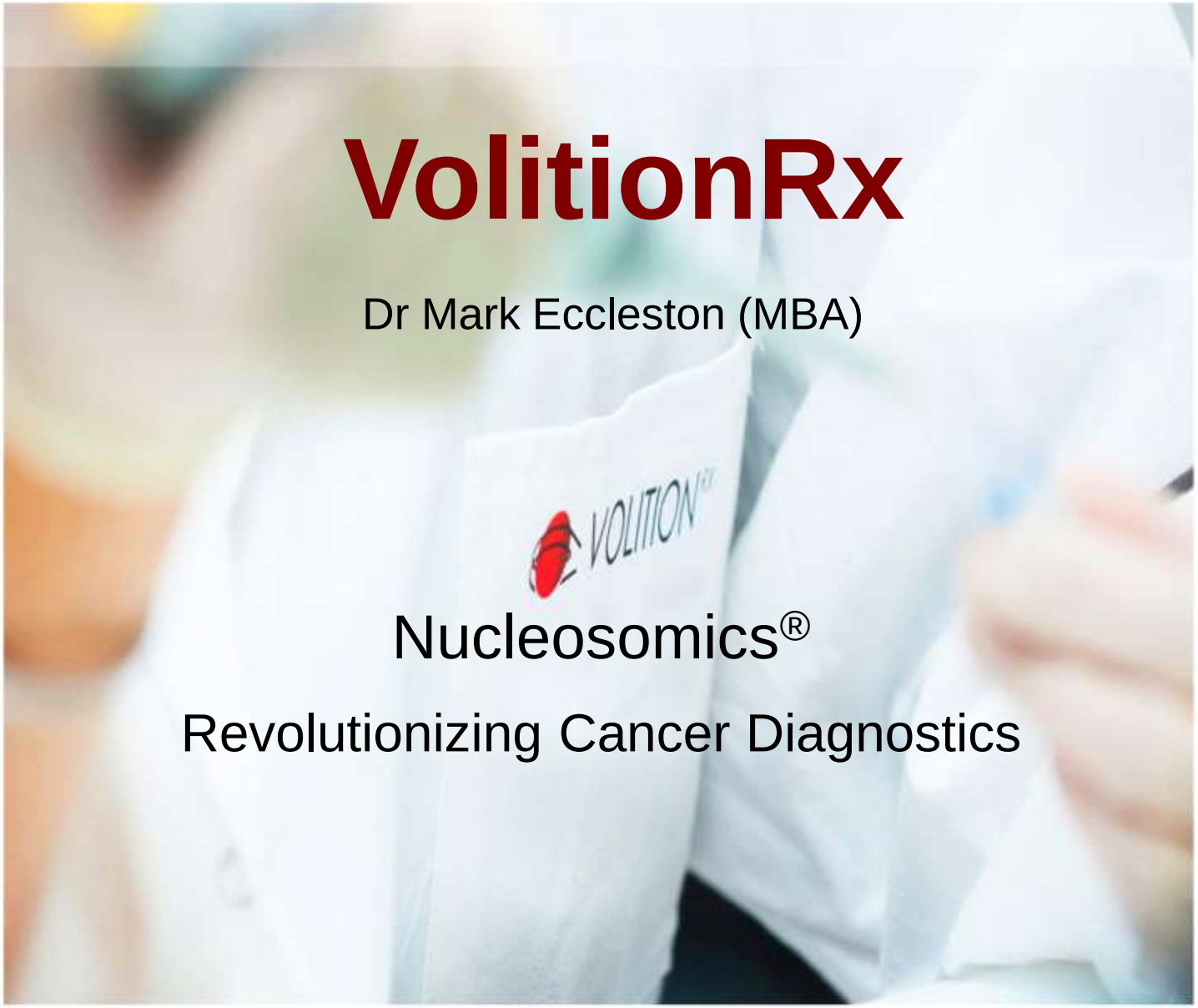
VolitionRx

Dr Mark Eccleston (MBA)



