Ipsos MORI
Social Research Institute

Commissioned by BBSRC bioscience for the future

Public views on strategic priorities for Basic Bioscience Underpinning Health

Report on public dialogue pilot

02 November 2012

About BBSRC
BBSRC invests in world-class bioscience research and training on behalf of the UK public. Our aim is to further scientific knowledge, to promote economic growth, wealth and job creation and to improve quality of life in the UK and beyond.

Funded by Government, BBSRC has a total budget of around £500 million a year (2012-13) which includes spend to support research and training in universities and strategically funded institutes. BBSRC research and the people we fund are helping society to meet major challenges, including food security, green energy and healthier, longer lives. Our investments underpin important UK economic sectors, such as farming, food, industrial biotechnology and pharmaceuticals.

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About Ipsos MORI
Ipsos MORI is one of the largest and best known research companies in the UK and part of the global Ipsos Group. The Ipsos MORI Social Research Institute is the leader in public sector research, helping policy and decision makers understand what works. Our award-winning qualitative research and public engagement department explores the views, motivations, attitudes and behaviours of citizens, consumers and stakeholders, to provide rich and useful insight for policymakers.

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Executive Summary

Background

This report gives findings from a 21 person day-long workshop. Participants, members of the general public, were asked to explore:

- What 'healthy' meant to them
- The challenges to health facing our society
- Their views on potential different strategic directions BBSRC could take when funding research into basic bioscience underpinning health.

This report describes what the participants, as a sample of the public, think are the most pressing challenges of health for society to address, where they feel BBSRC should concentrate its attention, and why they feel this is most important. The workshop was a small scale pilot. This project was designed to test out this workshop approach as a way to engage the public with BBSRC's ongoing strategic planning.

What is healthy?

Participants spontaneously mentioned five key aspects of personal health:

- **Mental health and happiness:** for many, this was the most pressing concern, mentioned before other areas such as diet, freedom from illness or longevity. This related to **freedom from stress** and the way the **environment** impacts on people. Mental health was seen as strongly interlinked with physical health. Participants called for science in future to explore the link between mind and body and understand more about the repercussions for health.
- **Diet:** It was presumed by many that **eating healthily** (5 a day, fresh food, sensible portion sizes) was, in the absence of a major disease or other medical condition, the cornerstone of maintaining healthiness. Some participants noted that **information overload** and contradictory information can make it difficult to know what to do.
- **Exercising**: especially its effects on **fitness** and **happiness** (thought to be more important than the effects on **weight**).
- **Freedom from illness:** this could involve **managing** ongoing illness. Only those who had suffered contact with serious illness themselves or in their families tended to highlight **prevention** of serious illness at this stage.
- **Maintaining health through life:** This meant having the health to work, socialise, look after a family and carry out recreational activities. At different stages of life, people were perceived to have different expectations of health, and different needs around health.

Thinking about society beyond themselves, participants focused on the following:-

- **Ensuring a healthy life for people even into old age** (though the word 'healthspan' was not used, the concept it describes was certainly discussed); however, extending life for its own sake was thought to be potentially risky for society.

- **Ensuring that everyone is educated about what it means to be healthy;** at different stages in life people would need different sorts of information.

- **Fair access for all** to other resources (good food, medicine, healthcare, opportunity to keep fit).

- **Reducing and managing illnesses** for society as a whole.

- **A good environment;** hygienic and free from pollution

Talking about health and science: the social context

Participants' spontaneous views were influenced by **underlying beliefs about health** and some **social and cultural contexts** which influenced the discussion**.** These were <u>not</u> necessarily explicitly stated, but were revealed by what participants prioritised; what they *didn't* say; and their overall responses to probes, stimulus and questions during the deliberation. Some of these views are mutually contradictory, as is often the case with views held on complex subjects.

- ***"We know how to live healthily already – science has done its job"*:** In both table discussions, participants described much health knowledge (especially about diet, hygiene and exercise) as 'common sense'. They did not make the link between this and the scientific research on which this knowledge is based. This meant that they undervalued the role of *future* science in creating an even more healthy society. It also meant they saw health problems as economic and social issues, rather than scientific ones. Throughout the day, there was a call for more education and communication of existing information, and some participants even prioritised this more highly than doing more investigative science.

- ***"We don't understand the term 'ageing'"*:** While people supported the idea of reducing disease and disability for older people and increasing their ability to be independent, they interpreted the term *ageing* as growing old (rather than a process affecting everyone, all the time). Getting old and dying was also seen as natural and participants did not want science to try and extend lifespan indefinitely. This affected the way some weighed up the benefits and drawbacks of any research into the process of ageing, even research which related to reducing the impact of age-related diseases.

- ***"We should be careful what we meddle with":*** participants had a sense that our current state of knowledge is a safe status quo and that future scientific discoveries might have unintended consequences. Extending lifespan might be an example of this. This is a common theme often found in deliberation on science and health issues with the general public.

- ***"Everybody's different":*** Participants felt health was subjective, and that every individual was responsible for his or her own health. They were reluctant to make judgements about individuals making unhealthy choices, because what is unhealthy for one person may not be

so for another. They were reluctant to say that different lifestyles may impact health, in case this was seen as judgemental to others. Similarly, there was a strong trend to say that good health is different for different people. They asserted that good health was defined as 'what you are used to' and also 'how capable you are of living the life you want to', and did not label people who suffered illness or disability as 'unhealthy'.

- ***"Everyone should have access to health":*** Participants drew in the social and economic context when discussing health. They saw health challenges as influenced by wider social and political challenges and felt that even basic bioscience research should not avoid addressing the moral and ethical considerations of equity in health outcomes.

Key Health Challenges and the role of BBSRC

The health issues above were seen as important for individuals and society. When we asked participants to focus on the most important challenges for a healthy society in future, some different areas emerged.

- **Meeting the needs of different groups through life:**
    - childhood education on diet, fitness and in particular how to avoid obesity.
    - helping working-age people avoid the effects of stress and maintain their health when busy with a range of complex responsibilities.
    - helping the elderly live independent lives as long as possible.
- **Preventing and curing diseases,** in particular the most serious and impactful e.g. Parkinson's, Alzheimer's, stroke, cancer. It is important to note that cancer was felt to be already being tackled by considerable investment into research. While it was seen as a major illness, opinion was divided as to whether it remains a 'challenge'.
- **Understanding genetic inheritance and the effects of the environment on the individual.**
- **Understanding the causes of unhealthy behaviours or addictions** (expressed more strongly in one sub-group than the other).

When participants heard about BBSRC and its remit, particularly the BBUH strand, they agreed that BBSRC could help society meet its major health challenges by focussing on **gaining a better understanding of how health is maintained, how diseases are caused** and **how environmental and lifestyle and genetic factors impact on health**. Areas of work that participants also suggested as particularly relevant included: **understanding genetic inheritance, learning how addictions work, and investigating how viral epidemics move through a population**.

This reflected the fact that they wanted BBSRC to tackle the kinds of problems around health which they felt needed a *scientific* solution (as opposed to an *economic* or *educational* solution). They continued to stress that new research should go alongside communicating and educating people about the knowledge we already have, and trying to ensure fair access to resources for everyone.

Strategic insights for BBSRC

Participants looked at some contrasting ideas for **strategic directions and principles which should govern BBSRC's funding decisions**. These were used as stimulus, rather than presented as real options for BBSRC. Through hearing the arguments used in support of one or other approach, we can derive the *values and principles* which were ultimately important to people.

The following ideas reflect the **values** of participants and the **themes** that they would want BBSRC to take into account when priority-setting.

- Develop a **flexible** strategy so that BBSRC can adapt to meet different needs over time.
- Check and ensure that BBSRC is **building on**, not duplicating, research that other countries or organisations have already done.
- Participants felt research should be funded which has the "potential to improve health or wellbeing"; but there is a need to **measure carefully** how this potential can be judged. There are various ways to do this, for example, funding things…
    - that potentially help the greatest number of people;
    - that have the highest likelihood of success;
    - that help the most seriously ill;
    - that help the youngest, oldest, or poorest people.
- All of these funding strategies were seen as potentially legitimate, but each might have positive and negative implications which should be considered. They were all based on the idea that BBSRC should aim for **fairness and equality**.
- Research should be done on issues which **affect all ages**, not just those which affect the elderly.
- Funding research that addresses a particular set of health challenges could be seen to **discriminate** against people who do not have these health challenges, so this should be considered. This is especially relevant when choosing whether or not to fund research which might affect people suffering 'lifestyle diseases'.
- BBSRC should invest in research where **science is the best way to solve the problem** (reflecting people's concern that some health issues are political and economic rather than scientific).
- BBSRC research should help us **understand how health works**. This was a prompted statement but reflects the fact that many, through the deliberation, came to realise that there remains work to be done on understanding the story of health, as well as illness.
- Some felt that research should focus on improving **quality of life;** though for others, this was seen as hard to do when each person's health is subjectively different.

- BBSRC research should **empower people with the understanding to make better choices about their own health**. This reflects the view held by participants that we are all ultimately responsible for our own health and so need information to help us live healthy lives.

1. Introduction and methodology

1.1Background

The Biotechnology and Biological Sciences Research Council (BBSRC) is a UK research council that invests in world-class bioscience research and training on behalf of the UK public. It funds scientific research in institutes and universities around the UK. It is the largest funder of non-medical bioscience and has a total budget of around £500 million a year (2012-13) which includes spend on research, training and capital projects. This research creates knowledge about biological processes, an aspect of which is helping to understand the makeup and operation of 'normal health'. The application of these findings in bioscience can be taken forward by the scientific community, policymakers, industry and others in a number of ways.

Half of the research that BBSRC currently funds is towards 'curiosity driven' biology research, the other half is towards research in three focused priority areas; Food Security, Industrial Biotechnology and Bioenergy and Basic Bioscience Underpinning Health (BBUH). BBSRC is refreshing its strategic plan in autumn 2012 for sign-off in early 2013. As part of this revision, BBSRC wished to engage with the public and ask them for their views on what should be the broad strategic direction of the BBUH strand.

Ipsos MORI was commissioned to carry out a small public dialogue. As well as helping the public feed into BBSRC's strategic priorities, the method was chosen as a way of testing out the public engagement approach and other related tools and explore how best to involve the public in future with BBSRC's strategic planning.

The pilot dialogue explored public attitudes to health, perceptions of health challenges facing individuals and society, and how views on these should feed into strategy setting in their BBUH stream.

