. through a fellowship), or who is taking their first steps towards establishing their own research area (e.g. pre-fellowship).

A BETTER FUNDING SYSTEM

The limitations of the funding system was another prevalent theme, with funding listed as the main barrier to researchers continuing their careers; with 38% of our respondents spending 10-25% of their time on funding applications, 31% spending 25-50% of their time on it, and 13% spending over 50% of their time on funding applications. In our focus groups, it was felt that some funders were better than others in terms of transparency, although specifics were not entered into. Finally, there are frustrations about funding being duplicated.

What we are doing

Our grant call process is two-stage, with Stage 1, Expression of Interest (EOI), designed to be quick both for the researcher to complete and for PCR to assess (resulting in a quick decision for the applicant). PCR's EOI form was highlighted as very good in the focus group sessions. Our process includes feedback from both peer reviewers and patients in Stage 2, to which applicants have a right to respond.

Our plan

We will continue to ask for feedback on our funding processes from the scientists who pass through it and review it as necessary. We will continue to work with partners such as the NCRI to align strategies and reduce duplication.

By working together with partners, funders collaborators and scientists we can accelerate our impact.

	Cancer Charities	Cancer Research Charities
Charity Commission for England and Wales	1,702	675
Charity Commission for Northern Ireland	21	1
Scottish Charity Regulator	214	23
TOTAL	**1,937**	**699**

Charity Commission Search Results. Correct as of 05/05/2020

How we produced this report

This report focuses on the current state of prostate cancer research, in terms of funding, science, and other barriers to high quality research in this field in the UK.

AREAS REVIEWED

- **Literature review**
- **The funding landscape**
- **University analysis**
- **Clinical trials**
- **Researcher survey and focus groups**

We have conducted multiple investigations in the hope of mitigating the limitations of this kind of landscaping analysis. For example, we conducted our literature review with the understanding that not all research results in publication, and that publications give a sense of what has happened – sometimes years before the publication date – but less so, of what is happening now. Therefore, we also investigated which UK universities are currently working in this area. We are grateful for the membership and support of the NCRI, who assisted us with some funding data based on their 20 member organisations, but we also undertook our own analysis of funding bodies. We conducted a survey and focus groups to ask researchers directly what they felt the funding gaps and barriers to research were.

We are confident that this work presents a good representation of the field as it currently stands. However, we acknowledge that we will not have covered everything, as this would be beyond the resources and capacity of most charities. We also acknowledge the limitations that individuals who took part in our survey and focus groups may have been self-selecting and have their own perspectives, which may be subjective; that some of our analysis was limited to the information which was publicly available and accessible; and that science is not static and therefore this analysis will not be evergreen. There is always the possibility, with a complex and multi-stage analysis such as this, that the field develops in between the research being done and the publication of this report.

LITERATURE REVIEW

A literature review was conducted in the summer of 2019, using PubMed. We started broad, with recent reviews in high quality journals such as *Nature*, *New England Journal of Medicine*, and *Cancer*, and then prioritised research articles based on the information in the abstract, quality of the publication, citations in other key papers we had read, and publication within the last five years. The end result was a broad overview of the field; spanning basic research into the biology of the disease, drugs and treatments that are in development, and evaluation of the current standard of care. The final review is available on our website at **prostate-cancer-research.org.uk/ecosystem**

THE FUNDING LANDSCAPE

An internet search was conducted to identify funding for which UK-based prostate cancer researchers could apply, and a database compiled and analysed. Based on these results, a shortlist of 9 significant charitable funders of prostate cancer research in the UK were identified, and a thorough evaluation of their prostate cancer portfolios and research strategies (where available) was undertaken based on the information on both their own website and the relevant Charity Commission. The National Cancer Research Institute (NCRI) is a partnership of twenty of the biggest funders of cancer research in the UK, which includes both charity and government organisations. Prostate Cancer Research joined this partnership in February 2020.

Research funding data provided by NCRI Partners is captured in the NCRI Cancer Research Database (CaRD), which is a collection of well curated data on grant funding and on funded projects for all organisations represented in the NCRI partnership going back to 2002. CaRD data is collected in order to understand how funds are distributed across various areas of research and to identify any gaps in funding or opportunities for Partners to fund collaboratively. Each piece of research

funding is coded by cancer site and by research category, using an international classification system called the Common Scientific Outline (CSO). NCRI publishes annual summaries of the data, as well as periodic reports looking at trends or particular areas within the partnerships funding portfolio.

Together, the NCRI Partners spent over £700m on cancer-related research in 2019 according to the NCRI Cancer Research Database.

UNIVERSITY ANALYSIS

A list of UK universities with research in the fields of at least one of biological sciences, clinical medicine, public health or allied healthcare professionals was sourced via the Research Excellence Framework (REF, ref.ac.uk). A search of each university's website was used to identify which universities are conducting prostate cancer research, and the overall aim/hypothesis of that research (where available), in April 2020.

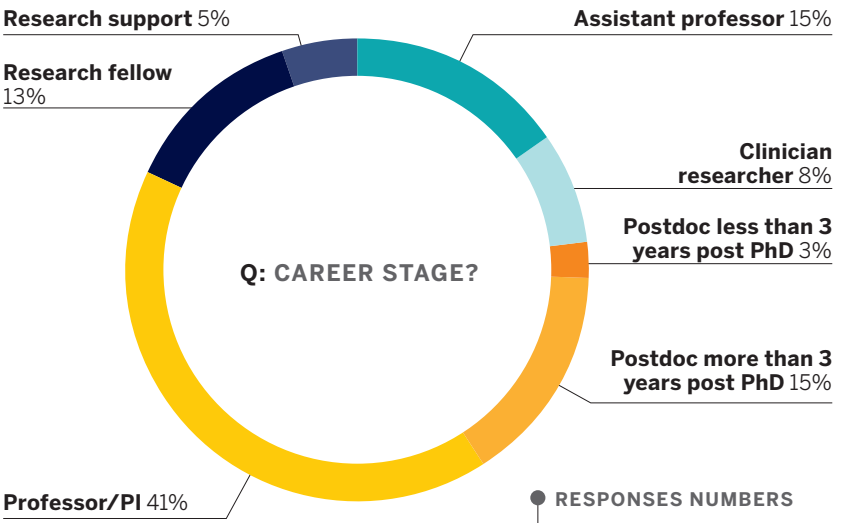
CLINICAL TRIALS

Information on current UK-based clinical trials into prostate cancer was compiled from the Cancer Research UK's public database and the UK Clinical Trials Gateway in March 2020.

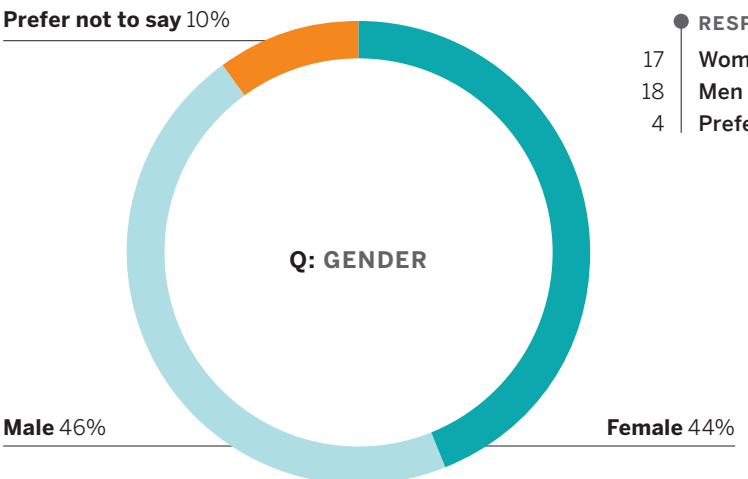
RESEARCHER SURVEY AND FOCUS GROUPS

A survey on funding gaps was prepared by PCR staff and publicised via the PCR website and via dissemination to university research and innovation offices (prostate-cancer-research.org.uk/research-gaps/). It was live from 12th November 2019 for 8 weeks and received 39 responses. The responses to this survey were used to form a topic guide for three focus groups with our funded scientists on January 23rd 2020. 20 scientists took part, divided into three focus groups of 7, 6, and 7. Scientists were allocated to groups based on their career stage. PCR staff facilitated the groups and took notes.

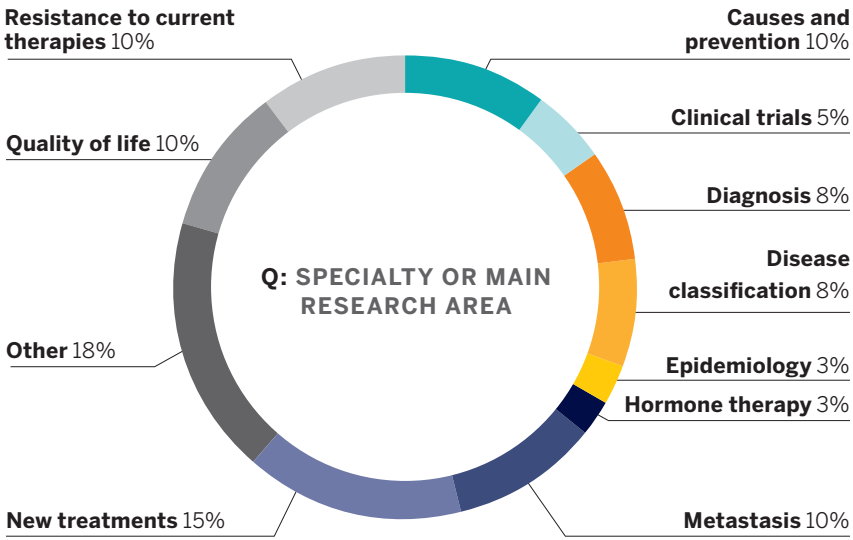
Who were our survey respondents



RESPONSES NUMBERS	
6	Assistant professor
3	Clinician researcher
1	Postdoc less than 3 years post PhD
6	Postdoc more than 3 years post PhD
16	Professor/PI
5	Research fellow
2	Research support
0	PhD student
0	Technician/Research assistant
0	Senior technician

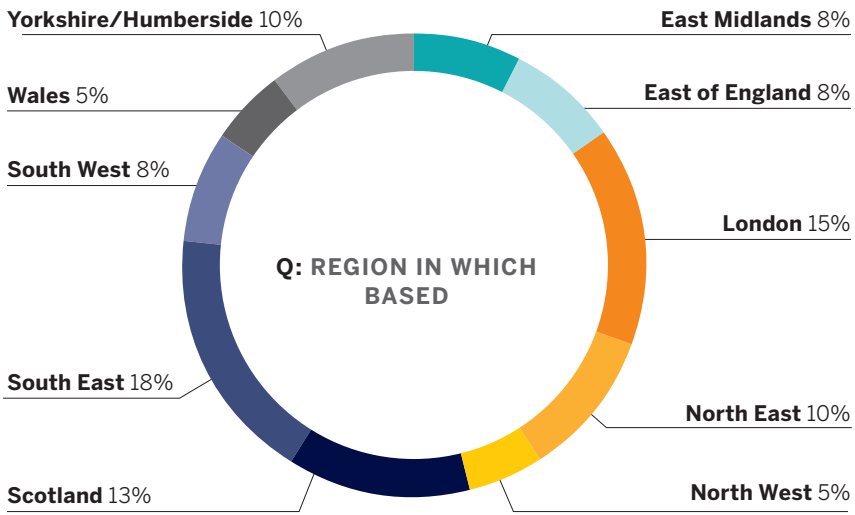


RESPONSES NUMBERS	
17	Women
18	Men
4	Prefer not to say



RESPONSE NUMBERS	
4	Causes and prevention
2	Clinical trials
3	Diagnosis
3	Disease classification
1	Epidemiology
1	Hormone therapy
4	Metastasis
6	New treatments
7	Other
4	Quality of life
4	Resistance to current therapies

DETAILED BREAKDOWN OF 'OTHER' RESPONSES	
1	Palliative care
1	Innovation & commercialisation
1	Androgen receptor biology (structure/function), hormone-resistant disease and new treatments
1	Research support
1	Basic mechanisms
1	Disease biology & therapeutic responsiveness
1	Blank



RESPONSES NUMBERS	
3	East Midlands
3	East of England
6	London
4	North East
2	North West
5	Scotland
7	South East
3	South West
2	Wales
4	Yorkshire/Humberside

What we still don't know about prostate cancer

Better understanding of prostate cancer will lead to new treatments, and using current treatments more effectively. Our review of peer-reviewed scientific literature – available in full at **prostate-cancer-research.org.uk/ecosystem** – identified the following gaps in our scientific knowledge of prostate cancer.

AREAS TO BE RESEARCHED

- **The underlying biology**
- **Treatment**
- **Diagnosis**

THE UNDERLYING BIOLOGY

The following biological pathways are known to be important in prostate cancer, but that knowledge has not yet led to optimal treatments. However, there is always the possibility that breakthroughs come from a discovery of something which is, at the minute, completely unknown.

Fixing faulty DNA

In normal cells, DNA damage is detected at specific checkpoints as the cell prepares to reproduce. When damage is identified the cell cycle is halted so the DNA can be repaired. Changes in these DNA damage repair pathways appear in 20-30% of advanced prostate cancers [1]. Cancers which have these changes are more vulnerable to treatments which damage DNA (both established therapies like radiotherapy and newer approached like PARP inhibitors), but we don't know why some patients respond to these treatments and others don't.