Nucleosomics®

Revolutionizing Cancer Diagnostics

A VolitionRx Company

20A

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Belgium

www.volitionrx.com

Disclosure Statement

The following discussion, in addition to the other information contained in this presentation, should be considered carefully in evaluating our prospects. This presentation (including without limitation the following factors that may affect operating results) contains forward-looking statements regarding us and our business, financial condition, results of operations and prospects. Words such as "expects," "anticipates," "intends," "plans," "believes," "seeks," "estimates" and similar expressions or variations of such words are intended to identify forward-looking statements, but are not the exclusive means of identifying forward-looking statements in this presentation. Additionally, statements concerning future matters such as revenue projections, projected profitability, growth strategies, possible changes in legislation and other statements regarding matters that are not historical are forward-looking statements.

Forward-looking statements in this presentation reflect the good faith judgment of our management and the statements are based on facts and factors as we currently know them. Forward-looking statements are subject to risks and uncertainties and actual results and outcomes may differ materially from the results and outcomes discussed in the forward-looking statements. Factors that could cause or contribute to such differences in results and outcomes include, but are not limited to, those discussed in this presentation. Readers are urged not to place undue reliance on these forward-looking statements which speak only as of the date of this presentation. We undertake no obligation to revise or update any forward-looking statements in order to reflect any event or circumstance that may arise after the date of this presentation.

Origins and Current Status

- Belgian R&D facility, US OTC listed
- Nucleosomics® Core Technology Platform
- $10M equity funding and €1.47M DG06 (regional) funding

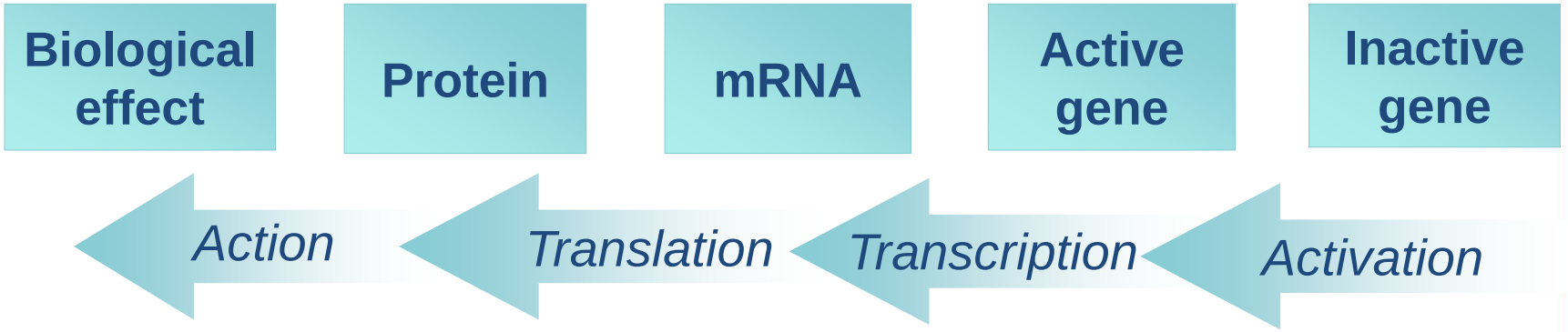
- Experienced management team
- Core team of 7 scientists
- Kit production
- Sales and Marketing Director
- Former Eppendorf lab


Namur Citadel and the river Meuse

Epigenetics - Definitions

- *"Heritable changes in gene expression without changes in DNA sequence"*
  - Non sequence based changes in phenotype and gene expression
  - Environmentally modulated
  - Reversible
  - Heritable
- *"Structural Adaptation of Chromosomal Regions so as to register, signal or perpetuate altered activity states"*
- *What turns genes on and off and under what circumstances*
  - '09 Silver Jubilee of groundbreaking work by Surani, Solter and Cattanach
  - Global epigenetic market ***$1.7 billion in '09*** with ***CAGR of 60%*** **to '12**

The Epigenome - a druggable target



NCE and antibody drugs inhibition protein action

Antisense or RNAi drugs inhibit RNA transcription

EPIGENOMICS:
Gene deactivation

HDACi
DMTi
KMTi

- New opportunities to probe Gene Expression
- Novel biomarker profiles for multiple indications
- New approach to disease identification, stratification and treatment
- Opportunities for intransigent disease indications