1.2 Aims and objectives

The research objectives were to:

- Explore what the general public understand 'healthy' to mean on a personal level as well as in a wider society context;
- Understand what the general public think the main challenges to health are that we face as a society;
- Get an understanding of what the general public thinks BBSRC should concentrate their research on in the BBUH strand and why this is important; and,
- Test out this form of research as a method of engaging with the public and informing BBSRC's strategic direction.

The findings from the workshop should help BBSRC to rearticulate the basic bioscience underpinning health theme in their strategic plan around a challenge or set of challenges which public groups have helped to define (alongside input from other stakeholders).

1.3 Methodology

A day-long public dialogue workshop was held in Swindon on Saturday 6th October 2012, 10am-4pm.

Recruitment & Sample

In order to qualify for the workshop participants needed to be over the age of 16, and not work for, or have any member of their family who work for, BBSRC. Soft quotas were also placed on gender, age, social grade and ethnicity to ensure a broad range of participants were recruited. Potential participants were asked a series of questions that allocated them to a particular group according to their attitudes towards science. This segmentation was based on a previous piece of research carried out by Ipsos MORI in 2011 for the Department of Business, Innovation and Skills on public attitudes to science, which breaks the public down into the following six segments:

1. **Concerned:** This group constitutes around a quarter (23%) of the population. They tend to have a more religious or spiritual outlook on life and consequently have stronger views on the limitations of science. They support Government efforts to consult the public on science, but have concerns about whether scientists themselves take the findings of these consultations on board.
2. **Late adopters:** This group constitutes around two in ten (18%) of the population. They did not enjoy science at school, but have since become more enthusiastic and now want to have more of a say in decision-making. Their interest in science tends to be linked to their environmental and ethical concerns, so they tend to be more engaged on issues such as climate change, GM crops and vivisection.
3. **Confident engagers:** This group makes up 14% of the population. They tend to have the most positive attitude towards science of all clusters, and have relatively few concerns about scientists, or the relationship between Government and science. However, they are concerned about how the media reports science and the media's influence on science policy.
4. **Distrustful engagers:** This group makes up 13% of the population. They are similar to Confident Engagers in their enthusiasm about science, but tend to be far less trusting of scientists and Government. Consequently, they often think the public should play a larger role in decision-making on science issues, and many want to be personally involved in this.
5. **Disengaged sceptics:** This group also constitute 13% of the population. They feel less informed about science and often find science somewhat overwhelming. They are among the most concerned about the speed of development in science. As a result, they favour a conservative approach to science regulation, and one that takes the public's views into account.
6. **Indifferent:** This group accounts for two in ten (19%). They are not especially negative or worried about science, but tend to think science is not for them, so are less interested in finding out about it or in getting involved in public consultation.

Hard quotas were put in place to ensure at least 4 participants from each of the segments were recruited and thus a wide range of views on science and scientific research.

Event structure

21 participants attended the workshop. At the workshop participants were split between two different tables with 10 or 11 on each, each with a range of age, gender and attitudes to science.

Four members of BBSRC staff attended. They sat at the tables with participants throughout the day, answering questions, raising issues and sometimes participating in discussions which created a dialogue between BBSRC and participants.

The day was broken down into three different phases (please see the appended discussion guide for greater detail, Annex B):

1. **What is healthy?**

The first phase in the morning was a discussion revolving entirely around the question 'What is healthy?' We started the discussion asking participants what healthy means to them, before widening this out to their friends/family/community and then to the UK/society as a whole. One group did not explicitly discuss friends/family/community as they had covered much of this ground while discussing what healthy means to them personally. We probed on their answers to try to understand why they think these things are important, what outcomes they expect to see from this, how these things are affected by other people and their own control over them. They then used stickers to identify the areas of health they thought were most relevant and resonant to them.

2. **Health challenges for society**

In the second phase participants were introduced to some data that gave context to 'health' and asked participants to discuss what the challenges might be, why they are challenges and how they might be resolved. One participant from each group then fed back to the room on what the key challenges they came up with were. During the lunch break, participants were invited to view both groups' list of challenges and identify the ones they thought were more important.

3. **BBSRC research and priorities**

The third phase introduced BBSRC in more detail to participants including examples of research projects it has funded previously. Participants were then given two examples of potential strategic visions that BBSRC could follow (these were not real strategies but simply used for the purposes of illustration) and discussed the relative merits and drawbacks of each, which allowed them to discuss the principles that they would like BBSRC to follow. The whole group then discussed these overall principles, and voted on what they thought would be the best strategic vision.

Data collection

On the day of the workshop we had a note taker on each table making detailed notes of everything heard, to allow for detailed analysis or the words and phrases used. There was also a digital recorder on each table which recorded the discussions on the tables so that we could listen back to particular bits of the day for further clarification. Flipcharts were used on certain exercises with participants to capture their thoughts and relay them back to them. These were collated at the end of the day.

Analysis

Following the workshop, the full project team held an analysis session to explore emerging themes that came out of the workshop by revisiting the research questions and objectives. The team drew on the flipcharts and other materials that had been produced during the day as well extensive notes.

This meant that we could examine the main findings from the workshop based on what was said and our interpretation of this. This session allowed Ipsos MORI to:

1. Develop a shared understanding of the data within the team through intense discussion around the research questions. This allowed the researchers to arrive at consensus on what the data is telling us, which then formed the narrative for this report.

2. Create a thematic framework for analysing the qualitative data, refined throughout later analysis by referring back to detailed notes and the audio recordings of the day.

The findings, as presented in this report, are based on this analysis. The findings represent an interpretation of the results rather than a purely descriptive account of what was discussed. They take into account what was said, what was not said, participants' level of understanding of BBSRC's work and the underlying beliefs, values and social contexts which seemed to be driving their discussions.

While moderators made every effort to ensure that participants stayed on topic throughout the day, sometimes participants had discussions that did not directly address the research questions under discussion.

Interpreting qualitative research

Unlike quantitative surveys, qualitative investigation is not, by its nature, designed to be statistically representative. It is intended to be illustrative and to provide in-depth understanding around a topic. Therefore, claims cannot be made about the extent to which the conclusions may be generalised to the population. Instead, we present the broad range of views given by participants, and where appropriate make reference to overall balance of opinion or general consensus.

Anonymous verbatim comments made by participants during the discussions have been included throughout this report. These should not be interpreted as defining the views of all participants but have been selected to provide insight into a particular issue or topic. Some issues were discussed in one or the other of the groups, and this is indicated throughout. However, in qualitative research, the goal is to explore the range of views present and how they are expressed in the context of a dynamic group. Within a dynamic group, participants inevitably discuss and build on the issues raised by others, so even when comments are discussed by a large number of people this does not mean that these are the most important comments; similarly, if one group focuses more on one set of issues than another, it does not mean that the issues discussed more briefly are not important.

1.4 Report Outline

This report mainly follows the same outline as the deliberative event itself.

1. **What is healthy?** This section explores what participants think of as healthy for them, their families and society as well as who is responsible for these healthy outcomes.
2. **Talking about health and science: the social context:** This section outlines participants' underlying beliefs about health and some social and cultural contexts which influenced the discussion

3. **Key health challenges and the role of BBSRC:** This section explores what the participants saw as the key health challenges for society, why these differed from some of their views on what healthy meant for themselves and how these changed once participants knew more about BBSRC.
4. **Strategy and principles for BBSRC:** This section describes participants' values with relation to BBUH research and the themes that they would want BBSRC to take into account when priority-setting.

2. What is healthy?

Participants spontaneously mentioned five key aspects of personal health:

- **Mental health and happiness:** for many, this was the most pressing concern, mentioned before other areas such as diet, freedom from illness or longevity and related to freedom from stress and the way the environment impacts on people. Mental health was seen as strongly interlinked with physical health.
- **Diet:** eating five a day and having good access to fresh, healthy food. Education on diet was also seen as important but some pointed out that some advice can be contradictory.
- **Exercising:** especially its effects on fitness and happiness.
- **Freedom from illness:** this could involve managing ongoing illness.
- **Maintaining health through life:** This meant having the health to work, socialise, look after a family and carry out recreational activities.

Thinking about what a healthy society might look like, participants focused on: ensuring healthy life for people even into old age; ensuring that everyone is educated about the information we already have on how to be healthy; and ensuring fair access the resources needed to be healthy (good food, medicine, healthcare, opportunity to keep fit). They also talked about reducing diseases and illnesses, and ensuring a clean and unpolluted environment.

This section describes the participants' discussions in the first part of the workshop, which focused on what 'healthy' means to them, their wider community and society. As participants were divided into two groups, the conversations in each naturally took different courses, with one group focussing more on mental health, the effect of the how we live and the environment in which we live on our health. The other group focussed more on the effects of diet and how to ensure fair access to the resources that allow for a healthy lifestyle. The findings are reported at an overall level.

2.1 What healthy means on a personal level

Being healthy was linked in the main to living a healthy lifestyle; managing any long-term conditions; and maintaining wellbeing throughout one's life. This included physical capability to perform necessary tasks; resilient mental health; and freedom from stress.

Mental health and happiness

Mental health was seen as a crucial part of overall healthiness. For some, it was the necessary foundation of physical health, whereas others thought that physical health is what allows for greater mental wellbeing. In either case, there was a strong sense that they were interlinked. While physical ill-health was seen as one cause, the environment and social context were thought to be the prime causes of "stress", which was used by many as a synonym for mental ill-health. For example some

thought that being either in work in a high-pressure job or out of work and unable to find employment would be a large cause of stress and result in impacting on the health service.

> *"Most people are working just to survive. The stress puts a lot of pressure on people and makes them ill"*

This in part explains why this topic was not returned to by all participants when discussing health challenges; although it is a key component of feeling healthy on a personal level for most people, they think that the causes of stress and mental ill-health are primarily social and circumstantial, not physical or biological.

Again, the social impacts of lack of mental health were emphasised by participants; many mentioned people not being able to work or placing extra strain on the NHS if they develop mental health problems.

However, in discussion individuals did acknowledge that there are genetic and physiological components to mental health and by the end of discussion there were several who would support funding research to understand more about the link between body and mind.

Healthy diet

It was presumed by many that this was, in the absence of a major disease or other medical condition, the cornerstone of maintaining healthiness.