Following the right pathways

The genetic makeup and resulting signalling pathways that make up a prostate cancer tumour determine its characteristics. This includes how aggressive the disease is and which treatments the tumour is likely to respond to. The genetic makeup of a single tumour may be highly varied and secondary tumours may differ in their profile to the primary tumour. All of this makes prostate cancer difficult to treat.

There are a number of common aberrations in prostate cancer. These include, for example, a protein called PTEN, which normally acts as a brake to prevent a cell becoming cancerous. The loss of the PTEN brake is thought to be a critical step in cancers becoming castration-resistant [2], but we don't yet have a way to use this knowledge to improve outcomes for people affected by prostate cancer. A further example is that proteins involved in another signalling chain reaction, called the wnt pathway, are known to be altered in prostate cancer [3], but no therapy targeting wnt has yet been tried. However, these are just two of many potential pathways which, if we understood them better, could lead to better treatments.

TREATMENT

Spreading to bone

About 80% of men who die from prostate cancer will have secondary tumours in bone [4]. Although there is some existing knowledge, the process of how prostate cancer spreads, or metastasizes, to bone is not fully understood. However, it is clear that it plays a significant role in disease mortality. Metastasis to bone can also cause bone pain and significantly reduce quality of life. There is a clear need to better understand how prostate cancer spreads to bone, and how this can be successfully prevented and treated.

What patients tell us

In our 2019 grant call, the patient panels felt that bone metastasis should be a high priority.

Androgens, hormone therapy, and keeping hormone therapy working

Prostate cancer is fed by male hormones such as testosterone, collectively known as androgens, which act via the androgen receptor (AR). Androgen deprivation therapy (ADT), a mainstay of prostate cancer treatment, essentially starves the tumour by blocking the AR or otherwise reducing androgen function. However, its use is limited as many cancers develop resistance, and manage to avoid being killed by ADT.

Androgen Receptor Variants, or ARVs, are short forms of the AR, which have lost the external part of the AR which normally acts as a switch. As a result, they are thought to be always on ('constitutively active') and ADT can't switch them off. In response to ADT, prostate cancers increase both normal ARs and ARVs. More research, including more studies in men, is needed to establish the larger role of ARVs in prostate cancer and resistance to hormone therapy, and how to successfully treat a tumour which relies on ARVs.

What patients tell us

Our research projects on keeping hormone therapy working are popular with patients. They tell us that as many patients, especially those with advanced cancer, are treated with hormone therapy, it gives them hope of having more time.

Side effects

All treatments for prostate cancer, especially prostate cancer which has spread to other places in the body, have side effects which can be life-changing. Erectile dysfunction and incontinence are the most common. Others can include nausea, bowel disturbances, and osteoporosis. Finding ways to prevent or mitigate the side effects of current treatments would have an enormous impact of quality of life for many people affected by prostate cancer.

What patients tell us

Although every patient's experience of side effects is different, they and their families consistently tell us that the physical and psychological side effects of their disease and its treatment have had a significant affect on their life.

Who should have surgery?

Radical prostatectomy (RP) is the surgical removal of the entire prostate gland. It is estimated that between 13 and 42 men may need to undergo RP, and are at risk of experiencing side-effects, for every one life saved by it [6]. Over-treatment such as this is costly both financially and in terms of quality of life for men who undergo unnecessary treatment.

Active surveillance (AS) is the process of monitoring prostate cancer without making any radical intervention to treat the cancer. While it avoids the harm associated with over-treatment, more knowledge is needed on which patients are suitable for AS and which are at risk of more aggressive disease and who require immediate treatment. Around 43% of men drop out of active surveillance protocols in the first five years [6], a small proportion of whom opted for treatment despite no signs of their disease getting worse, suggesting a lack of confidence in the system.

Immunotherapy

This type of treatment aims to harness the power of the immune system to treat cancer. Immunotherapies have been effective in a small number of other cancers, and while there are some indications that immunotherapy has potential to treat prostate cancer, many trials so far have had disappointing results. This is likely due to the ability of prostate cancer tumours and the area around them (the 'tumour micro-environment') to suppress the immune system.

DIAGNOSIS

The methods currently used to diagnose prostate cancer lead to both some cancers being missed and treatment of some cancers which, left alone, may never produce symptoms.

The need for better prediction

As many of the treatment options for prostate cancer carry significant side-effects (e.g. incontinence and erectile dysfunction), there is an urgent and clear need to develop diagnostic tools that can predict whether or not a man needs treatment. As well as better ways to diagnose prostate cancer, a major challenge is that we don't have enough tests to predict whether a particular drug will work for an individual patient.

What patients tell us

Many patients find it extremely difficult to choose which treatment option is right for them.

PSA tests

The PSA blood test is the only current method used to detect prostate cancer and is available for free on the NHS. 3 in 4 men with high PSA results will not have cancer, while 1 in 7 aggressive cancers can be missed by the PSA test.

Two large trials analysed population-based PSA screening for prostate cancer and found either a minimal (ERSPC [7]) or no significant decrease (PLCO [8]) between groups which were PSA tested and those that were not. The 3 in 4 men with high PSA but no cancer may undergo an unnecessary biopsy, which is a painful and invasive procedure, although the use of an MRI scan before biopsy reduces this risk.

While there are calls for a national screening programme for prostate cancer, the PSA test is not currently robust enough and a new, more accurate test is needed to justify the roll out of a national screening programme.

Circulating tumour cells

Circulating tumour cells (CTCs) can be detected in the blood of some prostate cancer patients and can provide useful information about the genetic makeup of the tumour. When the patient has castration-resistant prostate cancer, a larger number of CTCs correlates with a worse outlook for the patient [9]. However, current techniques to detect CTCs are time-consuming, expensive, and can only detect CTCs in about 50% of patients [10]. Before CTCs can be used in the clinic, detection methodologies would need to be improved, and large clinical studies would be required.

REFERENCES

1 Mateo, J. et al., (2015). 'DNA Replication in Prostate Cancer: Biology and Clinical Implications.' *European Urology*, vol. 71, pp 417-425.

2 Jamaspishvili, T. et al., (2018). 'Clinical implications of PTEN loss in prostate cancer.' *Nature Reviews Urology*, vol. 15, pp 222-234.

3 Robinson, D. et al., (2015). 'Integrative clinical genomics of advanced prostate cancer.' *Cell*, vol. 161, pp 1215-1228.

4 Murillo-Garzon, V. & Kypta, R. (2017). 'Wnt signalling in prostate cancer.' *Nature Reviews Urology*, vol. 14, pp 683-696.

5 Jin, JK. et al., (2011). 'Steps in prostate cancer progression that lead to bone metastasis.' *International Journal of Cancer*, vol. 128, issue 11, pp 2545-2561.

6 Abdollah, F. et al., (2012). 'Survival benefit of radical prostatectomy in patients with localised prostate cancer: estimations of the number needed to treat according to tumour and patient characteristics.' *The Journal of Urology*, vol. 188, issue 1, pp 73-83.

7 Van Hemelrijck, M. et al., (2019). 'Reasoning for discontinuing active surveillance: assessment of 21 centres in 12 countries in the Movember GAP3 consortium.' *European Urology*, vol. 75, issue 3, pp 523-531.

8 Schroder, F. et al., (2014). 'Screening and prostate cancer mortality: results of the European Randomised Study of Screening for Prostate Cancer (ERSPC) at 13 years of follow-up.' *Lancet*, vol. 384, pp 2027–2035.

9 Pinsky, P. et al., (2017). 'Extended mortality results for prostate cancer screening in the PLCO trial with median follow-up of 15 years.' *Cancer*, vol. 123, issue 4, pp 592-599.

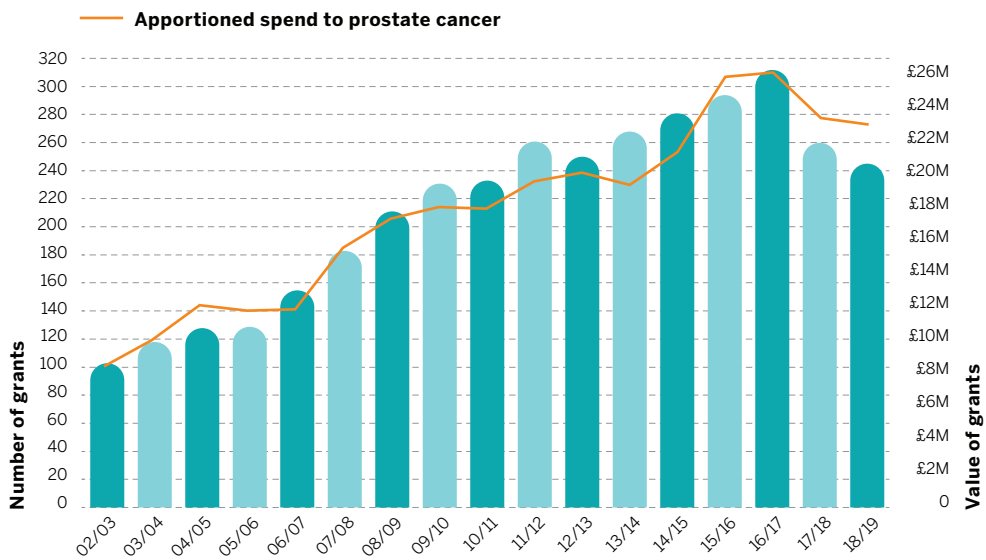
10 Saini, S. (2016). 'PSA and beyond: alternative prostate cancer biomarkers.' *Cellular Oncology*, vol. 39, issue 2, pp 97-106.

Investment in prostate cancer research in the UK

Despite an increase in incidence, national spend on prostate cancer was declining from 2016/17. Despite being the second most common cause of cancer death in men, it was only the 5th largest spend on a specific cancer site. PCR's 2019 awards constituted a 10% rise in the amount of money spent on prostate cancer research in the UK.

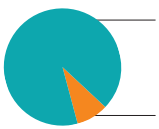
PROSTATE CANCER SPEND TREND

Based on data from the NCRI Cancer Research Database (CaRD)



SPEND ON RESEARCH IN 2018/19

Based on data from the NCRI



£315,963,391 spent overall on site-specific cancer research

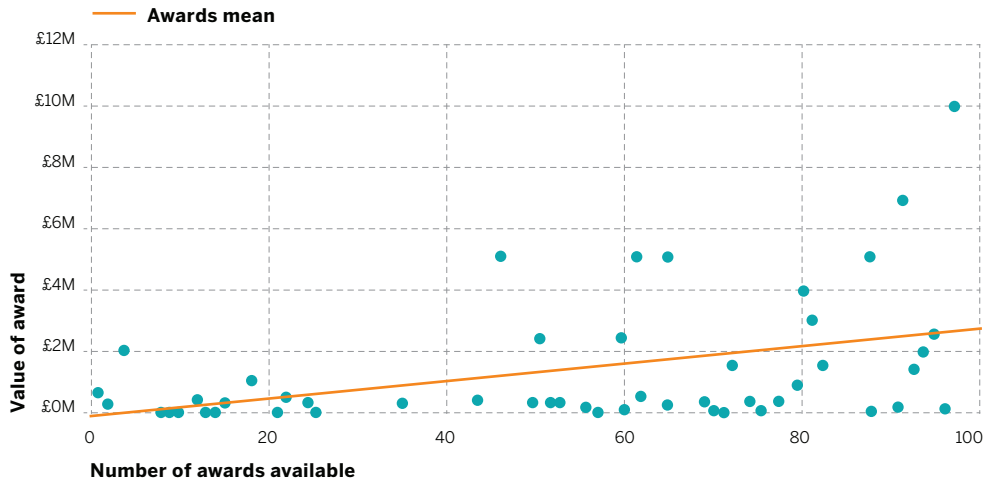
£22,794,479 was spent on prostate cancer research

Most awards for which prostate cancer researchers can apply cluster below the £500,000 mark.