Epigenetic Marks - DNA Methylome

- Mediated by DNA methyltransferase (DNMT) enzyme family
- Methylation of cytosine C_5 in cytosine-phosphate-guanosine (CpG)
- Normal cellular control of gene expression through partial or complete abolition of transcription factor binding at methylated site
- De-methylation relaxes chromatin allowing histone acetylation and binding of transcriptional complexes
- Locally enriched CpG islands found in 40% of mammalian promoters
- CpG islands normally un-methylated and sporadic CpG sites methylated.

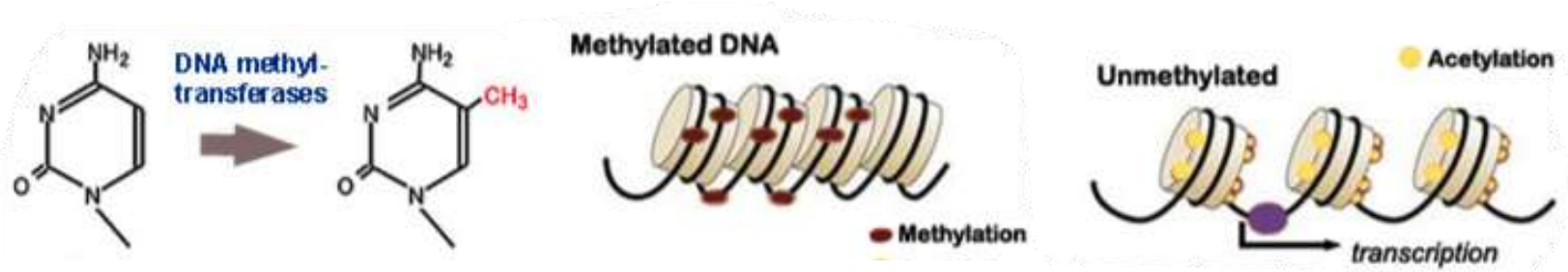


Image credited to "p53 and deregulation of DNA methylation in cancer", Cell Science Reviews Vol.2 No.3

