

# Early detection biomarkers in ovarian cancer



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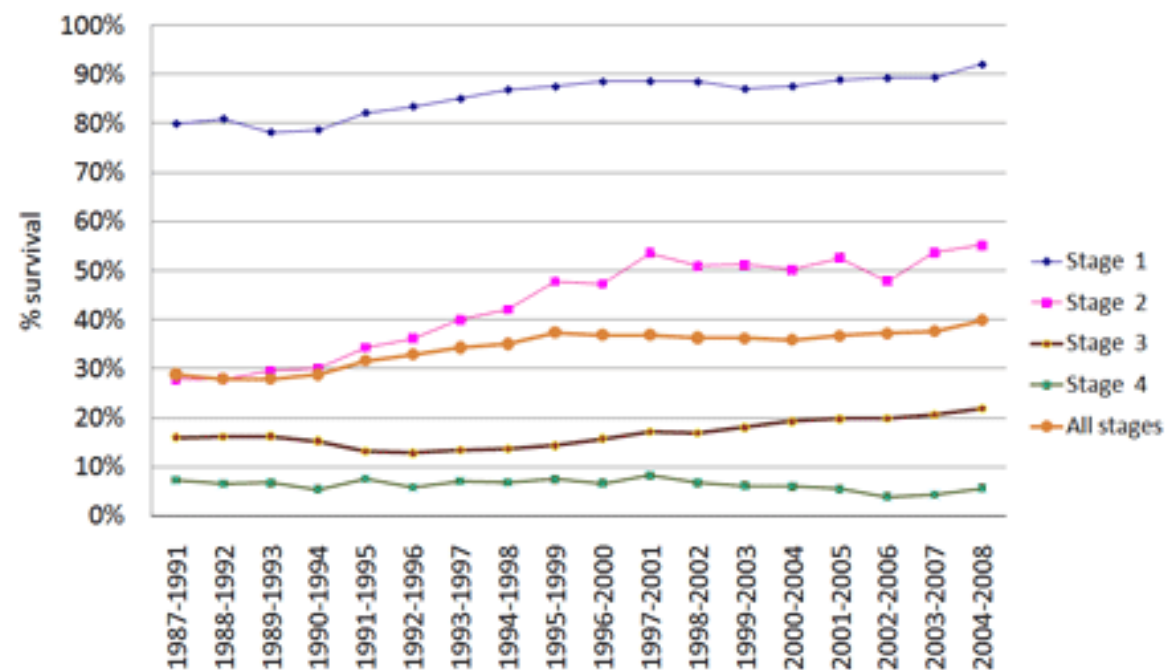


# Overview

- Ovarian cancer overview
- Liquid biopsy: What is it? How can we use it?
- Epigenetics + DNA methylation
- Brief overview of my research project

# Ovarian cancer

- High-grade serous carcinoma (HGSC) is the most common + most aggressive
- >75% of women with ovarian cancer (OC) are diagnosed when the tumour has already spread<sup>1</sup>
- The ability to detect and diagnosis OC earlier would dramatically improve cure rates
- Currently **no effective method of screening**<sup>2</sup>