AWARDED AMOUNTS 2019/20

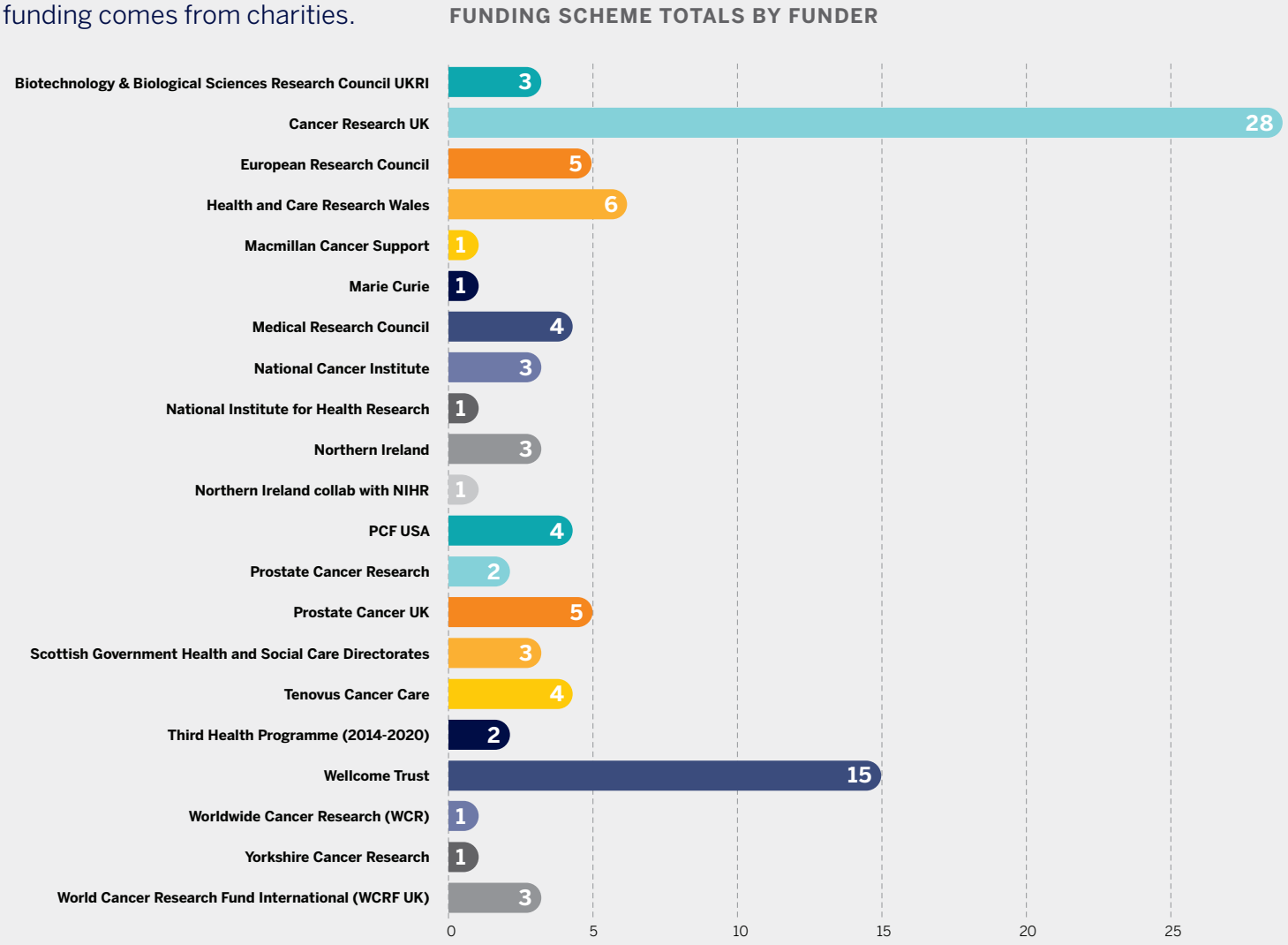
Based on data from PCR analysis

Amounts which were available via (non-prostate specific) cancer research funding schemes in the UK.



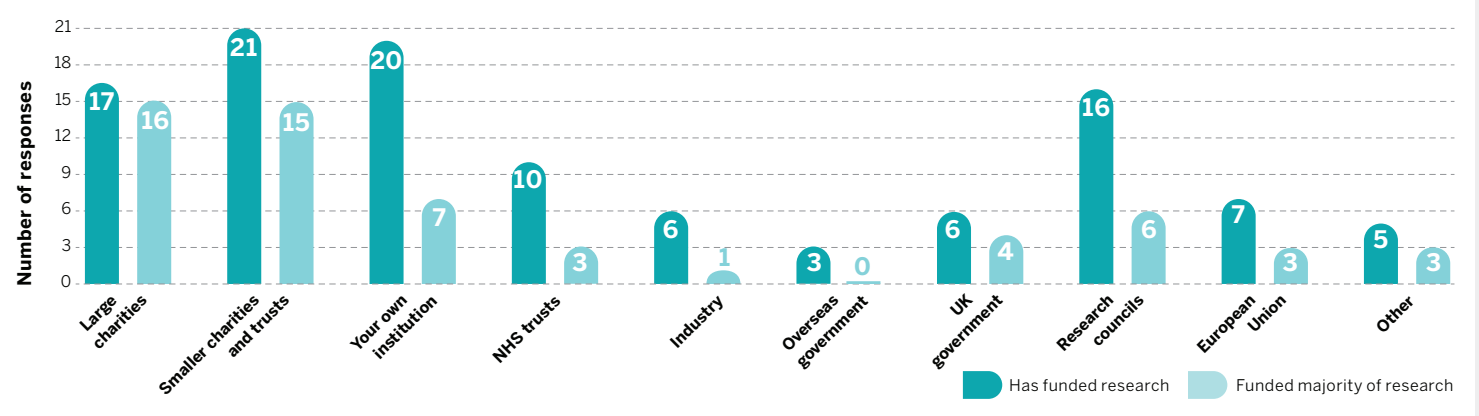
Funders of prostate cancer research in the UK

A number of funding schemes are available to UK cancer researchers. Most of these are not prostate specific. The majority of funding comes from charities.



Survey responses

Q: OVER THE PAST FIVE YEARS, WHO HAS FUNDED YOUR RESEARCH VS WHO HAS FUNDED MOST OF YOUR RESEARCH



Q: SOURCES OF FUNDING AND PERCEPTIONS OF FUNDERS FROM FOCUS GROUPS

A number of funding sources were referenced by researchers, listed below. There was a consensus opinion that governments and UK Research and Innovation (UKRI) prefer clinical benefit over creativity. Whether it's easier to fund research which is closer to the clinic or not depends on the funder, e.g. easier to get funding from PCF, but harder from Wellcome Trust.

Funder	Early Career Researchers	Mid-Career Researchers	Experienced Researchers	Total times mentioned	Notes
University/Institution	2	2	3	7	
Cancer Research UK (CRUK)	1	1	4	6	CRUK Pioneer Award – almost only funding stream to entertain 'significantly high risk ideas.' More likely to fund big, consortium grants.
Prostate Cancer UK (PCUK)	1	1	3	5	More likely to support project-specific work. PCUK Innovation Award states its for novel ideas but requires a lot of preliminary data.
Prostate Cancer Foundation (PCF)	1	1	1	3	Very focused on research into advanced metastatic prostate cancer, and close to clinical benefit
Movember	0	1	5	6	
MRC	2	1	5	8	
National Institute for Health Research (NIHR)	0	1	1	2	
National Health Service (NHS)	0	0	1	1	
Biotechnology & Biological Sciences Research Council (BBSRC)	1	0	2	3	Highlighted as particularly supportive of 'blue sky thinking'
Scottish Government	1	0	1	2	
EU	0	0	2	2	Future Emerging Technology programme gives large amounts to high risk projects in the EU
Industry	1	1	1	3	
Local charities	1 (Breast Cancer Now)	1	2	4	
Other charities	1 (Marie Curie)	1	1 (Pancreatic Cancer UK)	3	
Worldwide Cancer Research	0	0	2	2	

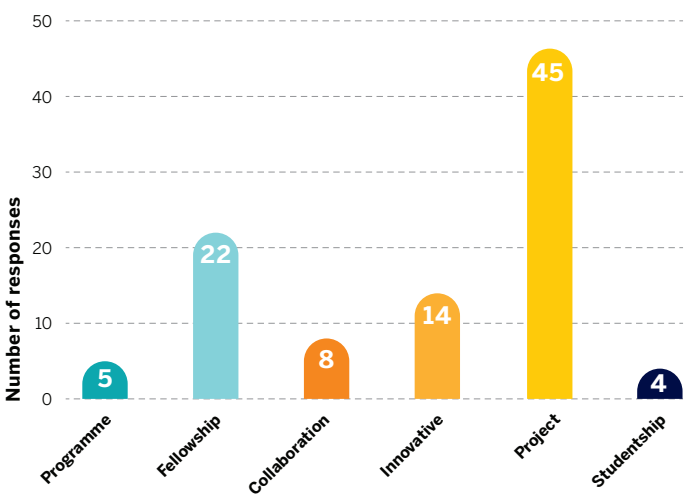
Current research and the gaps

AREAS OF ANALYSIS

- By funding type
- By research theme
- By career stage
- By location
- From university analysis
- Analysis of similar charities
- Clinical trials analysis
- Focus groups – funding gaps

BY FUNDING TYPE

COUNT OF GRANTS BY TYPE



Charity/Organisation	Funding scheme	Theme
PCR	Grant call	Project
PCUK	Open call jointly-funded MRC Clinical Research Training Fellowships	Fellowship
PCUK	Travelling Prize Fellowships	Fellowship
PCUK	Major Awards: Existing Trials: New Answers	Innovative
PCUK	Major Awards in Immunology and Immunotherapy	Project
PCUK	Research Innovation Awards	Innovative
PCF USA	Young Investigator Awards	Fellowship
PCF USA	Challenge Awards	Project
PCF USA	Creativity Awards	Innovative
PCF USA	Recognition Awards	Project
World Cancer Research Fund International (WCRF UK)	International Research Grant Programme – Regular Grant Programme Scheme – Investigator Initiated Grants	Innovative
World Cancer Research Fund International (WCRF UK)	International Research Grant Programme – Regular Grant Programme Scheme – Seed Grants – Pilot	Innovative
World Cancer Research Fund International (WCRF UK)	International Research Grant Programme – Regular Grant Programme Scheme – Seed Grants – Feasibility	Innovative
Worldwide Cancer Research (WCR)	Project grants	Project
Marie Curie	Research grants scheme	Project
MRC	Programme grant	Programme
MRC	Research grant	Project
MRC	Partnership grant Partnership grant	Programme Collaboration
MRC	New Investigator Research Grant (NIRG)	Project
NCI	Outstanding Investigator Award	Project
NCI	MERIT Award	Project
NCI	Provocative Questions Programs	Project
Scottish Government Health and Social Care Directorates	Response Mode Funding – Translational Clinical Studies	Project
Scottish Government Health and Social Care Directorates	Catalytic Research Grants	Project
Scottish Government Health and Social Care Directorates	Scottish Government Health & Social Care Policy Priorities Research	Project
Yorkshire Cancer Research	2019 Funding Round, Helping the people of Yorkshire, avoid, survive & cope with cancer	Innovative
Northern Ireland Award	HSC R&D Division Doctoral Fellowship	Fellowship
Northern Ireland collaboration with NIHR	NIHR Fellowship Award Scheme	Fellowship
Northern Ireland	US-Ireland R&D Partnership Programme US-Ireland R&D Partnership Programme	Project Collaboration
Northern Ireland	Commissioned research	Project
Biotechnology & Biological Sciences Research Council UKRI	Returners to Research Fellowships	Fellowship
Biotechnology & Biological Sciences Research Council UKRI	Follow-on funding call	Project

Charity/Organisation	Funding scheme	Theme
Biotechnology & Biological Sciences Research Council UKRI	Responsive mode application	Project
Tenovus Cancer Care	PhD Studentships	Studentship
Tenovus Cancer Care	iGrants	Innovative
Tenovus Cancer Care	KESS Studentships	Collaboration
Tenovus Cancer Care	RCBC Projects	Project
Macmillan Cancer Support	Macmillan research grants scheme	Project
Health and Care Research Wales	Health Research Fellowship Award	Fellowship
Health and Care Research Wales	NHS Research Time Award 2020	Project
Health and Care Research Wales	PhD Health Studentship Award 2020	Studentship
Health and Care Research Wales	Social Care Research Fellowship Award	Fellowship
Health and Care Research Wales	Research for Patient & Public Benefit (RfPPB) Wales Award	Project
Health and Care Research Wales	Research funding scheme: Health Grant Award	Project
CRUK	Accelerator Award Accelerator Award	Collaboration Project
CRUK	Advanced Clinician Scientist Fellowship	Fellowship
CRUK	Biomarker Project Awards	Project
CRUK	Biotherapeutic Drug Discovery Programme Awards	Project
CRUK	Biotherapeutic Drug Discovery Project Awards	Project
CRUK	Cancer Immunology Project Awards	Project
CRUK	Career Development Fellowship	Fellowship
CRUK	Career Establishment Award	Project
CRUK	Clinical Trial Award	Project
CRUK	Clinical Trial Fellowship Award	Fellowship
CRUK	Clinician Scientist Fellowship	Fellowship
CRUK	Drug Development Project	Project
CRUK	Early Detection Primer Award	Innovative
CRUK	Early Detection Programme Award	Programme
CRUK	Early Detection Project Award	Project
CRUK	Experimental Medicine Award	Project
CRUK	PhD Studentships	Studentship
CRUK	Pioneer Award	Innovative
CRUK	Population Research Catalyst Award	Project
CRUK	Population Research Postdoctoral Fellowship	Fellowship
CRUK	Population Research Programme Awards	Programme
CRUK	Population Research Project Awards	Project
CRUK	Postdoctoral Research Bursary for Clinical Trainees	Fellowship
CRUK	Pre-doctoral Research Bursary	Fellowship
CRUK	Programme Foundation Awards	Programme
CRUK	Senior Cancer Research Fellowship	Fellowship
CRUK	Small Molecule Drug Discovery Project Awards	Project
CRUK	Translational accelerator: Deep Science Ventures	Project
NIHR	Global Alliance for Chronic Diseases: Primary and/or Secondary Prevention of Cancer	Innovative
Wellcome Trust	Sir Henry Wellcome Postdoctoral Fellowships	Fellowship
Wellcome Trust	Four-year PhD Studentships in Science	Studentship
Wellcome Trust	Innovator Awards	Innovative
Wellcome Trust	Collaborative Awards in Science	Collaboration
Wellcome Trust	Investigator Awards in Science	Project
Wellcome Trust	PhD Training Fellowships for Clinicians	Fellowship
Wellcome Trust	Biomedical Resource Grants	Project
Wellcome Trust	Senior Research Fellowships	Fellowship
Wellcome Trust	Research Career Re-entry Fellowships	Fellowship
Wellcome Trust	Engagement Fellowships	Fellowship
Wellcome Trust	Springboard Awards	Project
Wellcome Trust	Longitudinal Population Study Grants	Project
Wellcome Trust	Principal Research Fellowships	Fellowship
Wellcome Trust	Joint Global Health Trials scheme	Collaboration
Wellcome Trust	UK Prevention Research Partnership Scheme	Collaboration
European Research Council	Starting grants	Project
European Research Council	Consolidator grants	Project
European Research Council	Advanced grants	Innovative
European Research Council	Proof Of Concept	Innovative
European Research Council	Synergy grants	Collaboration
Third Health Programme (2014-2020)	Project grants	Project
Third Health Programme (2014-2020)	Operating Grants	Project

GLOSSARY

Studentships fund the completion of a PhD and typically include university fees and a stipend. They may or may not include laboratory/consumables costs.