> *"5 a day – it's just drummed into your head now isn't it?"*

Eating enough fruit and vegetables, access to fresh food, and controlling portion size were seen as key components of a healthy diet. Eating food that has not been treated with too many chemicals was also mentioned. Some thought that they had adequate information to enable them to eat a healthy diet if they so choose, but for others the surfeit of information in this area made it difficult to understand what really are the healthy options. A general lack of trust in food labelling and "official" information contributed to this worry.

> *"Are we eating healthily...you can't even trust organic - the only way to be healthy is to grow your own"*

Nevertheless, it was thought that, as a society, we generally understand the effects of food on health and know what to eat to ensure health. The prime barriers to everyone eating healthily were therefore thought to be economic, cultural and geographic. The price of food, the time to cook from scratch and access to nearby shops that supply healthy and fresh food were all mentioned by participants when speaking about why they or others may not always be able to eat healthily.

> *"If you had a lot of money, I think you'd lead a healthier lifestyle, if you only have £2 a day to feed yourself you'd eat beans on toast every day"*

> *"I try to buy the better stuff but half the time I have to look at things and think; that's 50p and that's £1 and pick the cheaper"*

Participants did not spontaneously think of any ways in which scientific advances could help them ensure their health through diet, and indeed did not spontaneously bring up the topic of diet again

when discussing key health challenges and priorities for BBSRC before they had seen the presentation or the stimulus flashcards. As mentioned above, it was assumed that the scientific work in this area has already been done. When examples of new projects were introduced, however, individuals started to see the potential of new research.

Exercising

While this was mentioned as a component of personal health by many participants, there was little agreement around how important it was to them personally or why they saw it as important. Some pointed out that exercise was vital in order to be physically healthy. Some spoke of the importance of exercise to maintaining a healthy weight, avoiding illnesses or helping to manage them; this was seen as more important for particular groups of people such as the very young or very old, and was discussed in more detail later on in the day. Spontaneously, though, the mental benefits of exercise, and the subtle interplay between body and mind were the most important for many participants.

> *"Being physically fit matters because you need to be comfortable in your head that you can do things"*

> *"[Participant one] I don't think the huge guy with muscles is always the healthiest. Some people don't do cardio so they aren't healthy. [Participant two] It's the natural glow, that's what's healthy."*

Exercising was thus valued for its social benefit, and how it can help to reduce stress levels and increase confidence, as well as for its physical effects.

Freedom from illness and managing illness

Participants did not say spontaneously that being healthy involved being alive – or being free from serious and fatal infectious diseases. Even when moderators prompted on these issues, there seemed little real interest in this theme, except from one or two individuals. We could hypothesise that this is because these 21st century citizens live in an era of antibiotics and low childhood morbidity, and for them the continuation of life through youth into middle age is taken for granted. Illness was considered to be something that could often be managed, and was not thought to be bad in itself, but only bad when it stops people from living the lives they want to lead.

> *"There is an acceptable degree of unhealthiness...its fine if it's just moles or headaches every now and again"*

This was particularly true of long-term conditions such as asthma, and participants hesitated to label people who have such controllable long-term illnesses as unhealthy.

> *"My father walks three or four kilometres a day and he has diabetes, he does these things to keep himself healthy."*

However, it was thought by some that there is a line past which 'managing illness' becomes 'being unwell', particularly where people have to take a large amount of medication every day in order to stay alive. Some thought this was particularly a problem for the elderly. When managing an illness starts to affect quality of life those who are affected do not feel healthy; one participant spoke of

how having to inject himself made him feel less healthy, and how he would prefer to be able to take a pill.

Some spoke of freedom from specific illnesses as being important. This was usually where they or a member of their family had been seriously affected by an illness such as cancer or diabetes.

It was thought that sometimes, people abuse or overuse medication these days, and that our ability to manage illness by self-medicating can sometimes lead to us becoming less healthy, for example, when we take painkillers at the slightest hint of a headache. This idea of advances in health and medications available having unintended consequences was present throughout the day, as mentioned above. It played into a wider sense among participants (seen also in other research on science) that scientists should think more about the social outcomes of their research as well as the scientific findings.

Maintaining health

Being healthy was not seen as having perfect physical health. In fact, a small number suggested that our expectations of health are too high in developed countries, and that we focus on perfect wellbeing which can itself be unhealthy.

> *"There are too many expectations [among people in countries like Britain] of what they think they should have – people aren't used to any kind of hardship. People aren't used to difficulties with health"*

Others thought that high expectations were a good thing; saying that in the past you could be expect to be dead by 30, but scientific advances mean that this is no longer the case.

Maintaining health meant being able to go about your life as you want; being able to work, socialise, look after a family and carry out recreational activities. Having the physical ability to do these things would then lead to better mental health, happiness and wellbeing.

> *"Being healthy is enjoying life with no medical hang-ups"*

It was thought to be important to be able to sleep enough in order to maintain both physical and mental health, and some participants thought that this was a serious issue in society.

Avoiding unhealthy habits

Drinking less and not smoking were mentioned in passing as important to maintaining personal healthiness by a few people, but almost in passing, or because they thought they should.

> *"Smoking affects everything; longevity, cancer, the environment"*

> *"You might as well mention drinking then"*

This may reflect a view that these lifestyle habits, while harmful to health, are not something that can easily be changed. A number of participants in one group later focussed on "tackling addiction" to smoking and drinking as a key health challenge, rather than reducing levels of these activities throughout society.

2.2 What would a healthy society look like?

Maintaining health through life

Generally, participants thought that our current average lifespan was a reasonable expectation for a healthy society. A healthy society would not be one where people lived a lot longer than they do now. However, while they did not use the word ''healthspan'', the concept was advocated by many participants. They thought a healthy society would be one in which people maintained their health in old age, and certainly didn't see any point in extending longevity without also ensuring that the elderly remained healthy and active.

> *"What's the point of being 85 and walking with a frame and wetting yourself?"*

In one group there was vigorous debate about what a 'natural' lifespan was, (drawing in historical examples of shorter life spans of the past, and comparing lifespan in the West with the developing world). This ranged from those who thought that dying in ones 80s is *"natural"* to those who thought that *"people should live as long as they can"*.

However, the overall view was that helping old people to be active - and as a result contribute to society - would be an important part of a healthy society. The social impacts of this were thought to be of particular importance, in particular decreased strain on the NHS, the social care system and the relatives of the those who are elderly and in need of care.

A small number of participants drew out a further, more subtle issue. Our own desire for longer lives was seen in the context of wider problems facing the world, such as climate change, depleting resources and overpopulation. For this minority, any research which had the outcome of extending human life many years might in itself be harmful. It could potentially work against the ends of other areas of science. For example, investigating biofuels to reduce oil dependence might not help us if people on the planet stay alive longer and consume more resources. This all underlines the importance of the ethical dimension for participants.

Having the right knowledge and resources for health

A healthy society was thought, spontaneously, to be one in which all people had access to three things:

1) Knowledge about how to maintain their own health. This meant that everyone should know the basic information about what to do. Information should not be confusing and there should be more consistent advice around diet in particular and how to maintain a healthy lifestyle more generally.

   "It comes down to education. I don't think children are educated about it enough"

   Education needs were thought to differ across life-stage. Participants noted that young people need to know more about diet in order to help them avoid obesity, whereas adults and those in middle age need to know more about how to maintain their mental health, manage stress and remain healthy even when other priorities intrude. Participants also thought in future it would be important to develop more personalised information for each

individual about their own health needs, as more is understood about how our genes affect our health throughout our lives.

2) Resources for health, especially healthy food. Once people understand what is healthy for them they need to acquire it in a way that is not hampered by their own circumstances e.g. lack of access to facilities for exercising, or not living near a supermarket.

3) The medication or medical treatment that they need to manage illnesses or maintain a current state of health. Postcode lotteries in healthcare and inadequate funding of medication for long term conditions were mentioned as barriers to a more healthy society.

While it was acknowledged that not all people would make the right choices to be as healthy as they can possibly be in such a society, all of this knowledge and resource was thought to be important to enable the possibility of a more healthy society.

"There needs to be an opportunity to be healthy for everyone"

Reducing illness

"Getting rid of disease" was thought to be important by a small number, but this was not dwelt on by many. We suggest this is perhaps because other health issues seemed more immediate to those who had not experienced severe disease. When discussing personal health, a few noted that advances in immunology have allowed society as a whole to become healthier and a few mentioned getting their children vaccinated. However developing or rolling out *new* vaccinations was not spontaneously mentioned as an aspect of good physical health. When thinking about society, a few started to think along these lines though, and mentioned the control of new infectious diseases such as avian flu. However while participants understood that controlling infectious illnesses at a population level is important to ensuring a healthy society, it was not top of mind as it was assumed that we already have the knowledge and the tools to do this. General polling tells us that this assumption is not limited to those who took part in this research; concerns around public health issues tend to 'spike' when there are well-publicised crises such as BSE and avian flu, but remain negligible at other times.

Reducing *mental* illness was singled out by one group in particular. They thought that a healthy society would be one in which people were less stressed, which would mean less strain on the health service and have the added benefit of reducing employment days off and thus be good for the economy.

A healthy environment

The environment in which we all live in was seen as an important factor by participants, particularly those on one table. Living in a hygienic environment was seen as important for health and it was acknowledged that we are fortunate to live in a country with clean drinking water where water borne diseases are extremely rare. Pollution was seen as a big contributor to health worldwide because of its effects on the air we breathe, the ozone layer and the melting of the ice caps which were seen to have long term effects.

"I think environmental pollution will have the biggest impact on the health of the UK. It's not just this country, it's a global thing. It affects everyone."

2.3 Responsibility for a healthy society

Individuals were thought to have primary responsibility for their own health, but participants were keen to stress the role of society and the state in ensuring that people have the tools to allow them to take responsibility.

Three ways of enabling people's responsibility were suggested. The first two address the issue of giving people the knowledge to maintain their own health

1) Helping people to understand their genetic inheritance and their own predisposition to certain diseases or conditions. It was thought that people having this understanding would help them avoid developing serious illnesses as a result of conditions that can be managed throughout their lives (e.g. hypertension). It was also thought that it would give people better peace of mind by helping them to understand what is within and what is outside of their own control:

   "Then you'd know in your mind why you've got to take medication and can't do something."

2) People can also be enabled through education about health. As mentioned in the discussion above about a healthy society, this was an important theme in the discussions throughout the day. It was a strongly held view by participants that some people still do not understand the risks attached to poor lifestyle choices and need better education.

   "McDonalds is cheap and quick and they see everyone else eating it and think that's what they should do."