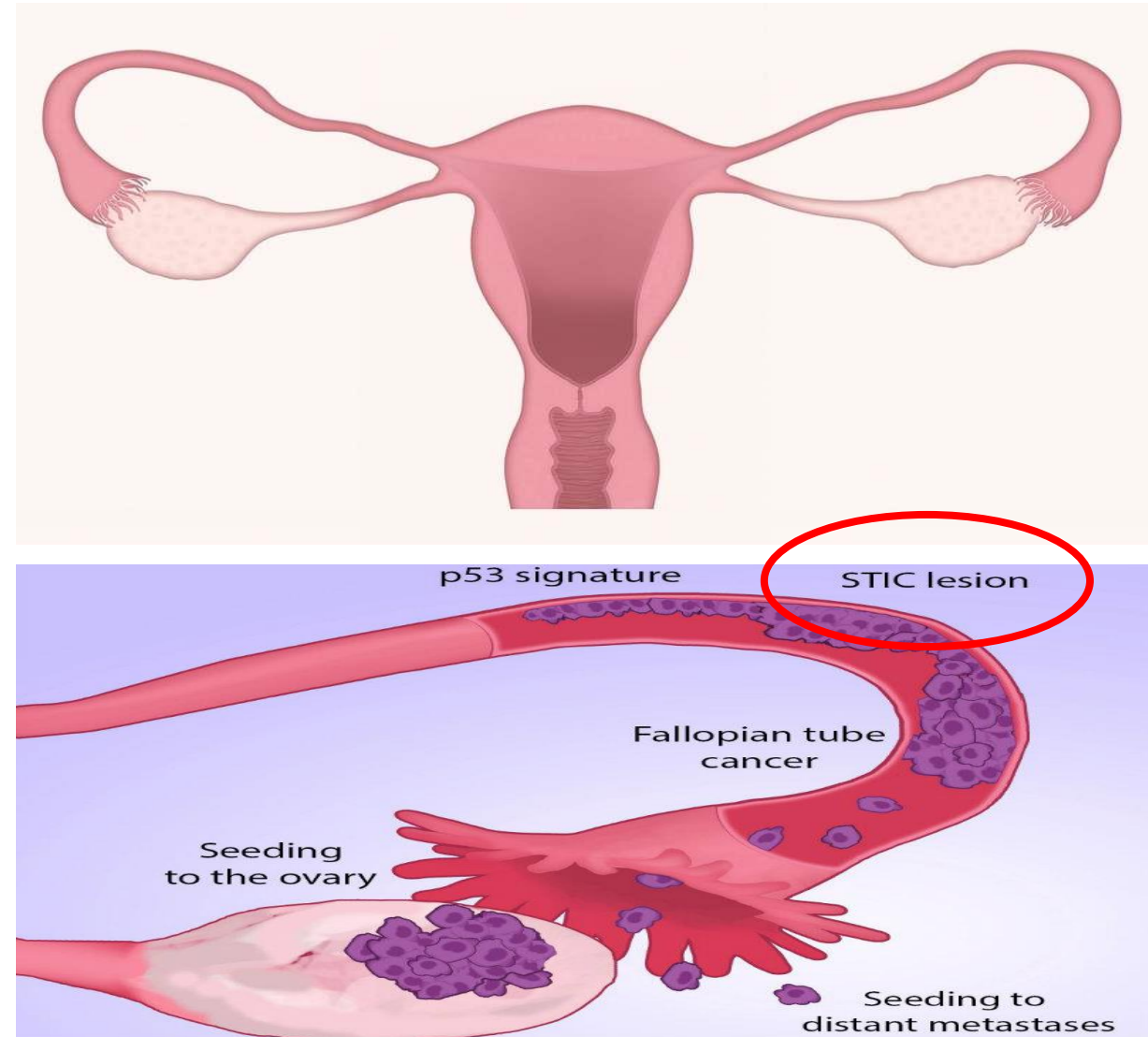
*5 year stage specific relative survival rates, adults (ages 15-99), Anglia Cancer Network, 1987-2008*