Fellowships are awarded to mid-career researchers and aim to develop their careers as well as fund research.

Project grants fund a defined project, covering consumables and salaries.

Programme grants are large, multi-year awards to a particular lab or institution working on several related projects.

Innovative grants (PCR definition) are to fund novel, high-risk work which may or may not have preliminary data to justify the grant beforehand. These are usually pilot grants.

What the scientists said

In focus group discussions, early and mid-career researchers highlighted the benefits of pilot grants as vehicles for testing new ideas and gathering data, and as an important stepping stone for postdocs to establish their own research area. But the value of these grants is often too low, and pilot grant awardees may have to juggle full-time employment on another grant with implementing their pilot award.

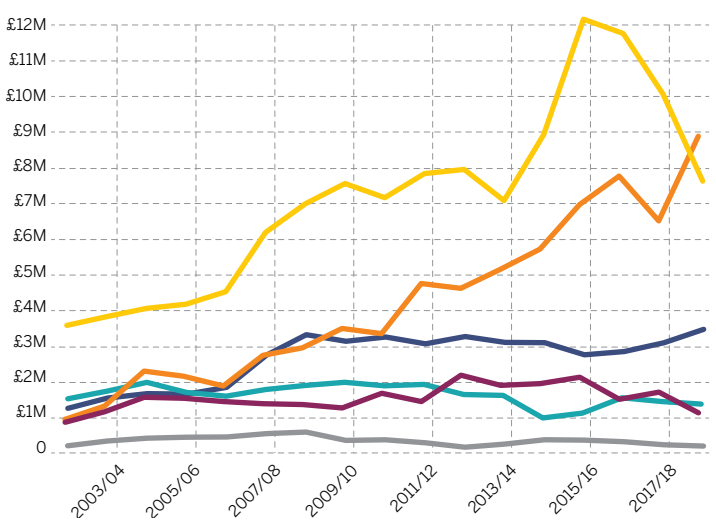
Programme grants offer stability, flexibility, and enable long-term thinking, but are difficult to apply for and seem to be declining. A success rate of just 5-10% was perceived.

BY RESEARCH THEME

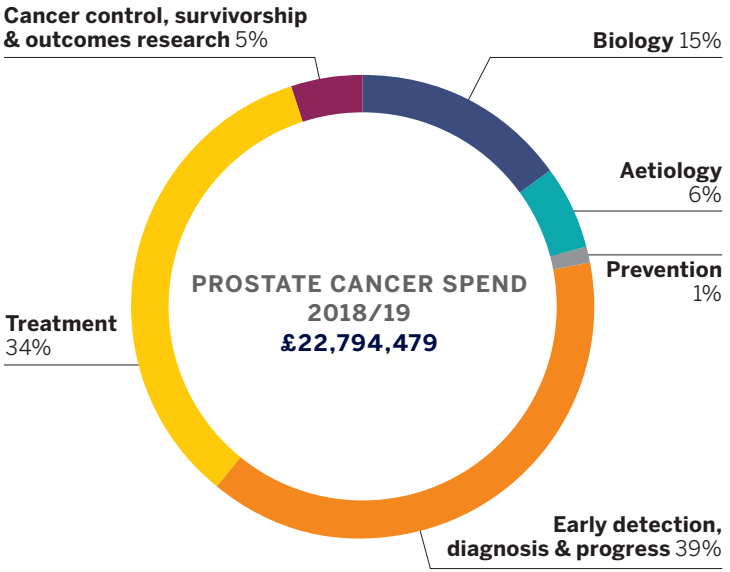
NCRI Capitalise Analysis

Most of the money spent on prostate cancer is spent on research related to early detection and diagnosis (39%), followed by treatment (34%), with prevention receiving the lowest amount of funding (1%). Over time, early detection and treatment have seen the sharpest increases in research funding.

COMMON SCIENTIFIC OUTLINE (CSO) TREND IN PROSTATE CANCER OVER TIME



Based on data from the NCRI Cancer Research Database (CaRD).



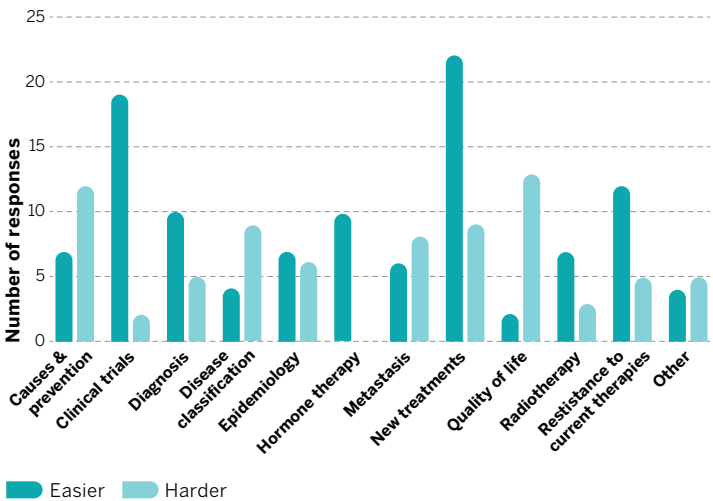
SPEND CATEGORY BREAKDOWN

Normal functioning	£123,623
Cancer initiation: alterations in chromosomes	£479,960
Cancer initiation: oncogenes and tumour suppressor genes	£1,382,916
Cancer progression and metastasis	£1,085,524
Resources and infrastructure	£417,741
Exogenous factors in the origin and cause of cancer	£500,675
Endogenous factors in the origin and cause of cancer	£350,937
Interactions of genes and/or genetic polymorphisms with exogenous and/or endogenous factors	£96,391
Resources and infrastructure related to aetiology	£448,577
Interventions to prevent cancer: personal behaviors (non-dietary) that affect cancer risk	£18,100
Dietary interventions to reduce cancer risk and nutritional science in cancer prevention	£56,968
Chemoprevention and other medical interventions	£98,455
Vaccines	£44,140
Resources and infrastructure related to prevention	£3,321
Technology development and/or marker discovery	£2,440,573
Technology and/or marker evaluation with respect to fundamental parameters of method	£3,806,876
Technology and/or marker testing in a clinical setting	£1,889,507
Resources and infrastructure related to detection, diagnosis, or prognosis	£759,491
Localised therapies - discovery and development	£685,791
Localised therapies - clinical applications	£1,061,588
Systemic therapies - discovery and development	£3,282,285
Systemic therapies - clinical applications	£1,475,457
Combinations of localised and systemic therapies	£7,655
Complementary and alternative treatment approaches	£67,581
Resources and infrastructure related to treatment and the prevention of recurrence	£1,058,853
Patient care and survivorship issues	£686,012
Surveillance	£59,983
Health services, economic and health policy analyses	£384,680
Education and communication research	£230
Resources and infrastructure related to cancer control, survivorship, and outcomes research	£20,591

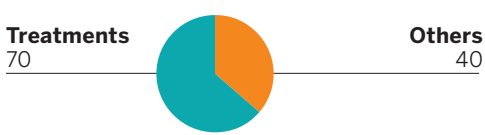
Survey responses

Our survey respondents believed it was easier to get funding for projects that focus on treatments compared to other topic areas such a prevention, diagnosis, quality of life and basic biology. They also perceived it as being easier to get funding to investigate new treatments than to investigate resistance to current therapies. Quality of life was viewed as difficult to get funding for. Survey respondents also reported that it was easier to get funding for clinicians and harder for postdocs.

COMPARISON OF AREAS THAT ARE EASIER AND HARDER TO GET FUNDING RESPONSES



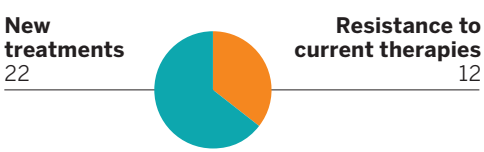
COMPARING EASE OF FUNDING – RESEARCH ON TREATMENTS VS OTHERS



Treatment includes: clinical trials, hormone therapy, new treatments, radiotherapy, and resistance to current therapies

Others includes: causes-and-prevention, diagnosis, disease-classification, epidemiology, metastasis, quality of life, other

EASY TO GET FUNDING FOR – NEW TREATMENTS VS RESISTANCE TO CURRENT THERAPIES



What patients told us

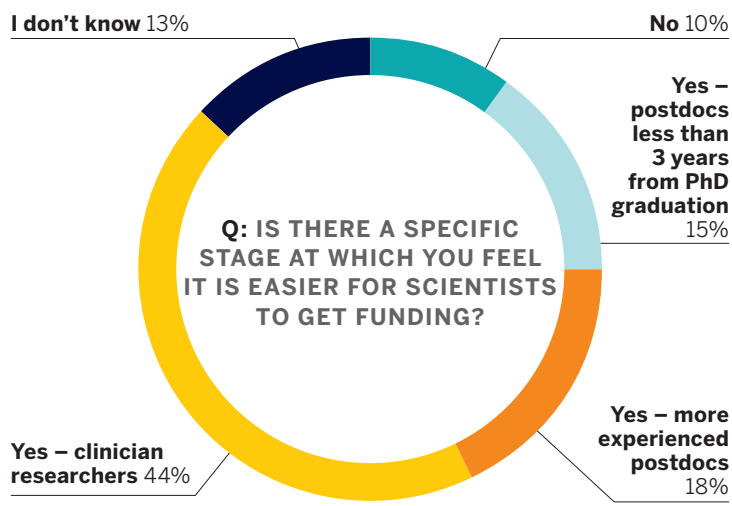
In a separate in-house research project in 2019, a survey of 204 prostate cancer patients and family members ranked 'Finding and testing new prostate cancer treatments' as their number one research priority.

What the scientists said

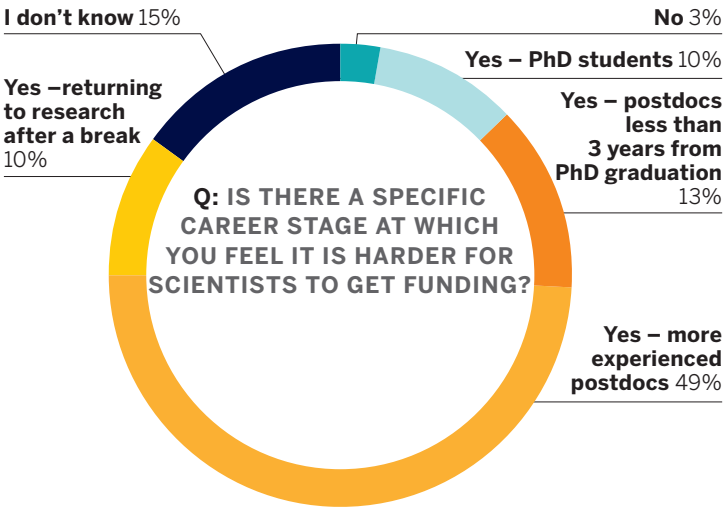
In focus groups, it was suggested that research with a clinical link was the easiest to get funding for, with basic science studies being more difficult to fund. Common 'buzz words' in current grant calls were mentioned, including 'unmet need', 'translational', 'bench to bedside', and 'interdisciplinary'.