3) Ensuring fair access to the ingredients of a healthy lifestyle (good food, opportunities to keep fit, medication and healthcare where necessary). This could include ensuring that the environment is equally conducive to health in all parts of the country.

When illness strikes, the state is thought to have primary responsibility for ensuring people can recover where possible. This seemed to be a background assumption and was not discussed in detail. Finally, businesses were thought to have some responsibility for not undermining people's own efforts to live more healthily.

3. Talking about health and science: the social context

Some underlying beliefs about health and social and cultural contexts influenced the discussion:

- In both table discussions, participants did not recognise how much of the health knowledge they described as 'common sense' was based on scientific research. This meant that they tended to **undervalue the role of future science** in creating an even more healthy society, and they saw health problems as economic and social issues, rather than scientific ones.
- People supported the idea of reducing disease and disability for older people and increasing their ability to be independent, they interpreted the terms *ageing* as growing old. Getting old and dying was also seen as natural and participants did not want science to try and extend lifespan indefinitely. This affected the way some weighed up the benefits and drawbacks of any research into the process of **ageing**.
- Participants had a sense that our current state of knowledge is a **safe status quo** and that future scientific discoveries might have **unintended consequences**. This is a common theme often found in deliberation on science and health issues with the general public.
- Participants felt health was subjective, and that **every individual is responsible** for his or her own health. Some participants were reluctant to say that specific lifestyle choices always impact health, in case this was seen as judgemental to others. Good health was seen as different for different people, and defined as 'how capable you are of living the life you want to' rather than an objective standard.
- Participants saw health challenges as influenced by wider **social and political challenges.** They felt that even basic bioscience research should not avoid addressing the moral and ethical considerations of equity in health outcomes.

Participants' spontaneous views were influenced by **underlying beliefs about health** and some **social and cultural contexts** which influenced the discussion. These are outlined in this section. Sometimes, these were not necessarily explicitly stated by participants, but revealed by what participants prioritised, what they *didn't* say, and how they overall responded to probes, stimulus and questions during the deliberation. It is vital to understand participants' comments in the light of these beliefs and contexts; looking at their contributions through this lens helps us understand some of the stances taken in the discussion of challenges and priorities, and why these did not always match up with what participants told us they thought about what it means to be 'healthy'.

It is important to note that not every participant held all the beliefs outlined below, but that throughout the analysis researchers found that at an overall level, these beliefs and contextual issues appeared to be driving responses.

3.1 "We know about health already"

To participants, many of our currently widely accepted views on health - such as needing to eat several portions of fresh fruit and vegetables a day to have a healthy diet, or washing hands – were seen as "common sense" rather than as the result of earlier scientific endeavour. The question of how to live a generally healthy life was thought by many to have been resolved at the broadest level, although some did think that communications around the specifics of how to eat well could be confusing (see section 2.1, 'Healthy diet').

This was particularly true for issues around a "healthy lifestyle". Participants spoke in detail about the things that they knew they needed to do to maintain a healthy lifestyle (eat well, get enough sleep, avoid stress) but did not speak about how we, as a society, have gained this understanding of how to live healthily. The idea that we do not, as yet, fully understand how the healthy human body works, and what *maintains* health, was difficult to comprehend, and could perhaps have been introduced earlier in the day to help facilitate more focussed discussion. By contrast, and perhaps as a result of publicity in this area, many were convinced of the value of research into *disease* and its causes. This attitude changed slightly throughout the day as participants learned more about BBSRC's work, but made it difficult for some to imagine the possibilities of basic bioscience and the potential for our current "common sense" views about health and healthiness to be changed.

3.2 Differing understanding of ageing

As outlined in section 2, people supported the idea of reducing disease and disability for older people and increasing their ability to be independent. However, ageing was a contested definition throughout the workshop particularly for one group who spent a long time debating it. Many participants seemed to define it as getting old, rather than a process by which the body starts to degenerate.

> *"You can't prevent the population from ageing unless you go to extreme measures"*

> *"There's a cycle of life, what's the point of keeping people alive?"*

For these people ageing and dying were difficult to separate out. As a result, ageing is seen as the start of the process of dying, and, as everybody dies, it was seen as "natural" and perhaps not something we, as a society, should be trying to stop or postpone indefinitely. These participants did not therefore see ageing as a problem in itself, but rather saw the diseases that come with age as the problem; while not fully making the link between slower ageing and lessened susceptibility to disease.

Sometimes different participants, or the participants and moderators, talked at cross purposes when discussing ageing as they had different definitions of the term in mind. As a result, some participants found some of the examples of BBSRC funded research in the stimulus materials were difficult to understand, as they had a different understanding of the concept of ageing than that used by BBSRC. This is a lesson for future public engagement or research in this area.

Views around the social impacts of ageing were also important in shaping discussions. Much discussion focussed on how to limit the effects of an ageing society on the economy and on carers

rather than on the potential to use science to improve the lives of those who are ageing (although this was mentioned, see section 2.2.).

Some raised the potential problem of overpopulation, and said that this was a more significant problem on a global scale and therefore was at odds with any Western efforts to increase longevity.

3.3 "We should be careful what we meddle with"

There was some evidence of an underlying assumption, held by a number of participants, that our current state of life and knowledge is a "natural" status quo and we do not need additional changes to the ways we live. Some participants gave examples of unintended negative consequences from more knowledge such as the overuse of antibiotics leading to resistance, overuse of over-the-counter painkillers leading to other health conditions, and an obsession with hygiene leading to increased asthma rates.

> *"We have vaccines, disinfectants. People don't build up an immune system. We've gone that way that everything is super clean and my grandchildren are always ill, always full of cold".*

3.4 "Everybody's different"

Participants broadly held the view that disease was caused by a mixture of lifestyle factors, genetic predisposition, and chance, and that each person's health outcomes in life would differ accordingly.

For example, when discussing the different effects certain lifestyle choices have on different people, some spoke of people they saw as exceptions to the 'rules' such as those who eat large amounts of food or very unhealthy food yet remain slim and apparently healthy, or relatives who died young despite leading a healthy life. Some took this as proof that general advice on health matters, and in particular advice on how to maintain a healthy lifestyle is inherently untrustworthy, given the perceived unpredictability of health outcomes at an individual level. However, some developed this thought to point out that we could each benefit from better individual understanding of our own bodies and genetic inheritance (and that society could benefit too).

This belief that everyone is different, making different choices and having different responses to health challenges, also affected some of the discussions later in the day about which health challenges we should prioritise. Some argued that we should not necessarily prioritise the health of people who might be more susceptible to lifestyle diseases. This seemed to be an argument drawing on ideas of **fairness**. While participants found it acceptable to focus on the bioscience underlying particular diseases (such as diabetes or lung cancer) some felt it would be unfair to place the focus on, for example, the *health of smokers,* or *the health of obese people*. This was for two reasons: first because these people were felt to be able to affect their own outcomes through their own choices without need for more scientific research; second, because there may be other people who develop the same diseases but are not smokers or obese, and they might be forgotten.

There was a further assumption that wellbeing is predicated on **capability**; that is, the different ability of each person to achieve the outcomes they particularly want from life. This capability is affected by both personal and environmental factors. For most, capability to have wellbeing was seen as the ability to go about your daily life without being unduly hampered by a physical or mental

ailment, or social or environmental constraints. But this was relative, and some participants were keen to point out that there cannot be one overarching definition of capability, as it is dependent on two things. The first is what one *values* the ability to do; thus wellbeing might be linked to, for example, being able to garden or to play with your children. The second is what one is *used to* having the ability to do i.e. wellbeing is the ability to maintain routines and the lifestyle that you have always had. This potentially reflects the cultural trend towards people with disabilities being treated more equally with others in society; disabilities are now described not as a *lack* but as a *difference*. It was significant that participants in the workshop drew a parallel between judging someone to be 'ill' and judging someone to be 'disabled', using the example of Paralympic athletes whose capabilities are different from what might be deemed the 'norm' but are still healthy and able, and more physically fit, by many yardsticks, than many without disabilities.

3.5 "We should all have access to health"

When discussing health, many participants spoke of the current lack of equality in health outcomes. Many pointed out that economic and environmental factors have a strong role to play in the prevention of ill-health, as people's access to the components of a good diet or an active lifestyle can be constrained. The effect of the current economic downturn and unemployment levels were also mentioned as an important cause of "stress" and mental ill health. Some spoke of the lack of equal access to health treatment, the "postcode lottery" and financial worries forcing people to forego essential medication to manage health outcomes. This is related to wider concerns about profits within the healthcare sector, through the provision of private healthcare and medication:

"You've got to look at the pharmaceutical companies that make loads of money"

As a result of these concerns, participants found it almost impossible to speak about health challenges without focussing on the social context in which those challenges are faced. While a small number spoke of the value of "blue sky" science research, for the most part the potential outcomes of any work in the BBUH area were the central focus of any discussion i.e. participants focused on solutions and societal implications rather than challenges.

4. Key Health Challenges

The key challenges outlined by participants were:

- Meeting the needs of different groups through life: -
    - childhood education on diet, fitness and in particular how to avoid obesity
    - helping working-age people avoid the effects of stress and maintain their health when busy with a range of complex responsibilities
    - helping the elderly live independent lives as long as possible.
- Preventing and curing diseases; in particular the most serious and impactful e.g. Parkinson's, Alzheimer's, stroke, cancer. (NB cancer was also felt to be already being tackled by considerable investment, so while it was seen as a major illness, opinion was divided as to whether it was a future 'challenge').
- Understanding genetic inheritance and the effects of the environment on the individual
- Understanding the causes of unhealthy behaviours or addictions (expressed more strongly in one sub-group than the other).

When participants heard about BBSRC and its remit, particularly the BBUH strand, they agreed that BBSRC could help society meet its major health challenges by focussing on gaining a better understanding of how health is maintained, how diseases are caused and how environmental and lifestyle and genetic factors impact on health. Areas of work that participants also suggested as relevant included: understanding genetic inheritance, learning how addictions work, and investigating how viral epidemics move through a population.

This reflected the fact that they wanted BBSRC to tackle the kinds of problems around health which they felt needed a scientific solution (as opposed to an economic or educational solution).

When asked to distil these ideas about personal health and a healthy society into the **key health challenges** facing us today, the emphasis changed.

Views varied and the discussions on different tables took different angles and developed differently. While the health issues discussed earlier in the day and outlined in Section 2 were seen as important for individuals and for society, when asked to consider 'challenges', those at one table included only those things that they felt *could and should be overcome by concerted action at a societal level*. Those at the other table avoided talking about challenges at all, moving quickly to talking about solutions, and especially bringing up issues such as the education of young people. This reflected the fact that they saw many health challenges as societal, rather than scientific.

