

## My Healthy Future: adult health

**80%**

of an individual's life expectancy will be spent in good health



**325,000**

mHealth apps are available (78,000 published in 2017)



**50%**

of all eligible adults took up their invitation for an NHS health check in 2016-17



For most, adulthood is a time of relatively good health and infrequent contact with health services, except in the context of reproduction. However, for each individual, the interactions between genes and environment continue to shape physiological and pathological changes that eventually lead to disease, even though these largely manifest in later life. The ways in which an adult responds to interventions aimed at keeping them healthy are also varied and individual, being shaped by biological, social and personal factors including previous experience and values. The years of adulthood are thus an important time for individuals to understand their own health better, to optimise their current wellbeing and to reduce their chances of serious disease in later life.

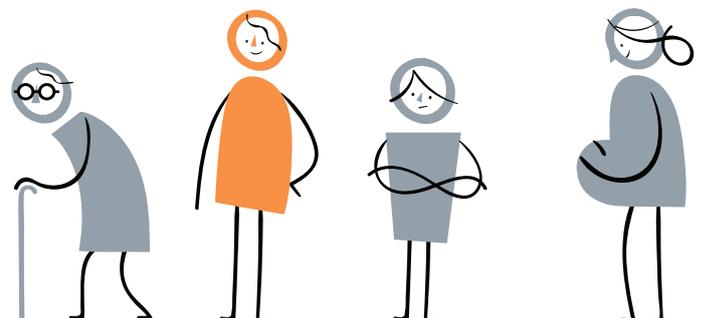
The aim of this workshop is to focus on the **opportunities** created by new technologies to improve health through more personalised approaches to health promotion and disease prevention, and the **issues** that may arise for individuals, health systems and wider society.

## Personalised healthcare technologies

Technological advancements over the next 20 years could provide unique opportunities to support the maintenance of good health, to obtain information on modifiable and non-modifiable disease risk factors, and to detect incipient disease before it manifests as a more serious condition.

### In the future?

- Routine screening for late onset genetic disorders, with personalised preventative interventions
- Risk assessment for a range of late onset 'complex' disorders, using complex algorithms to interpret information from various sources, including genetic and epigenetic data, other biological data collected from personal sensors, digital data from personal apps and wearables, and wider environmental data
- Epigenetic and metabolic biomarkers used as biomarkers of lifestyle and environmental exposures
- Pharmacogenetic profiles routinely available to optimise drug therapy and prevent adverse reactions
- Personalised nutrition and physical activity programmes for wellbeing based on genomic and wider 'omic biomarkers (transcriptome, proteome, metabolome, microbome, epigenome and even the exposome)
- Continuous monitoring by digital technologies of physiological and psychological parameters, to empower individuals to manage their own health
  - Advanced digitally enabled wearables to measure blood pressure, calorie intake, stress
  - mHealth apps to offer personalised support for lifestyle modification and to track wellbeing based on an understanding of the individual
  - External and implantable biosensors to detect circulating biomarkers and soluble factors



## Key facts

### Undiagnosed cases



Familial hypercholesterolaemia



Type 2 diabetes



Hypertension



35%

of the UK adult population are affected by pre-diabetes

20-30%

of the UK adult population are affected by non-alcoholic fatty liver disease

### Risk factors



15.5%

of adults are current smokers



61%

of adults are classified as overweight or obese



61.8%

of adults meet UK physical activity recommendations



74.3%

of adults drink  $\leq$  14 units of alcohol per week



26%

of adults eat 5 fruit and vegetables a day

### 12-14 years

The extra years of life that 50 year old adults with 5 low risk behaviours will have compared to adults with 5 high risk behaviours



> 5 million

individuals have purchased direct-to-consumer genetic testing through 23andMe



3x

The global market for direct-to-consumer testing is expected to triple by 2022



20-30%

of adverse drug reactions could be prevented by pre-emptive pharmacogenetic testing



85%

of adults in the UK own a smartphone, of which 91% use it on a daily basis



17%

of adults in the UK own a wearable device

A number of national strategies and public health programmes highlight the potential of using personalised prevention approaches for promoting adult health and wellbeing through personalised lifestyle modification or better understanding of genetic risk.

### Healthy Lives, Healthy People: A call to action on obesity in England - Department of Health (2011)

Outlines ambitions to tackle overweight and obesity in adults by 2020, using a life course approach. Delivery will involve empowering individuals through provision of information and tailored support, supporting local government initiatives, and commissioning of weight management services.

### Towards an active nation - Sport England (2016)

Describes strategies for 2016-2021 to tackle physical inactivity and support long-term behaviour change, to assist development of effective digital platforms, and to invest in sports facilities including improving accessibility to under-represented groups.

### The Government's Alcohol Strategy - HM Government (2012)

Describes ambitions to address unhealthy and irresponsible drinking by incorporating alcohol checks into NHS Health Checks and providing advice to those who drink at above low-risk levels.