BY CAREER STAGE

Survey responses



RESPONSES NUMBERS	
4	No
0	Yes – PhD students
6	Yes – postdocs less than 3 years from PhD graduation
7	Yes – more experienced postdocs
0	Yes – people returning to research following a break
17	Yes – clinical researchers
5	I don't know



RESPONSES	NUMBERS
No	1
Yes – PhD students	4
Yes – postdoc less than 3 years from PhD graduation	5
Yes – more experienced postdocs	19
Yes – people returning to research following a break	4
Yes – clinical researchers	0
I don't know	6

One of the most dominant themes to arise from our focus group discussions was the challenges faced by early career researchers. Taken together, 62% of respondents believed it was harder for postdocs to get funding, and although pilot grants can be a valuable way for postdocs to start to establish their careers, these are often less than ideal. Some researchers perceived that funding for junior fellowships was increasing as a switch from programme grants, which may lead to a future funding gap as current junior fellows may find it harder to move on to the next stage once they finish.

More experienced researchers felt there has been a decline in PhD funding, and that when studentships are awarded, they frequently don't provide sufficient funding for the consumables required for the work to be carried out, making taking on a PhD student expensive for a lab.

"Only a big lab can really support PhDs under this system."

The perception and associated frustration that it was easier for clinicians to get funding was also reflected in the focus groups, with participants speculating that this may be in part because clinicians rather than scientists form the senior leadership of significant funders.

"Training clinicians to do basic science rather than getting basic scientists to do it."

BY LOCATION

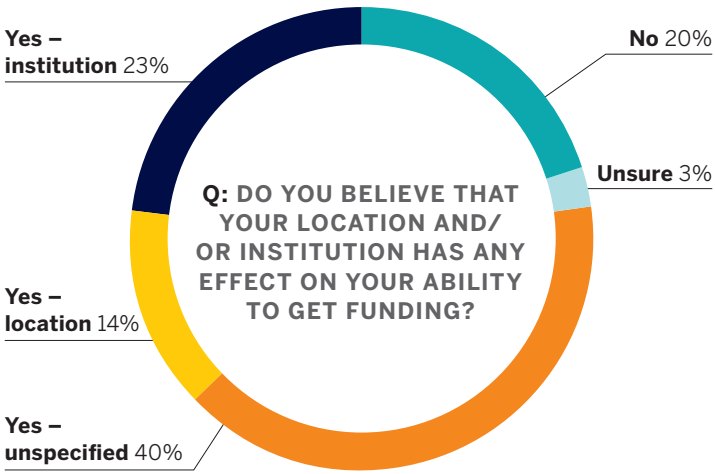
London, Oxford and Cambridge are referred to as the 'Golden Triangle' and analysis by the NCRI affirms the perceptions of both our survey respondents and focus group participants that most funding is concentrated here. Scientists mentioned that at less known, more geographically remote universities it can be a challenge to attract collaborators, and also recruit staff. Over half of the research groups had a focus on new treatments; only one had a specific focus on quality of life research, which was in agreement with the perceptions of our survey respondents.

SPEND ON PROSTATE CANCER BY CITY ACROSS UK, 2002/03 – 2018/19

London: £78,204,703
Oxford: £58,666,967
Cambridge: £22,532,547
Sutton: £20,726,493
Glasgow: £17,017,494
Bristol: £12,935,048
Newcastle upon Tyne: £12,250,465
Manchester: £11,510,197
Edinburgh: £8,507,951
Belfast: £6,796,577
Unknown: £6,484,065
York: £6,356,021
Birmingham: £5,617,545
Cardiff: £4,915,416
Leeds: £4,379,683
Aberdeen: £4,253,575
Sheffield: £3,857,178
Southampton: £2,694,201
Norwich: £1,834,938
Northwood: £849,002
Bath: £792,795
Dundee: £765,361
Leicester: £722,462
Coleraine: £547,509
Coventry: £459,126
Bradford: £408,883
Swindon: £320,183
Liverpool: £288,666
Brighton: £251,395
Colchester: £233,416
Lancaster: £216,274
Hull: £215,662
Nottingham: £189,829
Milton Keynes: £188,469
Stirling: £167,000
Wrexham: £138,196
Guildford: £130,707
Canterbury: £124,444
Swansea: £87,844
Uxbridge: £87,410
Aberystwyth: £66,510
Exeter: £64,341
Stoke-on-Trent: £50,520
Keele: £49,839
Bangor: £17,700
Wirral: £16,712
Neath: £14,000
Peeblesshire: £13,515
Taunton: £10,800
Salford: £8,063
Preston: £7,300
Trento: £5,000
Wakefield: £2,183
Surrey: £1,205

Based on data from the NCRI Cancer Research Database (CaRD)

Survey responses



Note: four participants did not answer this question

	EXPLANATION (WHERE GIVEN)
4	Harder to get funding outside 'Golden Triangle' of London, SE, Oxbridge
1	Standing and lack of large grants in institution make it more difficult
1	Teaching-focused university makes it more difficult
1	Overshadowed by nearby institution which soaks up most funding in the area
1	Institution doesn't prioritise research
1	CRUK funding being pulled out of area (the North): concerns others will follow suit
2	Small institution: lack of critical mass and infrastructure
1	Institution has access to funding which makes researcher ineligible to other funding - even if researcher can't directly access the institution's funding

FROM UNIVERSITY ANALYSIS

University totals	
Total no. universities analysed	88
Number of universities with prostate cancer research	26
Number of universities not researching PC, but researching other cancers which could potentially benefit PC	37
Universities with no cancer research	25
Total number PC-specific groups	64

University location	Prostate cancer	Other cancer	No cancer
North East England	1	2	0
North West England	3	3	3
Yorkshire and the Humber	3	2	2
East Midlands, England	0	4	1
West Midlands, England	1	3	3
East of England	2	4	0
London, England	5	6	7
South East England	2	7	1
South West England	2	2	2
Wales	1	1	3
Scotland	4	3	3
Northern Ireland	2	0	0

PC-specific groups research themes	
Total groups	64
New treatments	34
Disease classification	9
Diagnosis	16
Clinical trials	15
Metastasis	17
Resistance to current therapies	11
Quality of life	1
Causes and prevention	16
Epidemiology	3
Other	5

No. PC groups in unis which research PC	
Total no. universities analysed	26
1 PC-specific group	9
2-3 groups	12
4 or more	5

University groups were evenly split between work which was focused on early prostate cancer (17), advanced prostate cancer (19), or both (16).

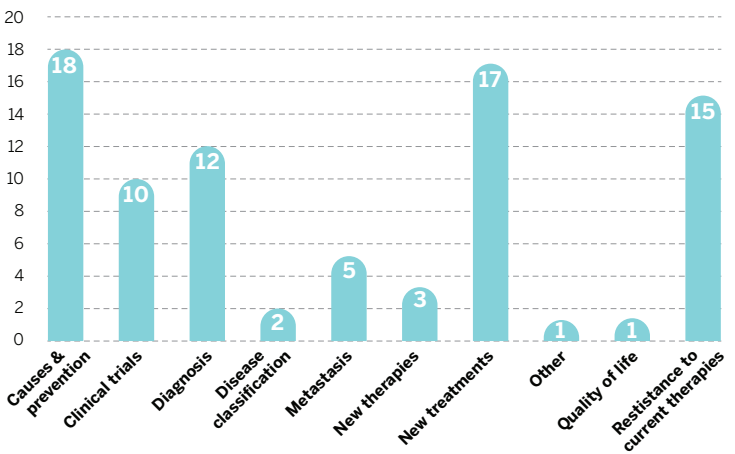
ANALYSIS OF SIMILAR CHARITIES

By analysing the portfolios of 9 UK cancer research charities including our own, we identified 68 prostate cancer projects, with the caveat that in some cases, charity websites did not make it clear if a project was ongoing or had completed, so this number may be a slight overestimate.

According to 2018/19 figures, Cancer Research UK was the biggest funder of prostate cancer research in terms of money, spending £13 million on 5 projects. The biggest funders in terms of projects/activity were Prostate Cancer UK and Prostate Cancer Research, respectively, with each organisation committing all of their research spend to prostate cancer; and PCUK spending 23% of their expenditure on research, PCR spending 67% of their expenditure on research.

Causes and prevention, new treatments and resistance to current therapies were the most common themes amongst the charity prostate cancer portfolios we analysed. Although there is widespread recognition that lack of a classification system, as is seen in other cancers, is a key knowledge gap and barrier to personalised medicine, relatively few projects focus on tackling this. Most of the key funders (in terms of expenditure) which we identified in our grants analysis don't have much prostate cancer in their portfolios: possibly due to the existence of prostate-specific charities. 49 of the grants held were in the names of senior scientists or clinicians, with 7 mid-career scientists and just 2 early career researchers holding awards in their own name.

COUNT OF THEMES WITHIN CHARITY PROSTATE CANCER PROJECTS ANALYSED



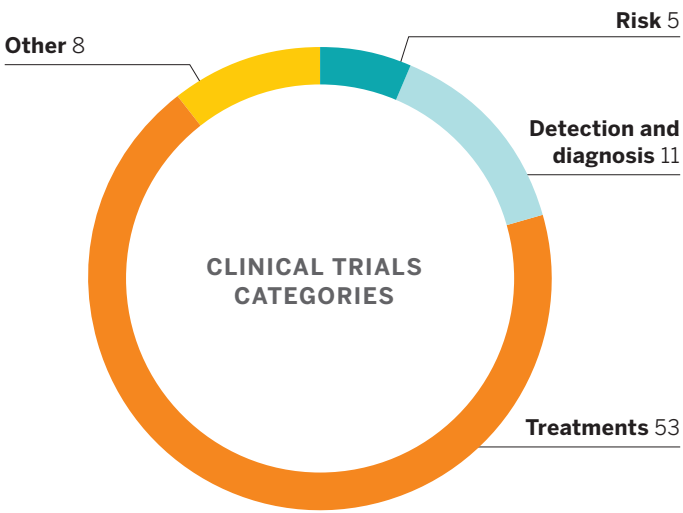
PCR analysis based on charity commission figures and annual reports

Organisation	Expenditure 2018/19 £	Expenditure on research %	Expenditure on prostate cancer research %	Number prostate cancer projects	Type of research (Early – Advanced – Early and advanced)	Key research theme(s) of prostate cancer projects
Cancer Research UK	£783,268,062	69%	2.38% (£13000000)	5	01 – 02 – 02	Causes and prevention Resistance to current therapies
Macmillan Cancer Support	£260,752,000	30%	0	0	n/a	n/a
Marie Curie	£152,740,000	1.80%	0	0	n/a	n/a
Prostate Cancer Research	£1,625,664	67%	100%	11	00 – 08 – 03	New treatments Resistance to current therapies
Prostate Cancer UK	£28,517,000	23%	100%	44	11 – 25 – 07	Diagnosis Resistance to current therapies Clinical trials New therapies
Wellcome	£1,331,304,164	64%	n/a	1	00 – 01 – 00	Cause and prevention Diagnosis New treatment
World Cancer Research Fund	£9,160,544	36%	Unknown, but 3/16 projects listed on PC, (1 ongoing, 2 completed)	1	00 – 01 – 00	Causes and prevention Quality of life
Worldwide Cancer Research*	£10,662,550	53%	Unknown	1	01 – 00 – 00	New treatments
Yorkshire Cancer Research	£8,352,107	78%	0	0	n/a	n/a

*Worldwide cancer research is reg. in Scotland which has a different financial year.

CLINICAL TRIALS ANALYSIS

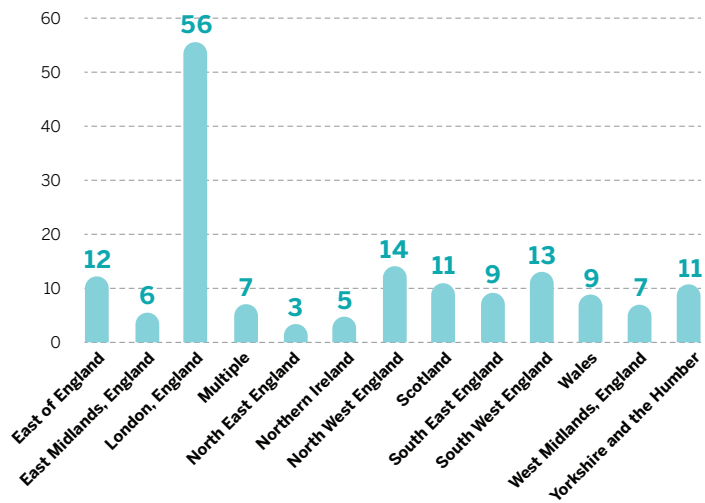
We identified 77 current UK-based clinical trials, of which 71 were prostate cancer specific and 6 were for multiple cancer types, including prostate, and of which 70 were still recruiting. When the clinical trials were grouped into loose categories of risk (most trials looking at genetic profiles), detection (many trials focusing on imaging), therapies (with trials looking at new therapies as well as adjustments to standard-of-care therapies, alone and in combination, reducing side effects and improving prediction of which therapies work best in which patients), and other (for example, trials looking at exercise, fertility, and treatment decisions), the majority of trials perhaps unsurprisingly focused on treatments.