When presented with **BBSRC's role** and the **BBUH stream**, priorities shifted again. Few spontaneously linked BBSRC's remit to the definitions of health they had been discussing earlier in the day. This was for two main reasons, both described earlier in the report:

1) They thought that we already know how to ensure a healthy society in many areas, but we do not need more science to help us do this. Instead we need to communicate what is known to the public; and BBSRC should be focusing on 'new' problems.

   "I think the ones on obesity and overeating have been flogged to death so when you hear something new it's much more interesting."

2) They undervalued the knowledge that we currently have in these areas i.e. how much of our common sense views on healthy lifestyles rest on prior scientific research and how much those views could be changed by new or greater understanding of basic bioscience.

   "The main challenge is getting across practical common sense like not eating too much chocolate."

4.1 What are the key challenges?

The key challenges outlined by participants are presented below.

Maintaining health throughout life

Life stage was seen by some participants as an important starting point to frame their strategic priorities as they felt different age groups have different needs. The challenge was seen to be *educational* for young people, *social* for middle aged people and a mixture of *scientific* and *social* for older people.

Education was emphasised, particularly for the younger years to ensure that what is "healthy" is taught to the next generation. The purpose of this would be to avoid child obesity. From this we can probably extrapolate that decreasing levels of obesity in society was seen as a key health challenge by at least some of the participants; though participants tended to shy away from saying this explicitly. Body language and group dynamics would suggest that there was an effort made not to offend members of the group who were themselves obese. There were a lot of comments through the day designed to show other participants that the speaker is not being judgemental and is aware that obesity is not necessarily a simple thing.

"How much you weigh isn't the main thing in health, my husband plays sport and he would still be considered obese because of his weight!"

Education would mean a wide variety of things for children, including educating them on diet, nutrition and how to prepare healthy food cheaply. Providing leisure centres was also suggested for younger age groups to tackle a number of societal problems in the future such as obesity, infections and emotional health.

Participants felt that middle aged groups needed support for mental health issues, and also for other problems of a stressful life such as addictions or stress caused by losing a job or financial worries such as concerns over pensions.

Health strategy for the older age group focused on diseases mentioned throughout the day that were related to old age such as rheumatism, Alzheimer's and Parkinson's, as well as how we would care and support families caring for the elderly. Helping older people maintain their capability for health

was seen as important both to the individual and to prevent a financial burden on middle aged people.

> *"If that person wants to stay at home and not stay in a care home they need social services to help them."*

However, some participants were a bit more divided over whether prolonging the "healthspan" of society would benefit the young generation in the future. Some argued that a longer "healthspan" would mean older people would contribute to society more effectively.

> *"If you're fit and healthy at 75, not retired, and fit, paying taxes, you're not on a pension; you could be a doctor looking after children!"*

Some younger participants then worried that the unintended consequence of this would be that older people might then take opportunities and jobs from younger people.

Preventing and curing diseases

While diseases were only discussed in passing when discussing what "healthy" means on a personal level, they were seen as very important when discussing the key health challenges faced by society. Participants repeatedly mentioned the need to "tackle extreme diseases", especially the 'big four' of cancer, Alzheimer's, Parkinson's and stroke. These were seen as the most prevalent, and some had had personal or family experiences of one of these illnesses. Cancer was also mentioned as one of the most serious diseases, though all agreed that there had been significant advances in treatment in recent years.

> *"I don't think there is enough research yet in cancer, Alzheimer's, Parkinson's. I'm really worried about cancer, if anything happens, I've got kids...Because it's 1 in 3 still."*

Also important were the other diseases of age which were seen as less "serious" but still had a large impact on people's lives for example rheumatism and arthritis. Genetic diseases such as muscular dystrophy were not discussed at length but seen as important due to the severe effects such illnesses can have on individual's lives. Diabetes was also mentioned but there was debate about how important this was as a challenge, especially in comparison to the other diseases, because it was perceived to be partly a matter for individual choice, and partly something that could be easily controlled; therefore not affecting the individual's capability for wellbeing so much.

Tackling diseases was thought to include:

1) Prevention, where possible, through education about lifestyle factors that contribute to contracting these diseases. At this stage there was little recognition that it might be important to do more research about the effects of lifestyle and environmental factors on propensity to contract particular diseases. It was presumed that we already know enough about this. Encouraging people to take up vaccinations that already exist was thought to be a challenge in this area, as there was a sense that this is increasingly a problem.

2) The enabling of early diagnosis through education about symptoms and screening. The current drive on screening for bowel cancer was highlighted as a good example of this;

participants pointed out that no one knew very much about this issue until a few years ago and now they feel much better informed. Encouraging regular health checks were also mentioned as a simple way of helping to enable early diagnosis, or simply advice on illness avoidance.

3) Searching for a cure or vaccinations. While this was not discussed in detail as participants had little knowledge of the science in these areas, they assumed that this would be the key challenge, especially for diseases like cancer. Some thought that there has already been a huge amount of progress in this area, but others thought that there is still not enough work being done or money allocated.

The balance of these things seemed to depend on how "lifestyle related" the illness was perceived to be; in the case of diabetes, it was thought that more effort should be placed on prevention. Some took a more extreme view and thought that diseases that are lifestyle related should not be seen as key health challenges for society.

> *"Things you can't control yourself are more important."*

Ultimately, a more nuanced view emerged as participants discussed the difficulty in unravelling the exact causes of ill health in every individual: the contribution of socioeconomic inequality to ill health. This was related to the underlying concerns around equity and fairness; it was thought that prioritising health challenges by their causes (i.e. lifestyle, genetic choices or chance) was potentially unfair and unnecessarily divisive.

Understanding genetic inheritance and effects of the environment

While participants were unsure what the possibilities are in this area, they had a broad sense that there is more to be learned around how an individual's genetic inheritance can contribute to their health or ill-health throughout their life. Testing for specific diseases was mentioned by some, and a few had personal experience of this:

> *"I think knowing you're genetically disposed to get something is great. If your mother gets breast cancer and then you get tested you can know if you've got the gene."*

However, it was thought that there is potential for knowing much more and allowing people to create complete tailored approaches to maintaining their own health. It was thought that this is a good use of money as it could save on the cost of treating diseases if it helps some people adopt the appropriate lifestyle to avoid them:

> *"In the long term they're going to spend a lot more money on treating disease than if they had tackled it in the DNA [i.e. helped people identify their propensity to genetic disease and how to avoid it through genetic profiling]"*

Some also made the point that our environment also plays a large part in determining our health outcomes, and thought that key health challenges would be to understand how this works, and how to improve the environment so it promotes a healthier society.

Understanding the causes of unhealthy behaviours or addictions

There was vigorous debate around this issue, particularly with reference to obesity. Participants, particularly in one group, were divided as to whether the causes were lifestyle or genetic. Some just did not believe that there are any causes of adult obesity other than a lack of willpower. A few had a nuanced view and tried to persuade others of the importance of more understanding of biological mechanisms in this area:

> *"I know there has been research that suggests that if you slow the rate at which you eat a meal that increases the rate at which the body tells the brain you are full. It's not necessarily a simple issue."*

There was more sympathy with the idea that we need to know more about other addictions, such as nicotine and alcohol. This was sometimes as a result of personal experience, but perhaps due to wider societal and media discourse around these issues, where alcoholism in particular is often referred to as a disease.

> *"I think most of it is mental anyway....cellular pathways in the brain. It would be genetically determined."*

There was some willingness to countenance the argument that there might be a combination of biological factors and willpower at work. In any case, some participants decided that it might be important to know more, to have a better informed debate about these issues, but that this challenge was less important than disease prevention.

4.2 Views on BBSRC's work and BBUH

A representative from BBSRC gave a short presentation about halfway through the public workshop, after participants had spent time discussing and refining their key challenges. They were also given 13 flashcards with example of BBSRC funded projects and their applications to look at and discuss (see Annex C). Participants said that they found BBSRC's remit quite easy to understand, and their discussions throughout the rest of the day indicated that they had interpreted it accurately (though more time spent on understanding the funding process and the nuances of BBUH would likely have created some useful findings on strategy).

There were some questions about the timescales around BBSRC funded research, and it seemed that not all participants fully appreciated how long it might take between BBSRC funding a research project to when there might be information, medication or other products available to help them or others become more healthy. Some thought that some of the research examples would have immediate impacts.

> *"The Alzheimer's research [referring to the flashcard on BBSRC funded research into nerve-wiring which points to potential future applications in neurodegenerative diseases] will help people now and in the future"*

Participants were particularly interested in the scope of BBSRC's work; the explanation that they are trying to understand the mechanics of how the body works when it is healthy helped to clear up any

confusion. The analogy of a car mechanic learning about how cars work before learning how to fix them was especially effective in helping to explain this.

Some questioned the emphasis on *ageing* research (as outlined in the BBSRC presentation). Prior to this part of the dialogue, while ageing had been seen as important, it never emerged as the most important thing, either when discussing personal health or the health issues facing society (as discussed in chapter 3). When a BBSRC representative pointed out that quite a lot of this basic bioscience can have many applications (and not just application for the particular problem or area that was originally researched), participants were much more comfortable with some of the examples of ageing research that were presented.

4.3 What can BBSRC do?

After the presentation from BBSRC, one group of participants immediately noted that it would be outside BBSRC's remit to fund research that focussed solely on **specific diseases**, and voted to remove these from their list of health challenges. However, it was thought that some of the research examples, such as that on 'how our nervous system develops' (see appendices for research examples) would eventually help us to develop cures or better treatments for specific diseases such as Alzheimer's and strokes. This was thought to be a good use of public money due to the potential savings for the NHS.

Genetic inheritance was a key area where participants thought that BBSRC funded research could help us address the challenges, as it was easy for participants to see how studying basic bioscience could help us understand genes. It may be that this was also influenced by the fact that a lot of advancements in genetic testing have happened in recent years and thus is top of mind for the public.

Some participants were of the opinion that **understanding addictions and unhealthy behaviours** is an area where BBSRC funded basic bioscience might be very important. As one participant put it, this kind of research should be undertaken when things seem like they might be common sense but there is actually more to it:

> *"That's the role of science; to look at issues that might seem obvious but aren't"*

Participants also thought that BBSRC research would be important in helping to tackle two challenges that hadn't before been discussed at length spontaneously. Those were **viral infections**, where it was thought that greater research could help us understand how viruses operate and mutate; and the **environment**, and working out how different factors in our environment contribute to good or ill health. However, it was noted that none of the examples of BBSRC research presented related to the environment.