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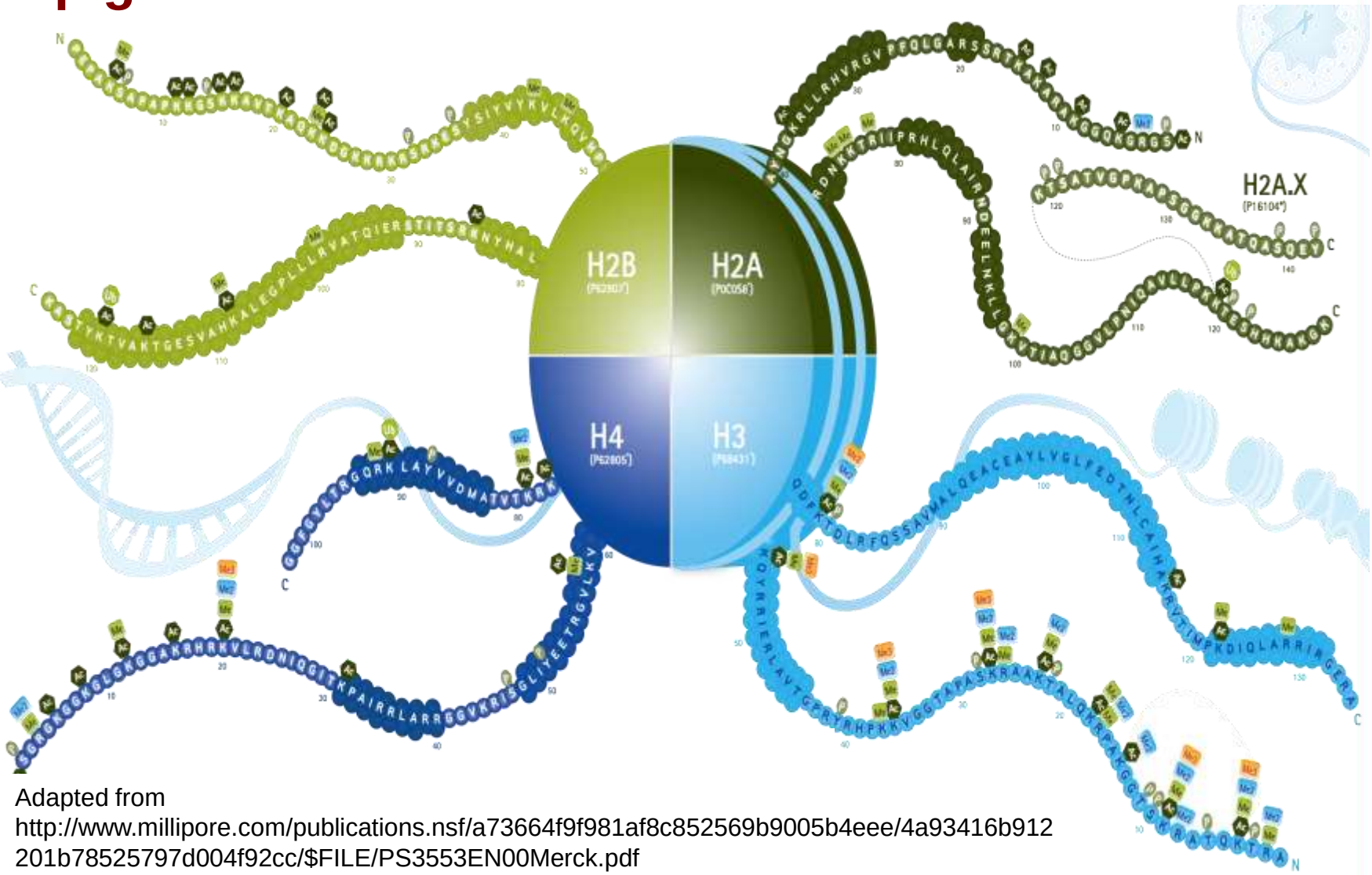
Most widely studied epigenetic pathway

Epigenetic marks - histone code



Adapted from
http://www.millipore.com/publications.nsf/a73664f9f981af8c852569b9005b4eee/4a93416b912201b78525797d004f92cc/$FILE/PS3553EN00Merck.pdf

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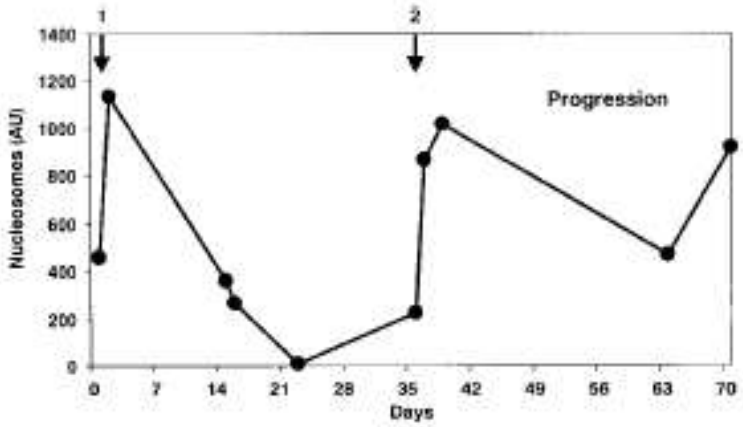
Multiple histone modifications and variants