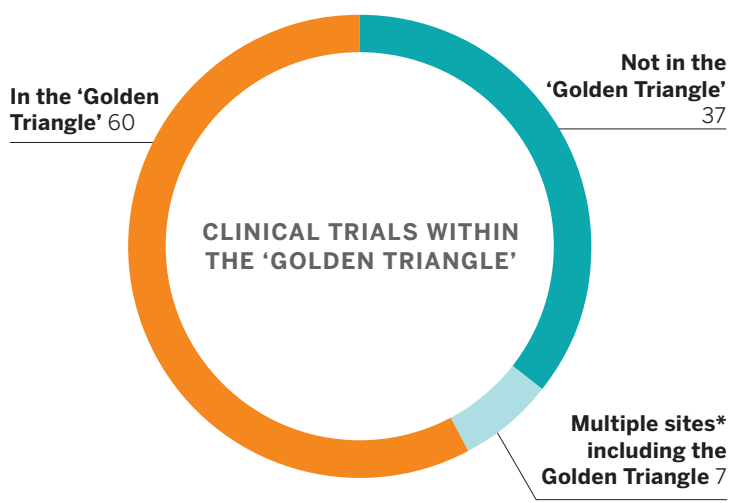
Of the prostate-specific trials, almost half of them focused on advanced disease.

The analysis by location was quite striking, with the majority of trials based partly or completely in London or the 'Golden Triangle' of London, Oxford and Cambridge.

COUNT OF TRIALS BY LOCATION



Nomenclature of Territorial Units for Statistics - https://www.ons.gov.uk/methodology/geography/ukgeographies/eurostat



*Multiple sites: Large international trials with UK involvement ranging from 7 – 110 sites.

Title	Summary	Location
A study of MRx0518 before surgery for solid tumours (MICROBIOME)	This study aims to find out if MRx0518, a bacterium that is found in the gut flora of most people, can help stimulate the immune system to kill cancer cells.	London
A study of a genetic test to identify people who have an increased risk of developing prostate cancer (BARCODE 1 Study)	This study aims to find out whether a genetic profile can be used to identify those most at risk of developing prostate cancer.	National
A study looking at breath samples to detect cancer early (PAN cancer early detection study)	This study aims to find out if analysing breath samples could help to detect cancer earlier.	Cambridge
A trial looking at metformin for early prostate cancer (METAL)	This study aims to explore how and why metformin, a drug used to treat diabetes, could have an effect on prostate cancer.	London, Newport, Sutton
A trial looking at hormone therapy with other treatments for prostate cancer (STAMPEDE)	This study aims to find out which treatments are best for prostate cancer that has spread beyond the prostate.	Multiple
A study looking at the genetic causes of prostate cancer – UK genetic prostate cancer study (UKGPCS)	This study aims to find out how family history increases a person's risk of prostate cancer.	National
A study looking at carboplatin in prostate cancer with genetic changes (BARCODE 2)	This study aims to find out if carboplatin, a chemotherapy drug, can help to control prostate cancer in people with certain genetic changes.	Multiple
A trial comparing different treatments for prostate cancer that has spread (IP2 ATLANTA)	This study aims to compare standard hormone therapy with other treatments that treat cancer inside the prostate.	Multiple
A study looking at biomarkers in prostate, kidney, bladder and testicular cancer (DIAMOND)	This study aims to find out whether a new blood test could be used to diagnose prostate cancer.	Bristol, Newcastle-Upon-Tyne, Southend on Sea, Sunderland
A study to find out more about prostate cancer (RelMAGINE prostate cancer risk)	This study aims to find out more about how and why prostate cancers spread and why different people respond to different treatments.	Epsom, London
A trial looking at whether aspirin can stop cancer coming back after treatment (Add Aspirin)	This study aims to find out if aspirin can stop cancer from coming back after treatment.	Multiple
A trial looking at a new way of giving photodynamic therapy for prostate cancer (SpectraCure P18)	This study aims to find out if photodynamic therapy, a treatment which uses a drug and laser light, can be used to treat prostate cancer that has returned. following radiotherapy	London
A study looking at a device to help reduce side effects from prostate cancer radiotherapy after surgery (POPS)	This study aims to find out if inserting a new device called ProSpare into the rectum during radiotherapy can increase the accuracy and reduce side-effects.	Sutton
A trial looking at hormone patches for prostate cancer (PATCH)	This study aims to see if oestrogen patches can be used to treat prostate cancer as an alternative to hormone injections.	Multiple
A trial looking at enzalutamide and Ra223 for men with prostate cancer (PEACE III)	This study aims to find out if combining Ra223, a type of radiotherapy, with enzalutamide, a chemotherapy drug, can be used to treat those whose prostate cancer has spread to their bones.	Manchester, Nottingham
A study looking at biomarkers before and after surgery of the prostate, bladder, penis or kidney	This study aims to find out if biomarkers, substances in the body that can be measured, can be used to monitor patients when they have surgery.	Bangor, London, Methyr Tydfil, Rhyl, Wrexham
A study using a quick scan to spot prostate cancer early (RelMAGINE prostate cancer screening)	This study aims to find out if an MRI scan could be used to test for possible signs of prostate cancer.	London
A study looking at PET-CT scan in men with prostate cancer and the BRCA gene mutation (GENPET)	This study aims to find out if a PET-CT scan is better at showing where cancer has spread in the body better than more commonly used scans.	London, Sutton
A study following a group of men who have prostate cancer and gene changes (GENPROS)	This study aims to find out if certain gene changes affect how well a person's prostate cancer responds to treatment.	Multiple
A study looking at thinking, memory and concentration problems in men having hormone treatment for prostate cancer (CogCan)	This study aims to find out how hormone therapy affects the thinking, concentration and memory of men with prostate cancer.	Birmingham, Chesterfield, Derby, London, Solihull
A study looking at the genetics of prostate cancer – The pan prostate cancer project	This study aims to find out more about the genetic changes associated with prostate cancer.	London
A study to find out if looking at gene changes could be part of prostate cancer screening (PROFILE study)	This study aims to find out if prostate cancer screening can be improved for those with an increased risk of the disease by exploring certain gene changes.	London, Sutton
A trial looking at different ways of giving radiotherapy for cancer of the prostate (PIVOTAL boost)	This study aims to find out if having extra boosts of radiotherapy to the prostate or having radiotherapy to the lymph nodes in the pelvis as well, improves outcomes for those with prostate cancer.	Multiple
A study looking at increasing the dose of radiotherapy to areas of cancer inside the prostate gland (DELINEATE)	This study aims to find out if intensity modulated radiotherapy can be used to plan radiotherapy and whether image-guided radiotherapy can be used to target the cancer more accurately with higher doses.	Sutton

Title	Summary	Location
A trial comparing surgery, conventional radiotherapy and stereotactic radiotherapy for localised prostate cancer (PACE)	This study aims to compare different treatments for prostate cancer.	Multiple
A study using ultrasound scans to diagnose prostate cancer (CADMUS)	This study aims to find out if an ultrasound scan can diagnose prostate cancer as well an MRI scan can.	London
A study of rucaparib in advanced prostate cancer (TRITON3)	This study aims to find out if rucaparib, a drug which has been used to treat ovarian cancer, can be used to treat advanced prostate cancer.	Multiple
A study looking at high definition MRI scan and ultrasound guided biopsy for diagnosing prostate cancer (MULTIPROS)	This study aims to find out if a multi parametric MRI can be used to diagnose prostate cancer and differentiate between serious and less serious cases.	Aberdeen, Dundee, London
A study of high intensity focal ultrasound (HIFU) for symptoms of pelvic cancer (HIFU PELVIC)	This study aims to find out if high intensity focused ultrasound can be used to help with the symptoms of cancer that has returned.	Sutton
A Phase 3, randomized, double-blind trial of pembrolizumab (MK-3475) plus enzalutamide versus placebo plus enzalutamide in participants with metastatic castration-resistant prostate cancer (mCRPC) (MK-3475-641/KEYNOTE-641)	This study aims to assess the efficacy and safety of the combination of pembrolizumab (MK-3475) and enzalutamide in the treatment of men with metastatic castration-resistant prostate cancer (mCRPC) who have not received chemotherapy for mCRPC, are abiraterone-naïve, or are intolerant to or progressed on abiraterone acetate.	Bristol, Torquay, London, Taunton, Cambridge, Northwood, Sutton
A phase 3, randomized, double-blind study of pembrolizumab (MK-3475) plus docetaxel plus prednisone versus placebo plus docetaxel plus prednisone in participants with chemotherapy-naïve metastatic castration-resistant prostate cancer (mCRPC) who have progressed on a next generation hormonal agent (MK-3475-921/KEYNOTE-921)	This study aims to assess the efficacy and safety of the combination of pembrolizumab (MK-3475) and docetaxel in the treatment of men with metastatic castration-resistant prostate cancer (mCRPC) who have not received chemotherapy for mCRPC but have progressed on or are intolerant to Next Generation Hormonal Agent (NHA).	Bristol, Northwood, Sutton, Cambridge, Stoke-on-Trent, London, Sheffield
Study of pembrolizumab (MK-3475) combination therapies in metastatic castration-resistant prostate cancer (MK-3475-365/KEYNOTE-365)	This study aims to assess the safety and efficacy of pembrolizumab (MK-3475) combination therapy in patients with metastatic castrate resistant prostate cancer (mCRPC).	Hoddesdon
Study of pembrolizumab (MK-3475) plus olaparib versus abiraterone acetate or enzalutamide in metastatic castration-resistant prostate cancer (MK-7339-010/KEYLYNK-010)	This study aims to assess the efficacy and safety of the combination of the polyadenosine 5'-diphosphoribose poly(ADP-ribose) polymerase (PARP) inhibitor olaparib and pembrolizumab in the treatment of participants with mCRPC who have failed to respond to either abiraterone acetate or enzalutamide (but not both) and to chemotherapy.	Bristol, Taunton, Northwood, Sutton, Cambridge, Stoke-on-Trent
A trial of BXCL701 and pembrolizumab in patients with small cell neuroendocrine prostate cancer	This study aims to assess whether BXCL701 combined with pembrolizumab is safe and effective for treating men with small cell neuroendocrine prostate cancer	London, Sutton
Prostate cancer outcomes: an international registry to improve outcomes in men with advanced prostate cancer (IRONMAN)	The goal is to establish a population-based registry and recruit patients across academic and community practices from Australia, Brazil, Canada, Ireland, Sweden, Switzerland, the United Kingdom (UK), and the US.	Manchester, London, Sunderland, Cardiff, Preston, South Shields, Southampton, Lancaster, London, Sheffield
Study to evaluate the safety, tolerability, pharmacokinetics, and anti-tumor activity of a thorium-227 labeled antibody-chelator conjugate, in patients with metastatic castration resistant prostate cancer	This aims to evaluate the safety and efficacy of thorium-227 labeled immuno-conjugate, specific for the prostate-specific membrane antigen (PSMA) for the treatment of mCRPC	Sutton
Biomarker study to determine frequency of DNA-repair defects in men with metastatic prostate cancer	This study aims to evaluate the prevalence of 4 or more DNA-repair defects in a population of men with metastatic Prostate Cancer (PC) and to use the variants reported to assess biomarker eligibility for niraparib interventional studies.	London, Preston, Cardiff, Bristol, Exeter, Blackburn
A study of abiraterone acetate plus prednisone with or without abemaciclib (LY2835219) in participants with prostate cancer (CYCLONE 2)	This study aims to see how safe and effective abemaciclib is when given together with abiraterone acetate plus prednisone in participants with metastatic castration resistant prostate cancer.	London, Northampton, Plymouth, Chelsea
Talazoparib + enzalutamide vs. enzalutamide monotherapy in mCRPC (TALAPRO-2)	This study aims to compare rPFS in men with mCRPC treated with talazoparib plus enzalutamide vs. enzalutamide after confirmation of the starting dose of talazoparib in combination with enzalutamide.	Glasgow, London, Oxford, Plymouth, Cornwall
Study of ipatasertib or apitolisib with abiraterone acetate versus abiraterone acetate in participants with castration-resistant prostate cancer previously treated with docetaxel chemotherapy	This study aims to compare ipatasertib or apoitolisib with abiraterone acetate vs abiraterone acetate in CRPC	Sutton, London, Birmingham, Glasgow, Leeds, Wirral