In addition, some of the specific examples of research on flashcards touched on health issues that hadn't arisen before in the dialogue. Several participants noted in particular the example of an artificial trachea, and thought that this was the kind of research that BBSRC should be doing (i.e. tissue engineering in general):

> *"That's a good one – you stop people dying at 20 because they are on the donor list"*

This related to a more general view that BBSRC funds should be aimed at **trying to solve problems for which there are no other solutions**. Where solutions already exist, more emphasis should be placed on ensuring that they are put into place or people are better informed about them, and participants pointed out that this is not the remit of BBSRC.

After discussion, participants generally agreed that BBSRC can help society meet its major health challenges by focussing on gaining a better understanding of **how health is maintained, how diseases are caused and how environmental and lifestyle and genetic factors impact on health**. Participants stressed that this should go along with making the most of the knowledge we already have – for instance, educating people about healthy eating.

It was thought that making decisions about how to prioritise research to ensure that the right challenges are being met would be a very difficult task. The general feeling seemed to be that the experts were to be trusted to make the decisions on prioritisation, as they understand the research and the scientific merits the best. However, participants did have some views on the overall strategic direction BBSRC should follow, which is outlined in the next section.

5. Testing different strategic principles

In the last section of the day participants were given stimulus designed to push them to discuss the benefits and drawbacks of some different approaches to strategy for BBSRC. The stimulus was two contrasting draft strategic 'vision statements' for BBSRC's BBUH strand. It was made clear when the statements were presented that *neither* statement was an actual strategy statement but was hypothetical, designed to prompt discussion and argument. The statements were used as tools to help participants make tradeoffs between different strategic approaches. This enabled us to draw out arguments used in support of one or other approach, and understand the *values and principles* which were ultimately important to people.

In this section we describe participant reactions to the statements, then summarise the principles which the discussion reveals. The summary is based on analysis of the conversation at this point in the day, and also draws in key learnings from the rest of the day (as set out in the earlier chapters of this report).

5.1 Reaction to statements

The participants were shown two strategy statements for BBSRC's BBUH strand which were quite different from one another. One was very broad; 'BBSRC is to fund anything that has the potential to improve health/wellbeing'. The other was more restricted; 'BBSRC is to fund research that it very likely to improve health outcomes for a bounded number of key health challenges e.g. ageing'.

1. **BBSRC is to fund anything that has the potential to improve health or wellbeing**

Some liked that BBSRC would not be constrained and thought this would enable the organisation to choose projects, on their own merits, across a wide area. They pointed out that that sometimes you have to do research in a wide variety of areas to get functional research that can help improve health and wellbeing, and that it is not always possible to predict at an early stage which projects will bear fruit. The focus on improvement to health in general was also liked, as was the word 'wellbeing' which played into participants' feeling that mental as well as physical health is important.

However, opinion was divided. Some thought that this statement was too ambitious and might mean that BBSRC would spread its resources too thinly. Though the statement does not say that *everything will be funded*, just that *anything can be*, some participants still interpreted the broadness as promising to fund a wide range of projects. They were then worried that this broad remit could affect the stringency of the quality assessment BBSRC would use to decide on funding.

> *"They should tone it down a bit; they're just saying they'll pump money into anything."*

Other participants disagreed, saying that just because projects from many areas of science *could* be funded, this would not stop BBSRC carefully assessing the validity of each individual project. At this point, some objected to other words in the strategy, namely "health"; asking how health would be defined when implementing this strategy and how BBSRC would make a decision about the definition.

These comments reflected an underlying concern that participants had with this broad approach; where terms are not restricted at all, how should BBSRC prioritise what to invest in? Participants understood that, as money would be finite, BBSRC would still need to make decisions on funding one piece of research over another even where both fall under this broad remit of potentially improving health or wellbeing. Therefore how to prioritise became a consideration. Participants discussed the following ways to prioritise:

- Check and ensure that BBSRC are building on, not duplicating research that other countries or organisations had done.
- Choose ways to measure the "potential to improve health or wellbeing"; for example, funding things that helped the greatest number of people; research which had the highest likelihood of success; things that help the most seriously ill; or things that help the youngest, oldest, or poorest people.

Each of these principles is discussed in more detail in the section below on principles.

2. BBSRC is to fund research that it very likely to improve health outcomes for a bounded number of key health challenges e.g. ageing

Some participants preferred this statement because focusing on research that is 'very likely to improve health outcomes' sounded more positive even though this would be for a bounded number of key health challenges. While they were unsure about what these key health challenges should be, they thought that by focusing on a certain number within a set amount of time there would be a better chance of improving health outcomes.

> *"They can focus on specific things, hopefully when they've sorted out specific issues, they can them move on to a different set."*

Some liked this vision because they saw it as a way to help BBSRC fund research that helps the greatest number of people, or research which has the highest likelihood of successful future application. Those that preferred this second strategic vision also thought that the other principles should still be built into funding decisions.

This strategic vision also proved divisive, with a few on each of the tables raising objections. Those that preferred the first statement thought that research *only* into a bounded number of challenges meant some groups of people might not benefit.

> *"As people age there's a gap between people's age and their quality of life. So now it's deciding what those things are that fit into that gap. But that gap only takes in some people, or some issues."*

Those who took this position thought that it was important to fund some research where the potential application is not totally clear from the outset, and which is not totally focused on one group of people or one challenge, as applications may only become clear after further development work. Participants did tend to forget at this point that BBSRC also funds other more 'blue sky' areas of research, and when reminded agreed that they had simply wanted to ensure that this type of research is preserved.

5.2 The principles and themes underlying these strategies

There was an assumption that BBSRC has to limit itself in funding decisions because there will always be a finite amount of financial resources. Of course the process is not as simple as excluding some types of research and including others, and participants did not always have an informed view on the funding process or the way that decisions would be made; but given the constraints of a short session discussing this, they had clear views on the kinds of principles which could be applied. There was little overall consensus on a bounded or unbounded, strategic direction, but there was consensus on the key principles.

Towards the end of the discussion facilitators drew up summaries of some of the key phrases used during the discussions, and tested these additional statements as strategic directions also; we include responses to these here where relevant.

Flexibility

Overall, participants felt the strategy should be as **flexible** as possible to provide a direction for BBSRC that could be adaptable over time to reflect different needs in society.

Fund "the potential to improve health or wellbeing"

Participants felt research should be funded which has the *"potential to improve health or wellbeing";* and over half felt this statement seemed sufficiently broad and would not overly limit BBSRC in their freedom to fund a broad range of research. The participants' choice of this statement over the others seemed to indicate that many of them had developed an understanding throughout the day that there is still work to be done on understanding health, and not just illness.

> *"They need to understand how it [the body] works deeply before they can understand other stuff."*

But different ways to judge potential

However, they saw various ways to **judge** what this potential might be. Each of these funding strategies was seen as potentially legitimate, but each might have positive and negative implications which should be considered.

Many participants spontaneously mentioned that helping "***the greatest number of people"*** that could be potentially affected by serious diseases would be the principle they would apply when deciding on funding. This seemed to be important to get a broad and fair remit for BBSRC so that their research could help as many people as possible in the future.

> *"You've got to look at how many people it affects and the likelihood that the research will be able to do something about it."*

However, there were some concerns about this; particularly that it would be unfair to those who have less common health problems.

> *"If you're just researching things that affect everyone then you wouldn't be researching things like a rare cancer because that doesn't affect everyone"*

While participants would like BBSRC to think about the potential for helping the greatest number of people at an overall strategic level, they did not think that this would need to be a consideration for every piece of research. Some thought that a **very strong potential for successful application** or **scientific excellence** would sometimes trump this principle when deciding between specific pieces of research.

> *"It's all about the quality of the research; I don't think anything should be precluded [from being considered for funding]"*

Not just one group in society

Some participants liked the phrase *"BBSRC should invest in research which improves quality of life"*, as it suggested research which would help people to live a **good, healthy life rather than a longer life**, and would not be restricted to research which led to interventions only for older people, thus would help more people overall. However they thought that defining quality of life would be difficult.

Most saw scope for individual projects which investigated areas of health relevant to the **youngest, oldest, or poorest people,** though were also concerned that if BBSRC chooses to focus on a demographic group, rather than on health issues, this might mean that fewer people would benefit from the research.

> *"Potentially you shouldn't prioritise any one generation, not young people, and you should focus on diseases rather than ageing generally. Perhaps age is a bit of a red herring."*

'Ageing' research, of course, does not refer only to research which benefits older people. Some did have this misconception. The key here, though, is the principle that research should not benefit only one group. Through the discussion, participants did acknowledge that the research would be into *health* rather than *illness*. They thought that maybe then everyone would benefit, even from projects which looked at the ageing process towards the end of life, because everyone is invested in health. For this reason they liked the phrase "*research which has potential to improve our understanding of how health works".* Participants appreciated that this left room to do different kinds of research: some on health issues that affect everyone; some on issues that affect individual groups.

Fairness

Participants wanted BBSRC to consider the principle of **equality** when choosing what to fund. All felt strongly that BBSRC should strive for **fairness**. There were various contrasting examples given of what would be fair. Some felt that focusing on diseases relating to 'lifestyle illnesses' was discriminatory. One hypothetical example was given, of a person who beats obesity through sheer willpower. This member of society has no need of research into the physiological mechanism of diet. The participant who invented this example argued that the funding could have been put into researching some other aspect of health, which might benefit our hypothetical person more. Some people put a counter argument to this, which was that society should *not* think about the causes of different illnesses. Just as someone who breaks their leg doing sport is not refused medical treatment because they have 'brought it on themselves', participants felt that health research would

be fairer if it ignores the causes of illness or problems and focuses on the challenges needing to be addressed.

A further angle on this is that participants were concerned that any bounded vision would **discriminate** against people who have illnesses or health issues outside that boundary.

Many liked the phrase *"research that improves the ability of each individual to live healthy lives"* as it sounded positive, didn't limit all the money available to one area and didn't make promises that couldn't be kept.