Epigenetics meets oncology

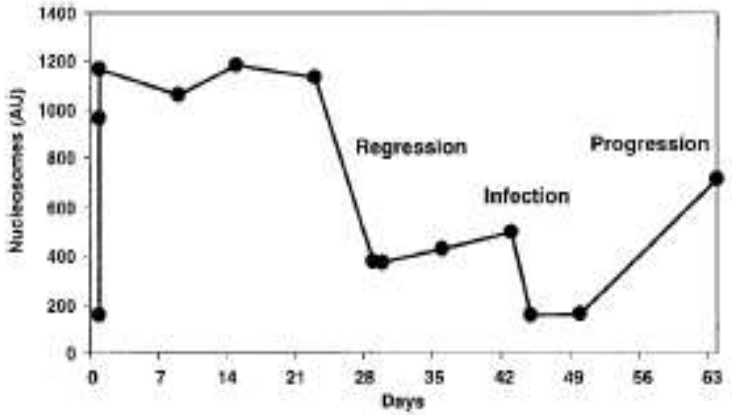
- Epimutations provide a second hit in two-hit cancer initiation model
- These events can take place **years** before symptoms present*
- Gradual ramp up to (often) high nucleosome levels on diagnosis
- Histone variants can distinguish nucleosomes of tumour origin
- Altered histone modification profiles in cancer derived nucleosomes
- Applications
  - Low cost screening and early diagnosis
  - Patient stratification e.g. Neoadjuvant therapy selection
  - Prognosis

*Aotake 1999, Holdenrieder 2009

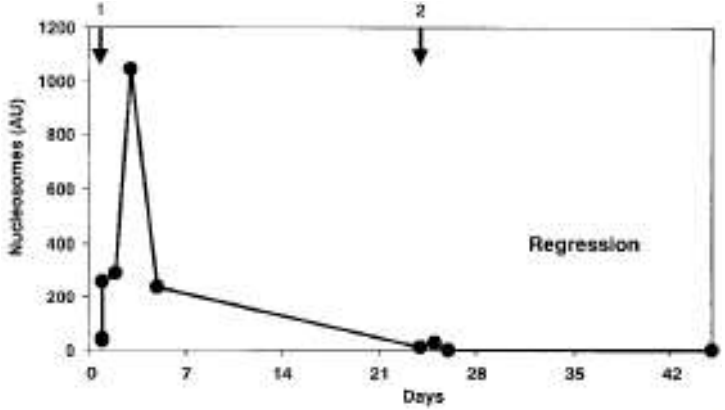
Cell free nucleosomes for disease monitoring