Title	Summary	Location
Partial prostate ablation versus radical treatment (PART): Comparing partial ablation of the prostate to treatment or removal of the whole prostate in men with localised cancer of one side of the prostate only	This study aims to test whether partial treatment of the prostate is as effective in curing prostate cancer as treatment of the whole prostate by surgical removal or radiotherapy (known as 'radical' treatments), with fewer side-effects.	Oxford
A study for subjects with prostate cancer who previously participated in an enzalutamide clinical study	This study aims to collect long-term safety data on patients who benefitted from treatment in a previous enzalutamide clinical study	Bebington, Belfast, Bristol, Cardiff, Glasgow, London, Manchester, Northwood, Sutton
A study of niraparib combination therapies for the treatment of metastatic castration-resistant prostate cancer (QUEST)	This study aims to evaluate safety and efficacy of niraparib in combination with other anti-cancer agents.	London, Southampton, Bath, London, Truro, Sutton
A study of apalutamide in participants with high risk, localized or locally advanced prostate cancer who are candidates for radical prostatectomy (PROTEUS)	This study aims to determine if treatment with apalutamide plus androgen deprivation therapy (ADT) before and after radical prostatectomy in participants with high-risk localized or locally advanced prostate cancer results in an improvement in pathological complete response (pCR) rate and metastasis-free survival (MFS), as compared to placebo plus ADT.	Wolverhampton, London, Bristol, Southampton, Cardiff, Sutton, Preston, Dundee, Wakefield
A study of niraparib in combination with abiraterone acetate and prednisone versus abiraterone acetate and prednisone for treatment of participants with metastatic prostate cancer (MAGNITUDE)	This study aims to evaluate the effectiveness of niraparib in combination with abiraterone acetate and prednisone (AA-P) compared to AA-P plus placebo.	Wolverhampton, Aberdeen, Torquay, Blackburn, Lancaster, London, Truro
A study to evaluate the safety and efficacy of relugolix in men with advanced prostate cancer (HERO)	This study aims to determine the benefit and safety of relugolix 120 mg orally once daily for 48 weeks on maintaining serum testosterone suppression to castrate levels (≤ 50 ng/dL [1.7 nmol/L] in participants with androgen-sensitive advanced prostate cancer.	Wirral, Glasgow, Scunthorpe, Aberdeen, Nottingham, Plymouth, Wrexham
The prostate liquid study (PLiS)	This study aims to evaluate the potential use of the ChEC test of seminal fluid as an additional triage test in stratifying patients for further tests.	London, Norwich
MR-simulation in radiotherapy for prostate cancer (FIMRA-P)	This study aims to assess the feasibility of acquiring an MR scan in the radiotherapy treatment position as part of the patient's radiotherapy pathway and incorporating the data into our radiotherapy planning systems, so that it can be potentially used to reduce healthy tissue exposure to radiation.	London
Study to evaluate CORT125281 in combination with enzalutamide in patients with mCRPC	This study aims to evaluate the safety, tolerability, pharmacokinetics (PK) and pharmacodynamics (PD), and preliminary efficacy of CORT125281 in combination with enzalutamide in patients with metastatic castration-resistant prostate cancer (mCRPC) to identify a recommended dose (RD) for Phase 2 studies.	London, Southampton, Sutton
Whole body magnetic resonance imaging study (WISE)	This study aims to show that whole body MRI scans are more effective than standard CT and bone scans currently used by the NHS to monitor bone disease	Sutton
SPCG17: Prostate cancer active surveillance trigger trial (PCASTT)	This study aims to compare current practice of active surveillance with a standardised program for follow-up and triggers for treatment.	London
Plasma analysis for response assessment and to direct the management of metastatic prostate cancer (PARADIGM)	This study will investigate if a new blood test can provide information about which current treatments for prostate cancer will work best for future patients with this disease.	London
Nivolumab and ipilimumab treatment in prostate cancer with an immunogenic signature	This study aims to test the following hypothesis: Patients with metastatic castrate resistant prostate cancer that have progressed following at least one line of therapy and have an immunogenic signature will respond to combined PD-1 and CTLA4 inhibition.	London
Men's experience of prostate biopsy	This study aims to review the experience of men who have undergone a prostate biopsy.	London
Study to evaluate CCS1477 in advanced tumours	This study aims to assess the safety, tolerability, PK and biological activity of CCS1477 in patients with metastatic castration resistant prostate cancer (mCRPC) or advanced solid tumours.	Leicester, Belfast, Newcastle, Sutton, Manchester
Evaluating the effects of frozen section technology on oncological and functional outcomes at radical prostatectomy. (NSAFEPROOF)	This study will test whether this new surgical technique can be used to make surgery safer and more effective whilst allowing improved quality of life for patients having surgery for prostate cancer.	Sheffield, London, Bristol, Glasgow
Fertility after prostate brachytherapy	This study aims to investigate the effect of brachytherapy on fertility	Northwood
The IMPACT study - identification of men with a genetic predisposition to prostate cancer	The IMPACT study is an international targeted prostate screening study of men at increased prostate cancer risk due to the presence of known pathogenic mutations in BRCA1 and BRCA2 genes.	Sutton

Title	Summary	Location
Comparative health research outcomes of novel surgery in prostate cancer (CHRONOS)	This study will compare focal therapy alone to focal therapy with various therapies targeting the testosterone pathway that can shrink the cancer before it is treated.	London, Southampton, Chertsey, Sunderland
Vaccination in early and advanced prostate cancer (ADVANCE)	This study aims to evaluate the safety and efficacy of ChAdOx1-MVA 5T4 vaccine in combination with nivolumab in low and intermediate risk prostate cancer patients who have elected to have their prostate removed and in patients with advanced metastatic prostate cancer.	Manchester, Oxford
A study of nivolumab or placebo in combination with docetaxel in men with advanced castration-resistant prostate cancer (CheckMate 7DX)	This study aims to test the safety and effectiveness of nivolumab with docetaxel in men with advanced castration resistant prostate cancer who have progressed after second-generation hormonal manipulation	London, Manchester, Nottingham, Southampton, Lancaster, Northwood, Guildford, Blackburn
Study on olaparib plus abiraterone as first-line therapy in men with metastatic castration-resistant prostate cancer	This study aims to evaluate the efficacy and safety (including evaluating side effects) of combination of olaparib and abiraterone versus placebo and abiraterone in patients with metastatic castration-resistant prostate cancer (mCRPC) who have received no prior cytotoxic chemotherapy or new hormonal agents (NHAs) at metastatic castration-resistant prostate cancer (mCRPC) stage.	Manchester, Southampton, Swansea, Guildford, Blackburn, Sheffield
How does prostate cancer metastasize? Studying the role of secreted packages (Exosomes) from fat tissue in lean and obese patients (EXOPRO)	This study aims to understand how fat cells communicate with prostate cancer cells.	London
Targeted radiotherapy in androgen-suppressed prostate cancer patients. (TRAP)	The aim of the TRAP trial is to test whether a new precise radiotherapy technique called stereotactic body radiotherapy (SBRT) can slow down the growth of metastatic prostate cancer.	Newcastle Upon Tyne, Birmingham, Leeds, Cardiff, Manchester, Belfast, Sutton
Trial comparing irradiation plus long term adjuvant androgen deprivation with GnRH antagonist versus GnRH agonist plus flare protection in patients with very high risk localized or locally advanced prostate cancer (PEGASUS)	This study aims to assess if GnRH antagonists in combination with external beam radiation therapy improve progression free survival (progression that can be biological, clinical, or death) compared to GnRH agonists in combination with external beam radiation therapy.	Nottingham
Study of TAS3681 in metastatic castration resistant prostate cancer	This study aims to investigate the safety and tolerability of TAS3681 and to find the maximum tolerated dose of TAS3681.	Manchester, Sutton
Focal exablate MR-guided focused ultrasound treatment for management of organ-confined intermediate risk prostate cancer	This study is intended to show that exablate™ MRgFUS is a safe procedure that can significantly postpone or eliminate the need of patients with organ confined intermediate risk prostate cancer to undergo a definitive treatment (i.e., Radical Prostatectomy or Radiation therapy) for their disease.	London
Intense exercise for survival among men with metastatic castrate-resistant prostate cancer (INTERVAL)	This study aims to determine if high intensity aerobic and resistance training (supervised exercise) plus psychosocial support increases overall survival compared to psychosocial support alone (Self-directed exercise) in patients with metastatic castrate-resistant prostate cancer.	London, Guildford, Glasgow, Belfast, Bath
Prostate cancer screening trial using imaging (PROSTAGRAM)	This study aims to find an imaging technique, like mammograms for breast cancer, which can be used to screen for prostate cancer.	London
Safety and pharmacokinetics of ODM-208 in patients with metastatic castration-resistant prostate cancer (CYPIDES)	This study aims to evaluate safety and tolerability of ODM-208 in patients with metastatic castration-resistant prostate cancer.	Manchester
To evaluate efficacy and tolerability of deferred androgen deprivation therapy +/- upfront cryotherapy in men with localised radiation recurrent prostate cancer (RRPC)	This study aims to investigate the role of salvage prostate cryotherapy in patients with localised recurrent prostate cancer following radiotherapy	Glasgow
Exercise for advanced prostate cancer: a multicomponent feasibility trial (EXACT)	This study aims to investigate whether men with metastatic prostate cancer can take part in and progress through a home-based exercise program.	Belfast
Prolaris enhanced risk stratification – an economic and clinical evaluation (PERSONAL)	This study aims to find out if the Prolaris® test score helps patients with newly diagnosed prostate cancer and their clinical team make better informed treatment choices that are tailored to the individual patient.	Leeds
Capture of prostatic trans-rectal ultrasound scans for research (CAPTURE)	This study aims to build up a repository of prostate ultrasonography videos and prostate MRI scans to enable research into novel anatomical registration techniques.	Cambridge
Trial of pembrolizumab in metastatic castration resistant prostate cancer (PERSEUS1)	This study aims to evaluate the efficacy of pembrolizumab in metastatic castration resistant prostate cancer (mCRPC) patients (Part A) with a biomarker enrichment stage (Part B) if efficacy is shown in part A.	Sutton
Prostate radiotherapy integrated with simultaneous MRI (The PRISM study)	This study aims to assess the technical feasibility of delivering radical radiotherapy for prostate cancer using the MR-Linac, including the feasibility of changing the radiotherapy plan on a daily basis to mirror internal anatomy changes.	Sutton
Utilising CTC counts to optimize systemic therapy of metastatic prostate cancer (CTC-STOP)	This study aims to determine if serial CTC counts can be used as early markers of progression to direct early discontinuation of docetaxel chemotherapy in patients with mCRPC without adversely impacting overall survival, when compared with standard approaches to guide treatment switch decisions.	London, Edinburgh, Cardiff, Sutton

FOCUS GROUP – FUNDING GAPS

Novel, high risk ideas

All three groups agreed that the current climate makes it challenging to get funding for novel, risky ideas. The early career group highlighted the challenge of communicating novel, complex ideas to potential funders when the funders may lack understanding of the area, particularly when it comes to more recent technologies such as machine learning and computational biology. This group also called for 'an acceptable level of evidence' regarding preliminary data.

'They want us to do what we were proposing to do – but with no money.'

The experienced researchers agreed there was a definite bias towards safe projects with no risk. A comment was made that the sector wanted 'high risk with a guarantee.'

Some of the group voiced their frustrations at varying perceptions of time and acceptable outcomes between funders, who want results quickly, and researchers, who need time to gather solid data.

Scientific funding gaps

Quite a few specific gaps were suggested. For example, two researchers stated that it was particularly difficult to design projects involving mouse models which would deliver results within a typical project time frame.

Mechanistic work was also flagged as a gap: we now know a lot more about the genomic landscape but we need more mechanistic insights. This work also takes time and the time it takes is not always consistent with funders' requirements.

One participant noted that it was difficult to apply for large grants as a PI when your research background was entirely computational. Pilot grants were also noted by one participant as not being suited to animal work as the costs in this kind of research often far outweigh the funding available.

Another participant noted that animal work with radiation is incredibly expensive so again, this would not always be a route that they could take.

Barriers to research

BARRIERS TO CAREER PROGRESSION

Figures on the retention rate within academia are difficult to find, but according to the European University Institute, the wide use of temporary fixed-term contracts in the UK university system, in which 42% of academic staff are on fixed-term contracts, represents a major problem [1].

Lack of stability, and the challenges for early career researchers in particular were key themes in our survey and focus groups.

Our survey respondents saw funding as the main barrier to their careers, but job security and career stage or the transition between different career stages, were the next most significant barriers. Within our focus groups, it was suggested that the more senior you are, the harder it is to get funding for fellowships as you are experienced but too expensive, leading to many seeking an alternative career, out of academia.

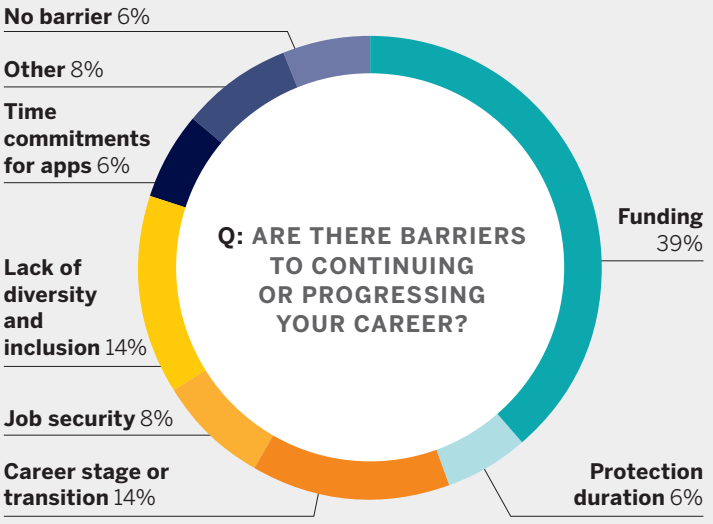
"We're losing talented researchers who don't see a career path in academia."

Larger, national funds were seen as very competitive and therefore very difficult to receive funding from. While they are seen as being very important for building careers, there was a suggestion that these larger grants tend to go to well-established names in prostate cancer research and that the only way for a junior researcher to get them is to have support from a well-known scientist.

Lack of diversity and inclusion was also a significant barrier for our survey respondents. Focus group participants agreed that men tended to remain in research, with an experienced researcher noting that there was a higher proportion of females at postdoc level (70%), which reduces to 5% at PI stage. Experienced researchers suggested the main reasons for this variance was due to maternity leave, few part-time working opportunities and a lack of female role models. One researcher, who previously worked in industry, said the circumstances there are much more positive.