<sup>1</sup>Cancer Research UK

<sup>2</sup>Jacobs et al. 2015

# Where does ovarian cancer begin?

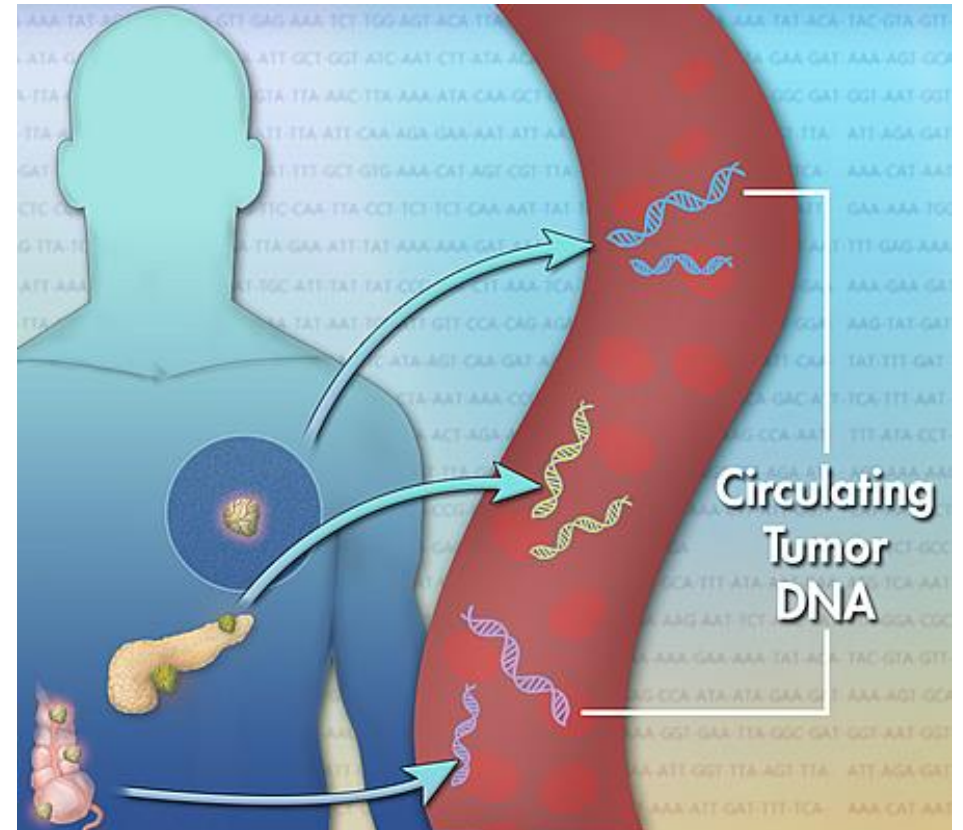
- Overwhelming evidence that the most common type of ovarian cancer does not begin in the ovary<sup>1</sup>
- *There are areas that we can identify that indicate that a cancer is starting to develop*
  - ***Serous tubal intraepithelial carcinoma (STIC)***<sup>2</sup>



<sup>1</sup>Crum et al. 2008; <sup>2</sup>Piek et al. 2001

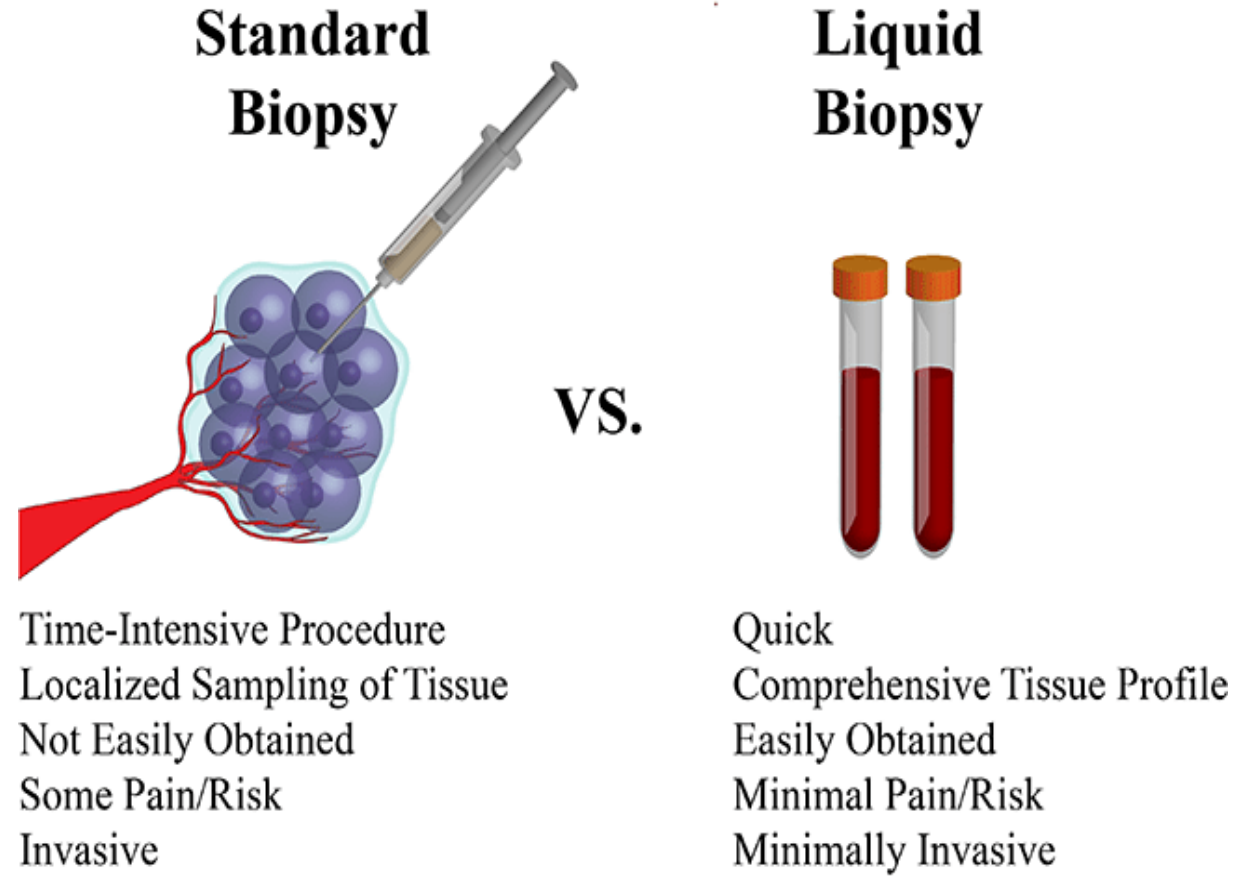
# What is a liquid biopsy?