### Cardiovascular Disease Outcomes Strategy: Improving outcomes for people with or at risk of cardiovascular disease - Department of Health (2013)

Sets out ambitions and actions to improve prevention and treatment of CVD by improving identification and management of risk factors and co-morbidities, supporting lifestyle modification, and improving uptake of cascade testing for inherited conditions e.g. familial hypercholesterolemia.

### Achieving World-Class Cancer Outcomes: A strategy for England 2015-2020 - NHS England (2015)

Proposes strategic priorities to radically improve prevention of cancers, and highlights the potential of stratified approaches to prevention and screening for individuals at high genetic risk of cancer.

### Generation Genome - Annual Report of the Chief Medical Officer (2017)

Explores the potential of genomics to improve health and prevent ill health. Describes the use of genomics to identify individuals at increased risk of disease and to inform personalised preventive strategies, including risk-stratified screening and targeted interventions.

### Life Sciences Industrial Strategy - Office for Life Sciences (2017)

Includes recommendations and goals to increase genomic testing and screening capabilities, to develop diagnostic platforms using multiple technologies for detecting early phases of disease, and to transform clinical pathology and imaging through digitisation and use of AI-based tools.

### Improving Outcomes through Personalised Medicine - NHS England (2016)

Describes visions to embed personalised medicine into mainstream healthcare to improve prediction, prevention, diagnosis and treatment of disease, through use of genomic and diagnostic technologies, integrated digital and informatics systems, and wearable technology.



Developments in biomedical, genomic and digital technologies are enabling more personalised prevention. During this workshop, we want to capture your thoughts on the opportunities created by new technologies, how this will impact the healthcare landscape in the future and what wider issues may arise.

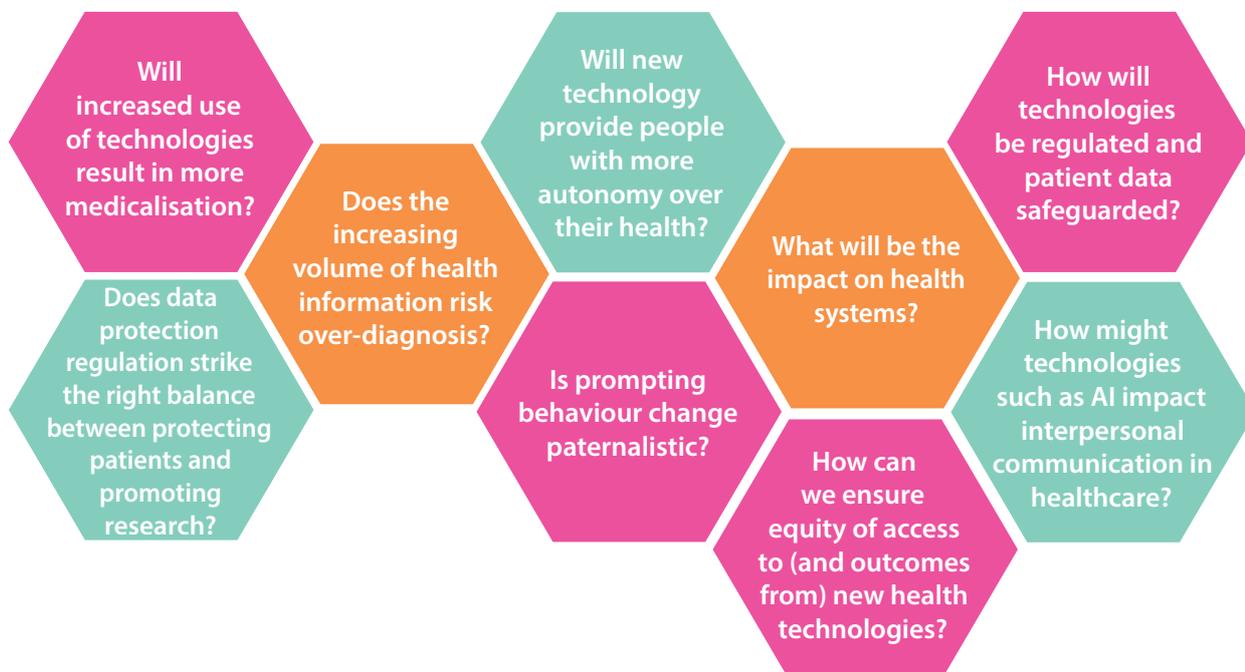
## Opportunities

What opportunities do evolving biomedical, genomic and digital technologies provide for:



## Issues

These technologies bring with them a range of issues for the individuals who might use them, the health systems that provide support and care, and for wider society. During the workshop, we will identify those that may arise in the context of personalised prevention during adult life.



Today's adult health workshop is one of four initial life stage workshops (on pregnancy and neonatal health, the health of young people, healthy ageing and the adult health) that will inform My Healthy Future, a PHG Foundation initiative culminating in a set of policy recommendations for how the health system and wider society will need to adapt to make optimal use of emerging technologies.

#myhealthyfuture



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