One (male) early-career researcher pointed to a male heavy department at the top tiers at his university, with mid-level positions being more equally split. He perceived it to be 50:50 or even 60:40 women to men. He stated he believed the gender disparity at the top would resolve itself in time. Another, a male mathematician, stated that he doesn't mind positive discrimination against his favour if it supports more women in his very male-dominated field.

Survey responses



Note: 10 people did not respond to this question, the graph is based on only those who responded

[1] www.eui.eu/programmesandfellowships/academiccareersobservatory/academiccareersbycountry/unitedkingdom#researchcareer, accessed 12/06/2020)

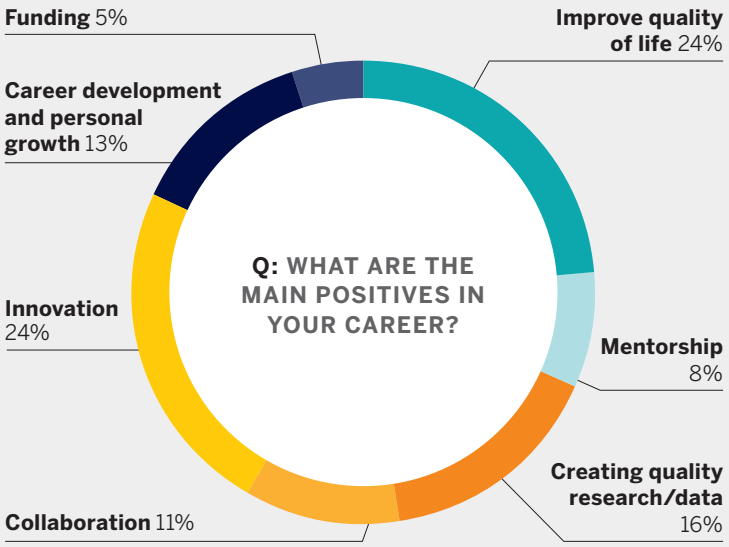
BARRIERS TO COLLABORATION

Our analysis (see previous) suggested that many universities have a low number of groups working on prostate cancer, or perhaps just one prostate-specific group, making prostate cancer collaborations more likely to be external. However, collaborations were flagged as challenging to establish and sustain. It was felt that technology, e,g. Skype, helps with initial conversations to collaborate with new researchers, but these are not picked up in the long-term and nothing more happens. People are unwilling to share datasets and ideas with people they don't know as individuals are measured on their own outputs.

Participants noted that conferences can be very helpful, but that some are so big it can be difficult to meet people and create solid connections. Smaller conferences were much more productive and people attending them seem to be more open to networking. The cost of travelling to and attending international conferences was mentioned as a barrier, as many grants no longer include a budget for conference travel.

One participant works across different cancer types and proposed that prostate cancer, in the UK, is generally collaborative. The greater amounts of money available for other cancers such as breast cancer may make it more competitive, thereby hindering collaboration.

It was also mentioned that context is very important – a project grant can give you the perfect opportunity to approach someone and a very established idea can also make it easier to approach someone to collaborate with. However, it can be difficult to approach potential collaborators if you only have some data or don't have a fully formed idea. It was mentioned that collaboration funds or awards that insist on collaboration with two or more centres can act as a springboard for collaboration.



Note: 12 people did not respond to this question, the graph is based on only those who responded

BARRIERS IN THE UK

When asked to think for a moment and identify the most significant barrier to high quality prostate cancer research in the UK, a number of suggestions were put forward from our focus group participants.

One early-career researcher suggested that there aren't any barriers as prostate cancer is well known amongst the public and highly publicised in the media. Another researcher disagreed and suggested that there was an awareness issue. It was also argued that funders prioritise other cancers due to a perception that prostate cancer has already been solved, and possibly because prostate cancer is a disease that predominately affects men later in life. However, it was argued that a unique scientific opportunity existed with prostate cancer, as a significant population is aware of their condition but willing to leave it untreated under active surveillance.

The challenge of getting new treatments to clinical trials was highlighted as the biggest barrier. Legislation was highlighted as being core to this, with patients only allowed to be trialled on new drugs once all other options have been exhausted. This can lead to multiple-drug side effects and it is difficult to argue that these side effects are not caused by the new drug being tested. Another researcher reinforced this with the suggestion that patients receiving multiple drugs can develop resistance to new drugs very quickly. It was also speculated that patients at this stage may no longer want to try anything new.

Other barriers included that it was very difficult to secure high-risk project funding; that there is a lot of emphasis on translational studies and not enough on basic science. The stability and waiting times of funding also posed problems for retention, especially when staff require work visas.

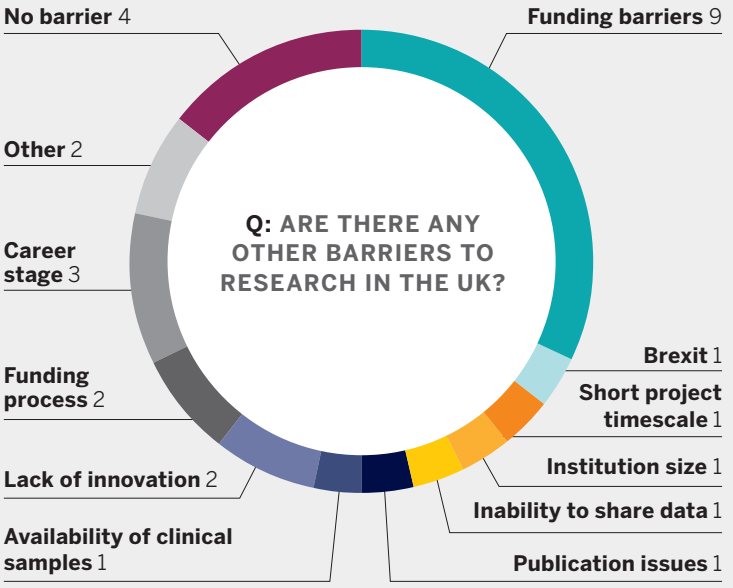
The cost of publishing papers was also mentioned. It was noted that larger charities like CRUK have a scheme where they pay for papers on their funded work to be published.

It was suggested that current models used to study the disease may not be representative of the whole spectrum of diseases known as prostate cancer, and often have a compromised immune system.

Finally, it was mentioned that all the CRUK Challenge Awards went to international groups and it was suggested that perhaps a UK-based funding scheme could mitigate against this.

Other responses included: access to good clinical material, funding, lack of interdisciplinary research, tractable targets and PhDs, data outside of trials or collected in hospitals that is hard to extract.

Survey responses



Funding process issues were that funding needed to be more streamlined and less duplicated, which creates 'a jungle to find funding opportunities'; that the long turnaround time affects staff retention; that chief investigators can't include their salary; that it's difficult to know how research committees prioritise and make decisions.

Q: IS THERE ANYTHING ELSE YOU FEEL WE SHOULD KNOW, OR ANY OTHER COMMENT YOU WOULD LIKE TO MAKE?

A: Please help early career scientists. Funding bodies such as PCR greatly help and can be career changing.

A: More basic research is required, leading to a better understanding of cancer biology, before effective long-lasting therapies can be designed.

A: I think this survey is a good idea and hope that you get useful results from it.

Prostate cancer facts

Globally there were over 1.2 million cases of prostate cancer diagnosed in 2018 and over 350,000 deaths from the disease.[1]

Prostate cancer accounts for 26% of male cancer diagnoses in the UK[2]. Prostate cancer is now the most common cancer in the UK.[2]

Prostate cancer-specific mortality at 10 years post-diagnosis is as low as 5% for clinically localised disease but increases to 66% for advanced disease with at least one metastasis.[3]

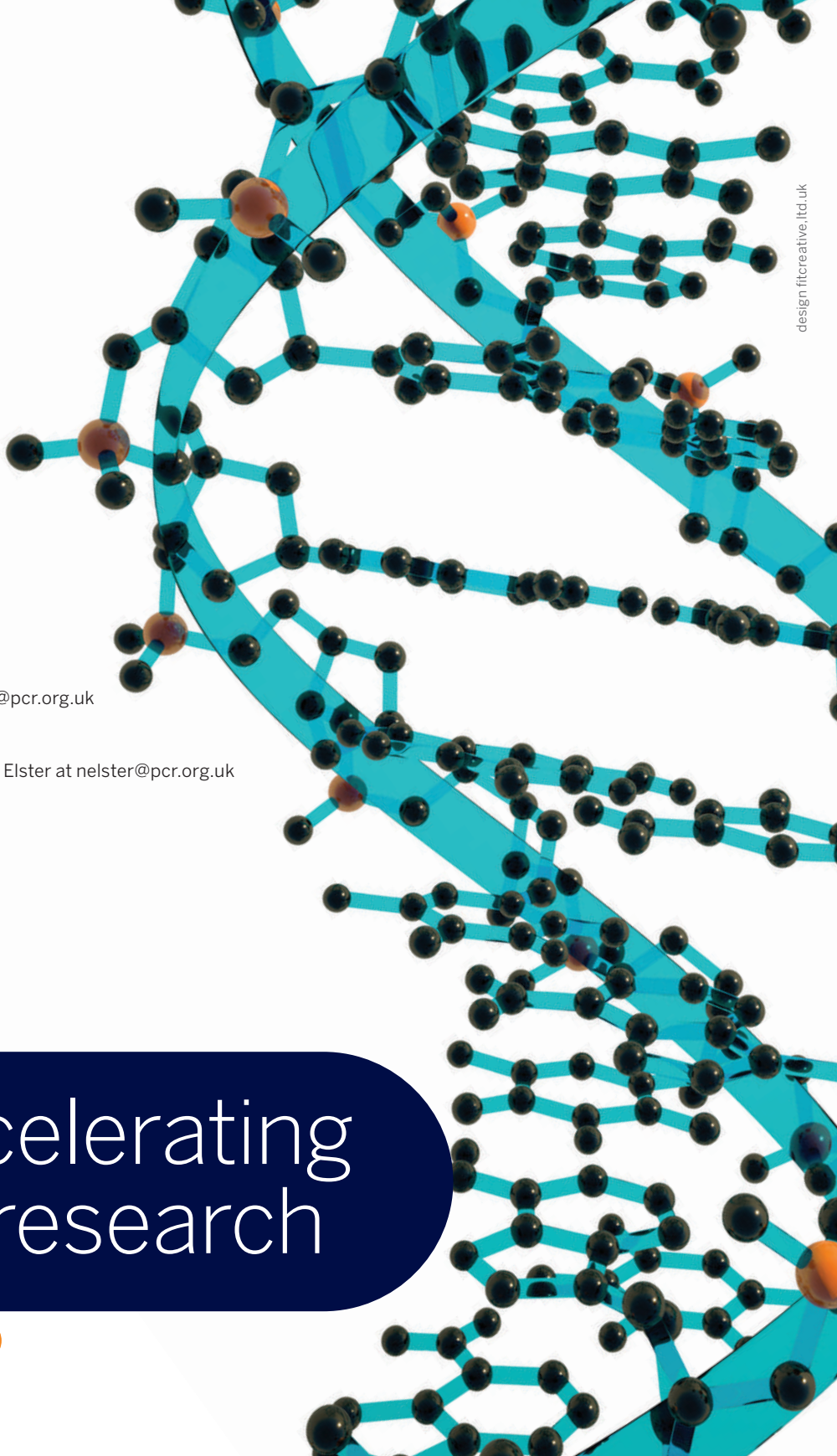
[1] Global Cancer Observatory, International Agency for Research on Cancer, WHO (GLOBOCAN, 2018a). *Prostate cancer fact sheet (pdf)*. **gco.iarc.fr/today/fact-sheets-cancers** Accessed on: 12/07/2019

[2] Global Cancer Observatory, International Agency for Research on Cancer, WHO (GLOBOCAN, 2018b). *United Kingdom fact sheet. (pdf)*. **gco.iarc.fr/today/fact-sheets-populations** Accessed on: 12/07/2019

[3] Shukla et al., (2015). 'Evaluation of the current prostate cancer staging system based on cancer-specific mortality in the surveillance epidemiology and end results database.' *Clinical genitourinary cancer*, vol. 13, issue 1, pp 17-21.

This report was written by Denise Karikari MPH, Grace Trump BSc, Katherine Colman MSc, Naomi Elster PhD. We gratefully acknowledge Abdul Mutabbir BSc and Alexander Renziehausen PhD from the NCRI for contributing data and analysis from the NCRI Cancer Research Database (CaRD).

Prostate Cancer Research



design fitcreative.ltd.uk

We are committed to continuing to develop innovative and effective solutions to the challenges that research faces and maximising our research impact for the people to whom it matters most. If you would like discuss how we can work together, we would love to hear from you.

PARTNERSHIPS

Contact our Head of Partnerships, Peter Harrison at pharrison@pcr.org.uk

RESEARCH

Contact our Head of Research and Communications, Dr Naomi Elster at nelster@pcr.org.uk

Be part of accelerating innovation in research

pcr.org.uk • 020 3735 5444 • info@pcr.org.uk