- **Circulating tumour DNA (ctDNA)** was first recognised more than 60 years ago
- Fragments of DNA released by healthy and cancer cells and finds its way into the blood flow
- Cancer DNA has different characteristics to healthy DNA
- Detecting the presence of ctDNA in pre-symptomatic individuals has the potential to become a useful screening test



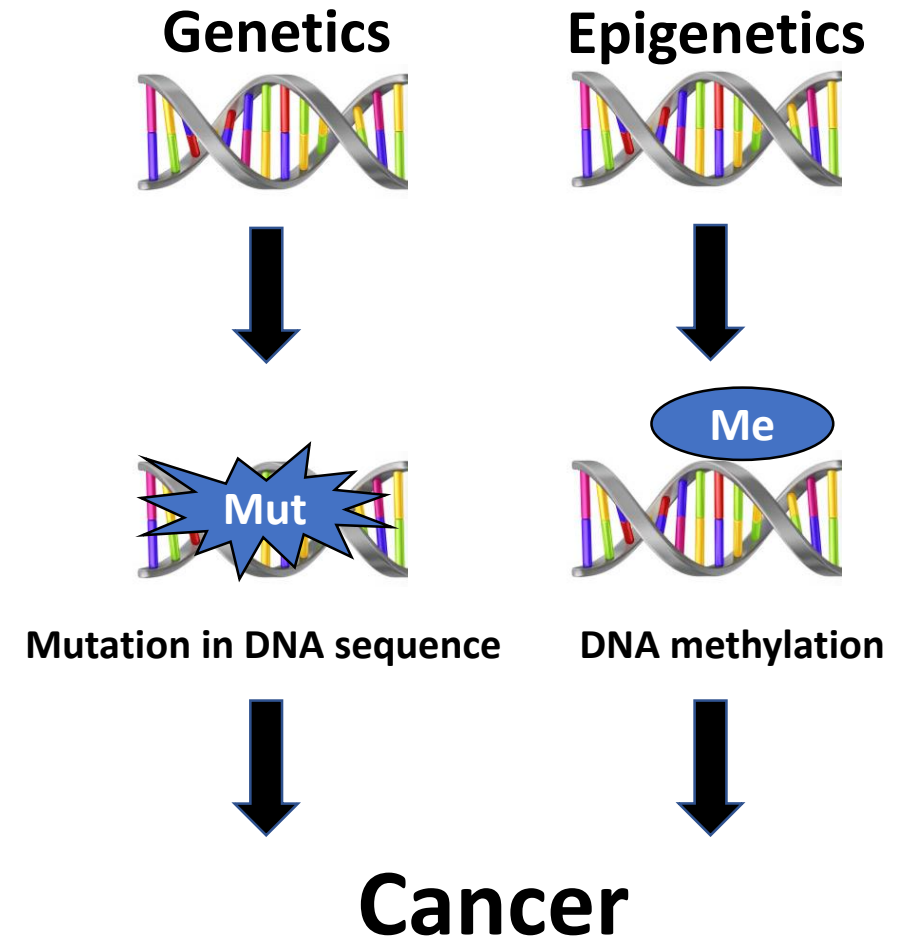
# Tissue biopsy vs Liquid biopsy

- Analysis of ctDNA in the blood forms the cornerstone of a **'liquid biopsy'**
- Liquid biopsies offer a number of advantages over standard/tissue biopsies



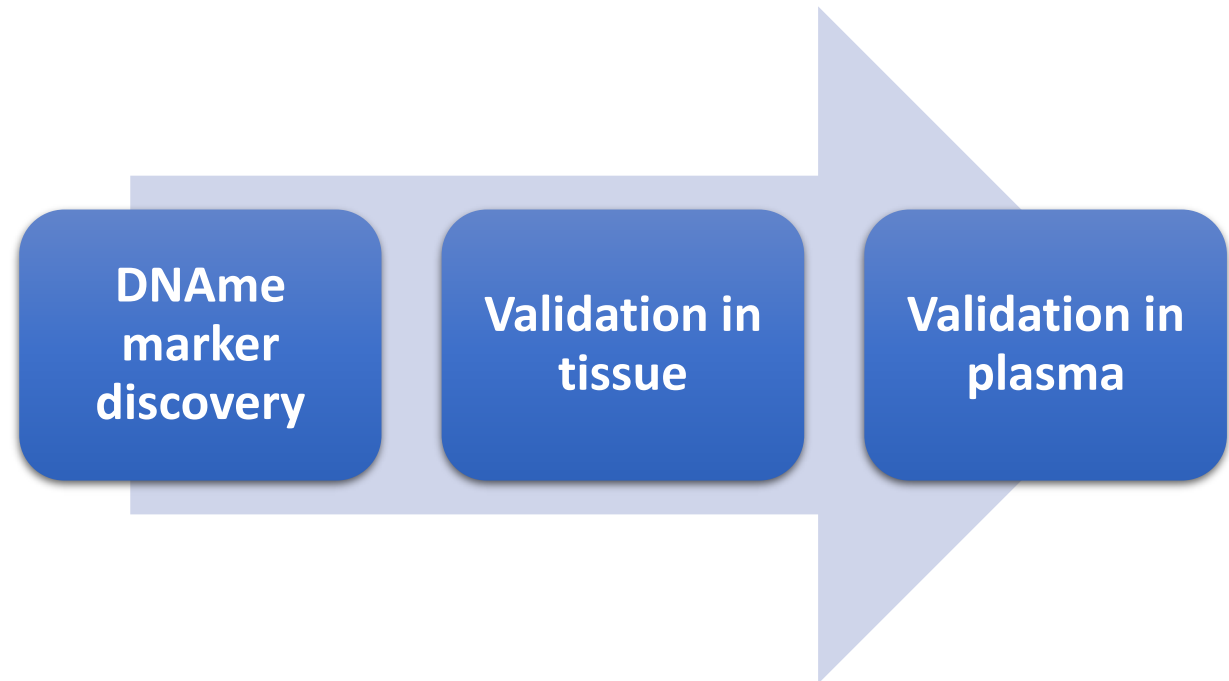
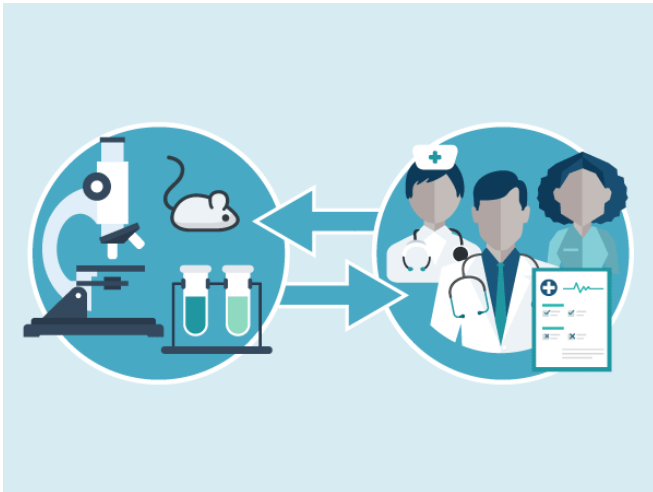
# What is Epigenetics + DNA methylation?