Focus on areas where science is the answer

Most thought that BBSRC research should focus on **areas where there are no other solutions to the health problem** already existing. Many liked the phrase *"BBSRC should invest in research where biology is the only answer to the problem i.e. where there are no other ways to solve it".* This helped to focus attention on the areas where BBSRC is best placed to help. They felt the goal should be to enable people to help themselves gain greater control over their health in ways that they cannot already do so. Participants were very averse to any sort of quick fix solutions that could come out of the research that would lead to people being relieved of their personal responsibility for ensuring their own health, for example they would think that funding research that could potentially lead to, for example, a magic weight loss pill should not be a priority for BBSRC.

As a further example of this, participants tended not to like the phrase *"BBSRC should invest in research which ensures that people have their basic health needs met".* Most participants argued that we already have the tools available to ensure our basic healthy needs are met and that this is a political issue, not a scientific one. This underlines the fact that the word 'basic' may need explaining more when in the context of health (which would be worth investigating more if there is a need to explore in more detail the area of 'basic bioscience underlying health').

Consider the context

Finally, a broad principle that seemed to underlie all of the discussion about strategy was that BBSRC should **take context and potential outcomes seriously** when evaluating and deciding between different proposals for funding. Participants' discussions throughout the day indicated that they do not think about their personal health in a vacuum, but as in relation to their social, environmental and economic context and as something that can have an impact on society. They expect scientists to think about their work in this way, and BBSRC to think about its funding decisions in this way too, considering how the potential outcomes of the research might play out in context, rather than focussing solely on the scientific implications.

Annex A: Breakdown of participant typologies

Category	Subgroup	Number of participants
Age	18-34	7
	35-54	9
	55+	5
Social grade	ABC1	13
	C2DE	8
Gender	Male	9
	Female	12
Attitude to science segment	Confident engager	3
	Distrustful engager	4
	Late adopter	3
	Concerned	4
	Indifferent	4
	Disengaged sceptic	3

Annex B: Topic Guide

BBSRC Public Dialogue
Discussion Guide (04/10/12)

The key objectives of this workshop are:

- To give an **overview** of the public's view of the spread of challenges that fit in the BBUH space, and how these should best be **expressed** and **prioritised**; and
- To **test out** this public engagement approach and related tools as a way of getting the public to regularly inform BBSRC strategic priorities from now on; the learning must go beyond an individual workshop.

Participants will sit in two 10-11 participants a moderator and representatives of the BBSRC who may be called upon to answer factual questions about the BBSRC's work, and to give their own point of view when asked to contribute; and will also have an opportunity to ask questions at the end of sections if they wish to.

- Plenary sessions involve whole group together; table sessions involve splitting into two groups
- When registering participants, tell them there will be a questionnaire at the end.

Activities / aims	Exercises	Materials needed
10:00-10.15 **Introduction** *Get drinks / food* *Relax participants and get them thinking about the issues*	**PLENARY** INTRODUCTION See presentation slide 2 • Who is Ipsos MORI (independent research company) • Who is the BBSRC – explain broad remit, what BBUH means and introduce the BBSRC participants and explain their role • What we will be doing – finding out what's most important to you in the health research that BBSRC do • Housekeeping etc. **TABLES**	

Activities / aims	Exercises	Materials needed
Ice breaker is very general but starts to approach the areas of health and wellbeing	Round-table introductions where Panellists and participants introduce themselves. Intro ice breaker e.g. introduce the person next to you, what's their favourite food or drink, best day out they've had recently, ideal holiday	
10.15-11.30 **What is healthy?** *This section aims at exploring what participants think of as good health, firstly for themselves and then broadening it out to look at their family, friends, community and society as a whole. This will allow them to reflect on the different considerations that might be at play when deciding on the health challenges in society, and the effects those challenges might have. It also allows us to explore that language participants use when describing health issues, and the principles at play when they talk about the relative importance of the different issues*	**PLENARY** Introduce activity (5 minutes) **TABLES** Each table works on the three themes below for 20/25 minutes each: • What does healthy mean for me? • What does healthy mean for my family and friends, my local community? • What does healthy mean for society in the UK as a whole? For each, participants to spend five minutes in pairs writing post-its of as many themes as they can think of. Then each pair presents their ideas back to the group and they/the moderator sticks the post-its on a wall chart, grouping themes together and creating links between related areas, adding any further ideas that are generated by the discussion. In this way, each group creates its own large mind map of what 'healthy' means in each of the three areas. As each idea is presented and clustered, moderators to ladder in. In particular, they will need to break each idea down into its component parts, and ask participants to specify in detail and discuss among themselves what each idea means (e.g. 'good diet' what does this actually comprise?) *If not covered, can prompt on any details, e.g. – ageing (including freedom from disease, recovery from illness, pain, mental health and mental acuity, immunity, diet, weight, absorbing nutrients, fitness, (e.g. strength, stamina, balance) sleep, fertility, genetics, wellbeing and mental health…* <u>Probes:</u>	Flipchart/A3 paper for mindmaps (sticky on back) Post-it notes

Activities / aims	Exercises	Materials needed
	Why is this important? Can you break this down more? What kind of 'health' are we talking about here? How would you know if this happened, what outcomes would you see? • Absence of illness • Longer lives • Better quality of life/more wellbeing • Physical fitness How would we know, measure or be aware of these outcomes? Would there be other knock-on benefits to society if we had this? How do the things that <u>you</u> do affect this? How is it affected by the things that other people do? • Friends/family/colleagues • Employers • Scientists • Companies • Our government • Other countries' governments • Others How far away from this are we at the moment?	
11.30-11.50 *By asking participants to consider others' maps, we prompt them to reflect on their and perhaps remind them of health issues that they may have overlooked.*	**TEA BREAK** *The flipcharts with each group's mind-maps to be stuck on the walls and participants to circulate the room putting stickers on the areas of health they think are most important areas of health overall – or they personally think are most interested in. Each person has 5 stickers to distribute across everything they see. The aim is to enable them to see the other groups' work.*	Stickers

Activities / aims	Exercises	Materials needed
11.50-12.30 **What are the key health challenges for society?** *This section will allow participants to reflect on the ideas they have generated, and to begin thinking about how they might be prioritised in trying to make society as a whole more healthy.* *At this point we do not focus on whose responsibility it is to address challenges, but capture if people think that there are broad trends impacting on it (e.g. resistance to disease might be a global problem not UK)* *Participants will have a chance to refine their ideas further throughout the day as they hear more about BBSRCs research and as they discuss the heath challenged in more detail*	**TABLES** Moderator to introduce stimulus on global trends to stimulate further discussion – *see presentation* You will now imagine you're in charge of **the UK being a healthy society**. You have to identify the biggest challenges we face – either problems we have, things standing in the way of health, or If you were in charge of identifying the biggest challenges affecting our ability to have a healthy society, what would you choose? Each table to spend 30 minutes choosing **5 key challenges for health** for the future. – using the mind maps from earlier to prompt. Moderators to probe in detail about why these are the most important ones: • Why is this a problem/challenge? • Is this one big challenge, or made up of smaller challenges – how would you describe the underlying challenges? • Who does this affect? • What will happen if we don't do anything about it? • Why is it bad if this (outcome) happens? • What will we see if we do something about it? • Considering all these together, why are these the 5 most important? How are you deciding what to prioritise? **PLENARY** One participant from each table to feed back to the room on what were the key challenges they came up with and why (5 minutes each).	Flipcharts Copy of slides ?-? for each participant

Activities / aims	Exercises	Materials needed
12.30-12.50 **Introducing the BBSRC and its work** *This section gives participants more information on the nature of the BBSRC's work and remit, which will help them in the afternoon sessions.*	**PLENARY - PRESENTATION** 15 minute presentation from the BBSRC covering: • Who they are • What their work is and isn't i.e. where it sits in relation to other research and development work • An example of impact to make this concrete • Why they need your help • Any questions? **TABLES** Allow participants to ask the BBSRC expert or moderators any further questions and ensure that they have broadly understood the organisation's remit and work (5 minutes).	Laptop, projector, BBSRC presentation
12:50-13:30 *By asking participants to comment on others' definitions, we prepare them to be more critical about their definition and question their assumptions.*	**LUNCH BREAK** *The flipcharts with each group's '5 key challenges' to be stuck on the walls and participants to circulate the room putting gold stars on what they think are the two most important challenges/amending words, adding ideas. They do this while having their lunch*	Stickers
13:30-14:35 **Introducing how BBSRC work relates to health challenges** *This section is designed to allow participants adequate time to take in and understand the flashcards, which will help the participants to*	**PLENARY** Moderator to write up the three challenges that got the most votes on a new flipchart and invite comments from the room and try to establish consensus (10 mins). **TABLES** Using the flashcard stimulus provided by BBSRC (Slides 11-22), participants to work in groups of 3, each to take 3/4 flashcards and discuss in their mini-groups, answering the following questions for each. Each group to capture their thoughts on paper.	4 copies of each of the flashcards per table

Activities / aims	Exercises	Materials needed
understand how the BBSRCs work might relate to the health challenges outline above, and potentially cause them to reflect further on the challenges they have identified and refine them.	• How does this relate to the health challenges we discussed earlier? • How would this kind of research affect you? Your family? Society? How might it change the way we live? • How important is this kind of research? Why? Would it be better or worse to concentrate on other areas in future – and what would be the reason you say that? • Could you see any other benefits to this research other than the ones outlined here? They also note any questions they have for BBSRC participants (10 minutes) Each mini-group to explain their 3/4 flashcards and their thoughts on the questions to the rest of the group and allow time for any questions to BBSRC participants on the tables (25 mins) **PLENARY** Whole room to discuss whether BBSRC could take the 3 key challenges we have already identified, or whether they are not quite right, based on what we just discussed. Moderator to build towards consensus (10 mins)	
14.35-15.20 **Testing and creating strategic visions** *The purpose of this section is not to establish a consensus in order to be able to say that "this is THE vision that the BBSRC should follow" but to explore the language used, the principles that are seen to be important and less so, and the perceptions of trade-offs in order to help you understand how the*	**TABLES** Spontaneous views on strategic vision: Participants to spend a short time discussing what, given what they decided about health challenges and what they know about the BBSRC, they think the strategic vision for the BBUH should be i.e. what principles should there be to decide what research to fund? (10 mins) Moderate to introduce the two different 'straw man' visions in turn and spend 10 minutes as a group discussing each. (30 mins) Two visions • One that is very unfocussed (BBSRC to fund anything that has the potential improve health/wellbeing) • One that is much more focussed (BBSRC to fund research that it is very likely to improve health outcomes for a bounded number of key health challenges e.g ageing)	Copies of straw men visions for each pair of participants