- Epigenetics is essentially extra information layered on top of the sequence of letters that make up our DNA
- DNA can be tagged with a tiny molecule (methyl) that stick to some of its letters
- Can switch off genes
- Crucial role in early cancer development



# Research objectives

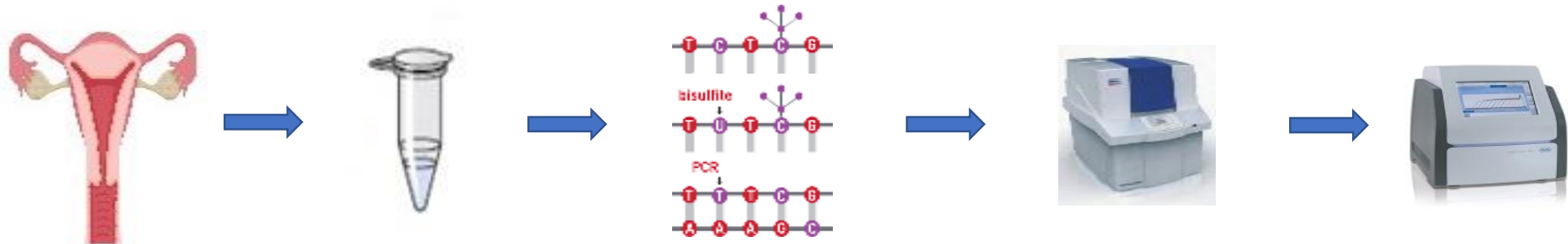
- To identify DNA methylation changes that will detect early stage OC
- To develop a blood test that can be used to screen for early stage OC



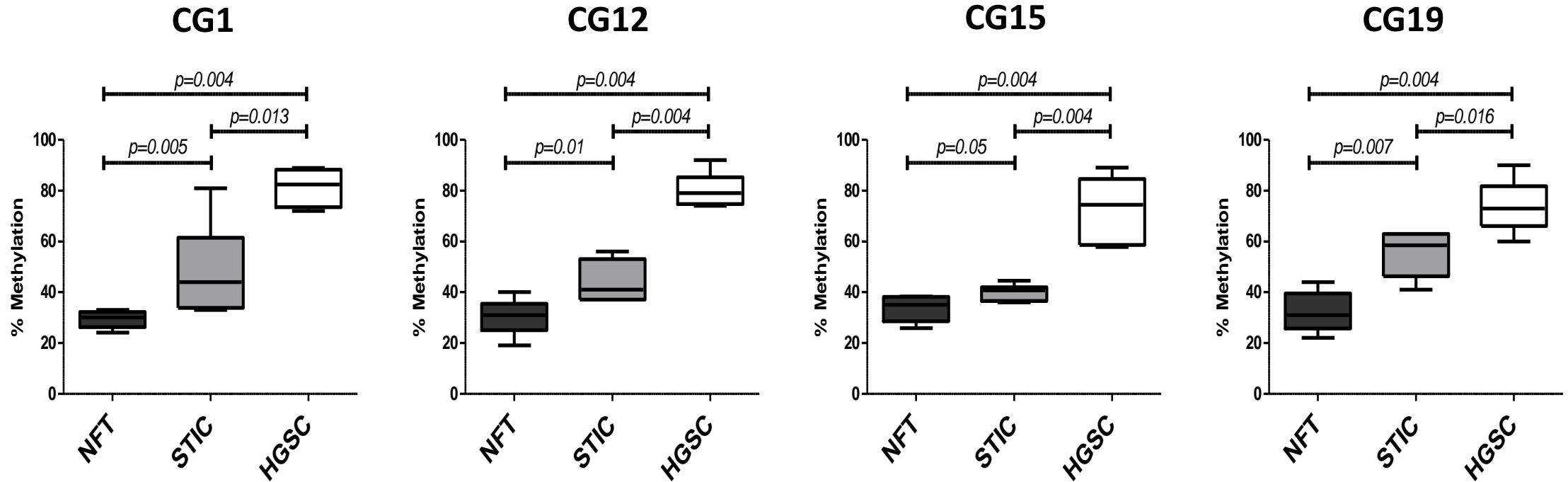


# Discovery method

- In a previous study we identified **20 DNA markers** to investigate
- **Discovery:** 9 of the most promising DNA markers were analysed using tissue samples from a small study group
- **Validation:** 4 of these markers were analysed using tissue samples from a larger study group

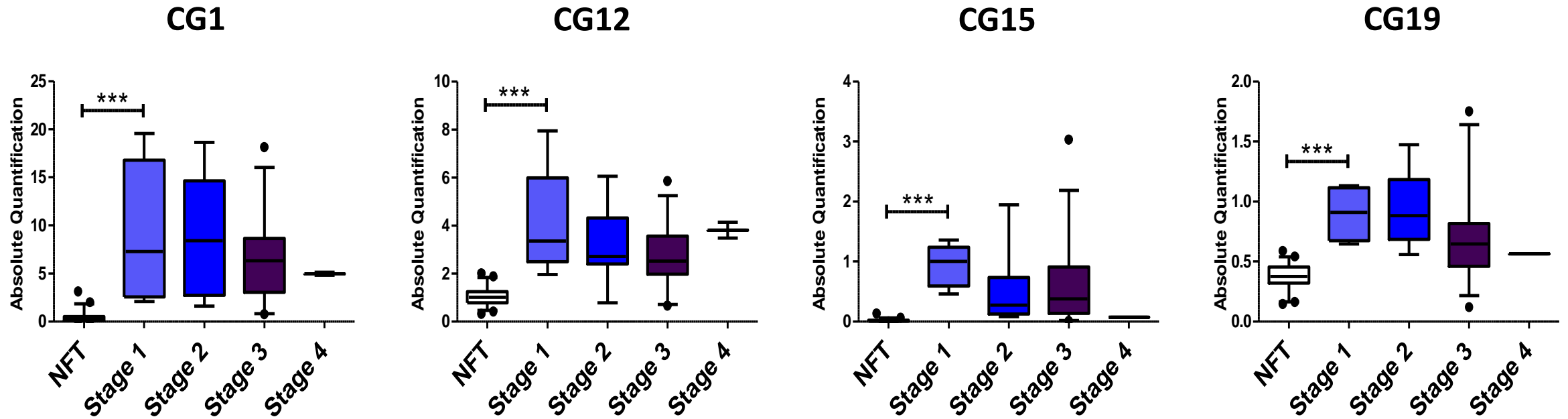


# DNA marker analysis



4 DNA markers were higher in STIC + HGSC samples compared to NFT

# DNA markers elevated in early stage OC



Highlights potential for use in early detection

\*\*\* =  $p < 0.0001$

# Summary

- Need for earlier detection for OC to improve patient survival
- We have identified 4 DNA methylation markers that can be used to detect early stage OC in tissue samples
- We are now working on developing this into a blood test
- Rapidly evolving field and advances in technology are making this a realistic possibility

# Acknowledgements

## **MSG group**

Dr Paul Mullan  
Dr James Beirne  
Dr Sharon Eddie  
Dr Anna McCormick  
Dr Alex McIntyre  
Dr Jennifer Ferris  
Shannon Beattie  
Alice Ormrod  
Charlotte McBrien

## **BHSCT**

Professor Glen McCluggage  
Dr Ian Harley  
Dr Elaine Craig

## **Buckley group**

Dr Niamh Buckley  
Paula Coulter  
Ahmed Elkashif

## **NI Biobank**

Dr Claire Lewis  
Paul Murray  
Tracey McGuigan

## **PMC group**

Professor David Gonzalez de Castro  
Lauren McConnell

## **University of Liverpool**

Dr Lakis Liloglou

## **University of Leicester**

Professor Jacqui Shaw  
Dr Mark Openshaw

All patients whose contribution has made  
this and many other studies possible