Activities / aims	Exercises	Materials needed
general public might interpret and react to different expressions of a strategic vision, and how best to communicate it to them..	<u>Probes for each</u> • What does this mean – what would be included, what would not be? • What might be the impact of taking this strategic approach? On you? Your family and friends? Society? • What might not happen to do if this approach was taken – what would be the trade-offs? • What are the benefits of taking this strategic vision? • What are the disadvantages? • Which is most likely to meet the challenges you think are most important? • Why is might this approach be better than the other ones we have discussed. Or worse? • What words or ideas would you need to add to this vision to make it fit with your sense of the challenges? Participants to refine their spontaneous vision in of discussion of straw men visions. Moderators to probe on the principles behind the final vision (5 mins): • What health issues should BBUH research focus on? • Are other outcomes as important? Should they be taken into account? • Who should benefit the most from BBUH research? **PLENARY** One participant from each group to feed back to the room on their vision and the principles behind it (10 mins)	
15.20-15.35 *By asking participants to comment on others' definitions, we prepare them to be more critical about their definition and question their assumptions.*	**TEA BREAK** *The flipcharts with each groups "Vision" to be stuck on the walls and participants to circulate the room putting a gold star on the best overall vision green and red stickers on aspects that they like/don't like.*	Stickers

Activities / aims	Exercises	Materials needed
15.35-16.00 **Affirming principles** *The purpose of this section is to further illuminate the principles behind participants' choices of key challenges and strategic vision by allowing them to test their choices against real-life examples and explaining how it would affect their views towards individual pieces of research*	**PLENARY** Moderator to work with the room to a establish consensus on what is the best overall strategic vision (5 mins). **TABLES** Mini groups of 3/4 participants to quickly look through the flashcards from earlier and identify one that they think would be most important given this strategic vision, and the one that would be least (5 mins) *NB – the aim here is NOT to suggest that some of the research should not have taken place – we are looking to an imagined future where priorities may be different. Also we can start from premise that ALL the research projects are valid and useful research, but use them simply to draw out different arguments.* Moderator to probe on this: • Why is this research/least most important? • Who would it benefit? • Who would lose out if research like this wasn't funded? Having looked through the flashcards, do you think there would be any drawbacks or dangers in following the vision you have outlined? (10 mins) What are the key principles behind the strategic vision? (5 mins) • What health issues should BBUH research focus on? • Are other outcomes as important? Should they be taken into account? • Who should benefit the most from BBUH research?	
16:00 – 16.10	**PLENARY** Share feedback - Thanks and circulate evaluation questionnaire and then incentives	

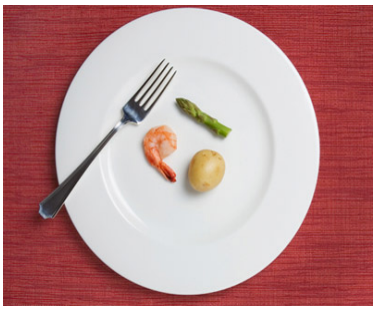
Annex C: Stimulus materials

Why low calorie diet can extend lifespan

BBSRC bioscience for the future

1

Research funded by the BBSRC is giving scientists new insight into why a restricted diet can lead to a **longer lifespan** and **reduced incidence of age-related diseases** for a wide variety of animals.



Scientists have known for some time that a restricted diet can extend the lifespan of certain animals but this work shows how it affects ageing mechanisms.

Significantly it has also shown that the **effects occur even if the restricted diet is adopted later** in life.

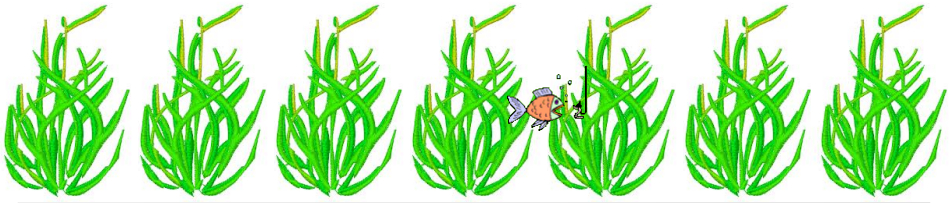
Ipsos MORI
Social Research Institute

Seaweed to tackle rising tide of obesity

BBSRC bioscience for the future

2

- Seaweed could hold the key to **tackling obesity.**
- It was found it **reduces fat uptake** by more than 75%, new research funded by BBSRC has shown.
- Seaweed can help your body retain less fat from the foods you eat.
- Now the scientific research team at Newcastle University are try **to develop foods that help you lose weight** by adding seaweed fibre to bread.

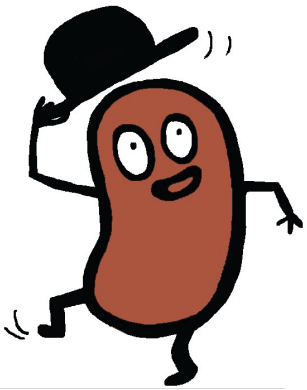


Ipsos MORI
Social Research Institute

The benefits in the bean

3

- Food processing like roasting gives us the aromas and flavours that we associate with coffee and chocolate.
- Food processing also changes the chemical structure of the bean including the *polyphenol* chemical which is reported to have health benefits.
- Cocoa has a positive effect on how your heart works.
- Research funded by BBSRC has found that **light processing does** not alter this effect too much – while **heavy processing** seems to abolish this positive effect.
- This means if food like cocoa and coffee beans is heavily processed, it could **reduce** their potential health benefits.



Ipsos MORI
Social Research Institute

Over eating – it's not one size fits all

4

- Research funded by the BBSRC has helped to identify **causes of over eating**.
- Through looking at:
  - how the body is made up;
  - how the body tells the brain that you are full; and
  - Behaviour in obese people,
- the study has produced **new findings and understanding** that wouldn't have happened by just looking at the link between body mass and appetite.
- This research combines expertise across a lot of research disciplines and has generated a lot of interest from researchers across the globe.

Ipsos MORI
Social Research Institute

Scientists make old muscles young again

5

- Researchers at have identified a key factor responsible for declining **muscle repair during ageing**

- They also discovered how to **halt the process** in mice with a common drug.

- These mice keep their body's ability to repair its muscles for longer, as they get older

Ipsos MORI
Social Research Institute

Keeping older people fit for longer

6

- A carefully framed combination of **moderate exercise and nutritional supplements** could help older people keep an **active lifestyle for longer**.

- A Manchester Metropolitan University study has found that taking **carbohydrate and protein supplements** (pills) just **before and just after gentle exercise** could boost how well muscles work and help to stop muscles working less well in people over retirement age.

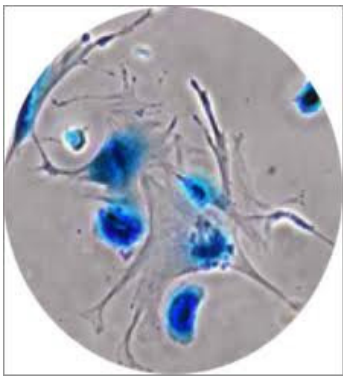
Ipsos MORI
Social Research Institute

Insight into ageing in cells

BBSRC bioscience for the future

7

- Scientists studying ageing have unlocked clues that give us **a greater understanding of the ageing process**.
- Research has shown that **stress-induced damage to the ends of our chromosomes** (organised structure of our DNA and protein found in cells) may be an important factor in **how our cells age**.
- Future research will need to focus on **understanding the properties** which make the ends of the **chromosomes** so special, so that we can develop **therapies** that help to **repair** them.



How the body clocks regulate healthy ageing

BBSRC bioscience for the future

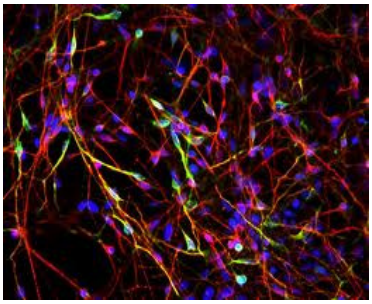
8

- Data uncovered by Professor Russell Foster and team suggests that **overlapping brain pathways** might be affected in **mental illness** and **sleep disturbance**.
- They are now working with psychiatrists to understand these common connections.
- The aim is to use this basic understanding of the neuroscience to develop new approaches to **correct abnormal sleep** and so improve the broader health problems and quality of life for patients with mental illness.

Research unravels nerve-wiring process

9

- Research has deepened our understanding of **how our nervous system develops**.



- BBSRC-funded researchers from Manchester University have provided detailed understanding of the machinery involved in wiring up the connections that allow for **signals to travel between our brain and target cells**.
- The findings also open up new avenues in the investigation of **neurodegenerative** diseases (such as Alzheimer's) and the gradual decline in **how well our brains work during ageing** by analysing the cellular causes of these conditions.

Part of brain that tracks the movement of limbs discovered

10

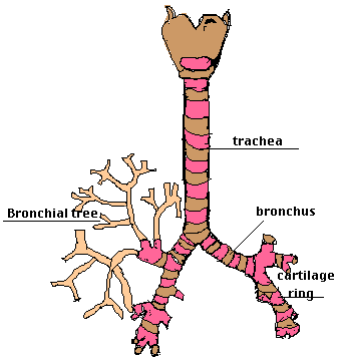
- Scientists have discovered the part of the brain that tracks and coordinates the position of our limbs as we move.

- Seemingly simple actions can involve a surprisingly complex coordination of different types of information provided by the senses in order for your brain to construct a constantly updated 'map' of the body.
- These findings may be particularly relevant to helping **children with developmental coordination disorder**, whose brains may have difficulty keeping this ‘map’ up to date.

Tissue engineering

11

The first tissue-engineered trachea (windpipe) to be transplanted successfully was developed using a technique for growing cells pioneered by BBSRC-funded scientists at the University of Bristol.



Immunity in old age

12

- Research at the University of Birmingham found that the **loss of immunity with age**, which makes older people more likely to get infections, is partially due to a **stress hormone imbalance**.

- Correcting the balance allows the **immune cells to function better** and thus for old people to have better immunity than they would otherwise

How intelligence changes through life

- Scientists funded by the BBSRC have estimated for the first time **how much genes lead to changes in intelligence across the human life course**.

- Identifying genes that influence intelligence could help us to understand:
  - the relationship between **knowledge and problem solving** and an **individual's outcomes in life**; and
  - why some people intellectually age better than others.


BBSRC
bioscience for the future


Ipsos