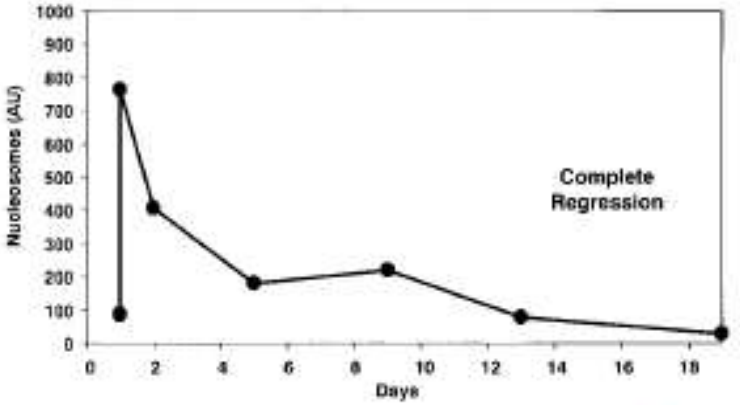
Pancreatic Cancer – Chemo progression



Lung Cancer – Chemo progression



Lung Cancer – Chemo regression

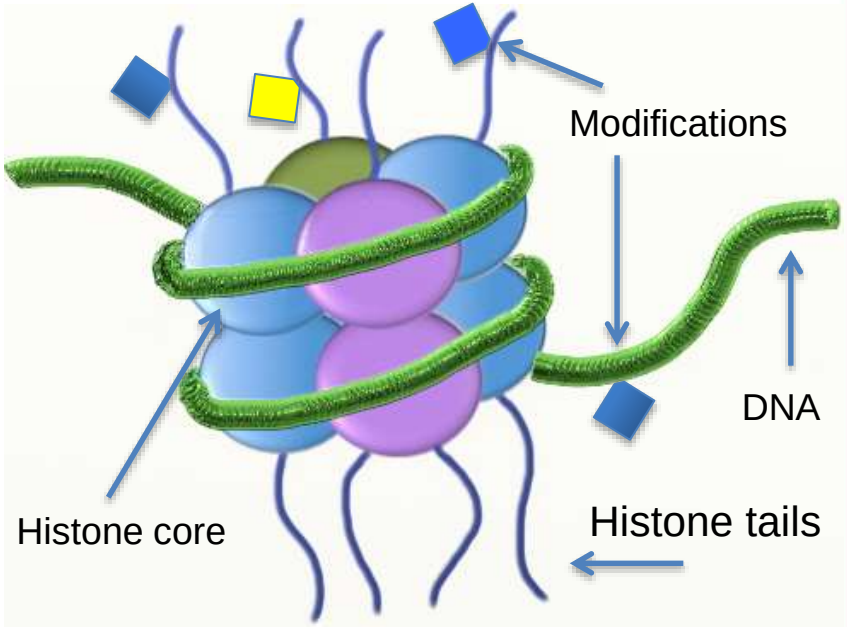


Head and neck Cancer – Radio regression

Holdenrieder et al, Nucleosomes in serum of patients with benign and malignant diseases. Int. J. Cancer (Pred. Oncol.): 95, 114–120, 2001

Nucleosomes - Diagnostic Potential

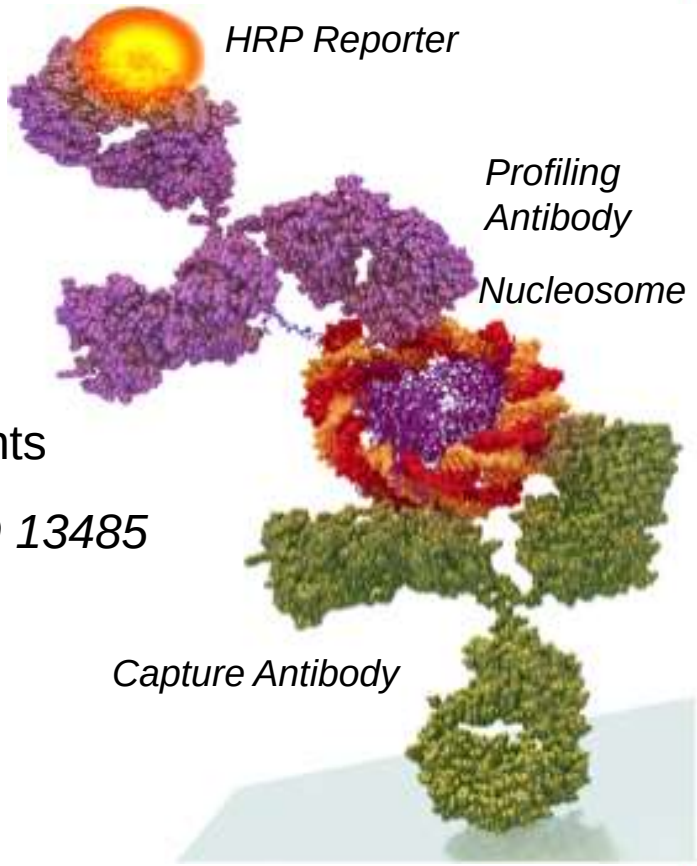
- Nucleosomes are a basic structural unit for genes
- Elevated cell turnover increases blood nucleosome levels
  - Cancer, heart attack, surgery, severe auto-immune disease
- This has previously limited diagnostic applications
  - Therapy response
  - Relapse
- ***Volition has solved this problem***



Nucleosomics® - Accessing the Epigenome

Four patent-protected NuQ® suites of products:

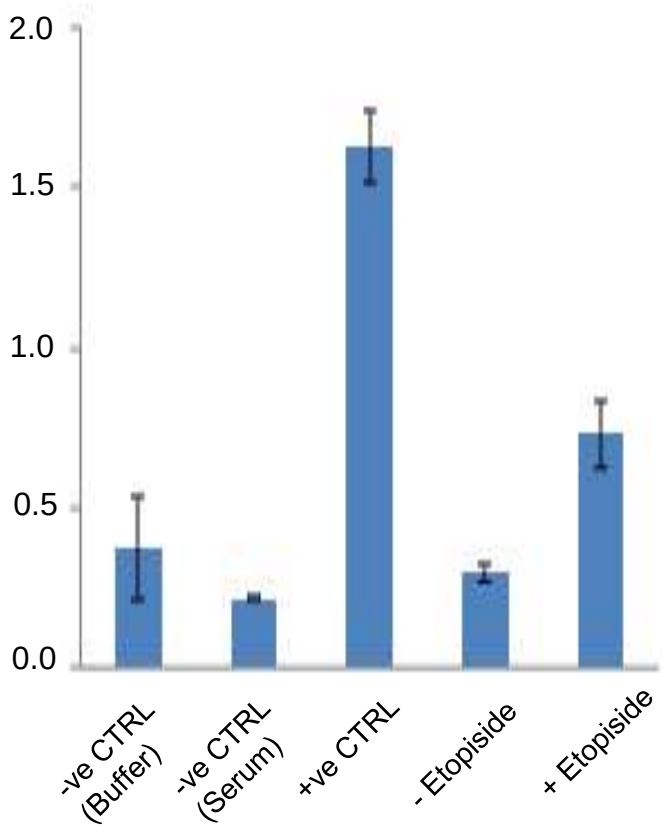
1. **NuQ®-X** specific DNA modifications
2. **NuQ®-V** histone variants
3. **NuQ®-M** histone modifications
4. **NuQ®-A** nucleosome-protein adducts



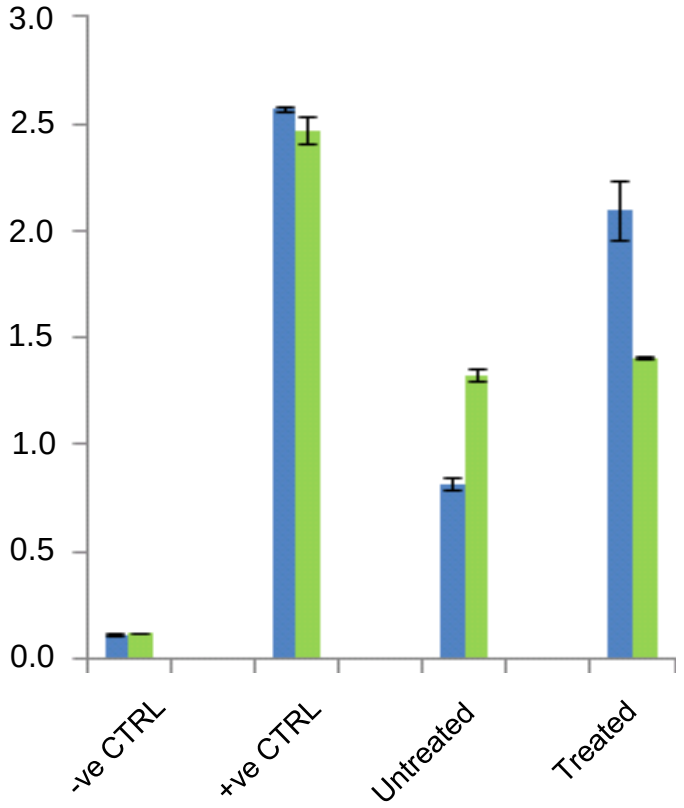
- Antibody supply and development agreements
- In house manufacturing and outsourced *ISO 13485*
- Research use only kits launched Q1 2014
- 6 assays (retail €795-€995) and growing
- Global distribution agreement

Nucleosomics® - In-vitro tissue culture

Healthy and Apoptotic HepG2 cells



HepG2 cells treated with HDACi (TSA)



VOLITION RX

Research Use Only assays

Nucleosomics® - Wales Cancer Bank study design

Phase I:

1. **25 Colorectal Cancer** — **76% Sensitivity, 90% specificity**
2. **25 Breast Cancer** — **96% Sensitivity, 90% specificity**
3. **25 Lung Cancer** — **100% Sensitivity, 79% specificity**
4. **25 Pancreatic Cancer**

Phase II:

1. **229 Colorectal Cancer**
2. **566 Breast Cancer**
3. **14 Lung**
4. **17 Pancreatic**

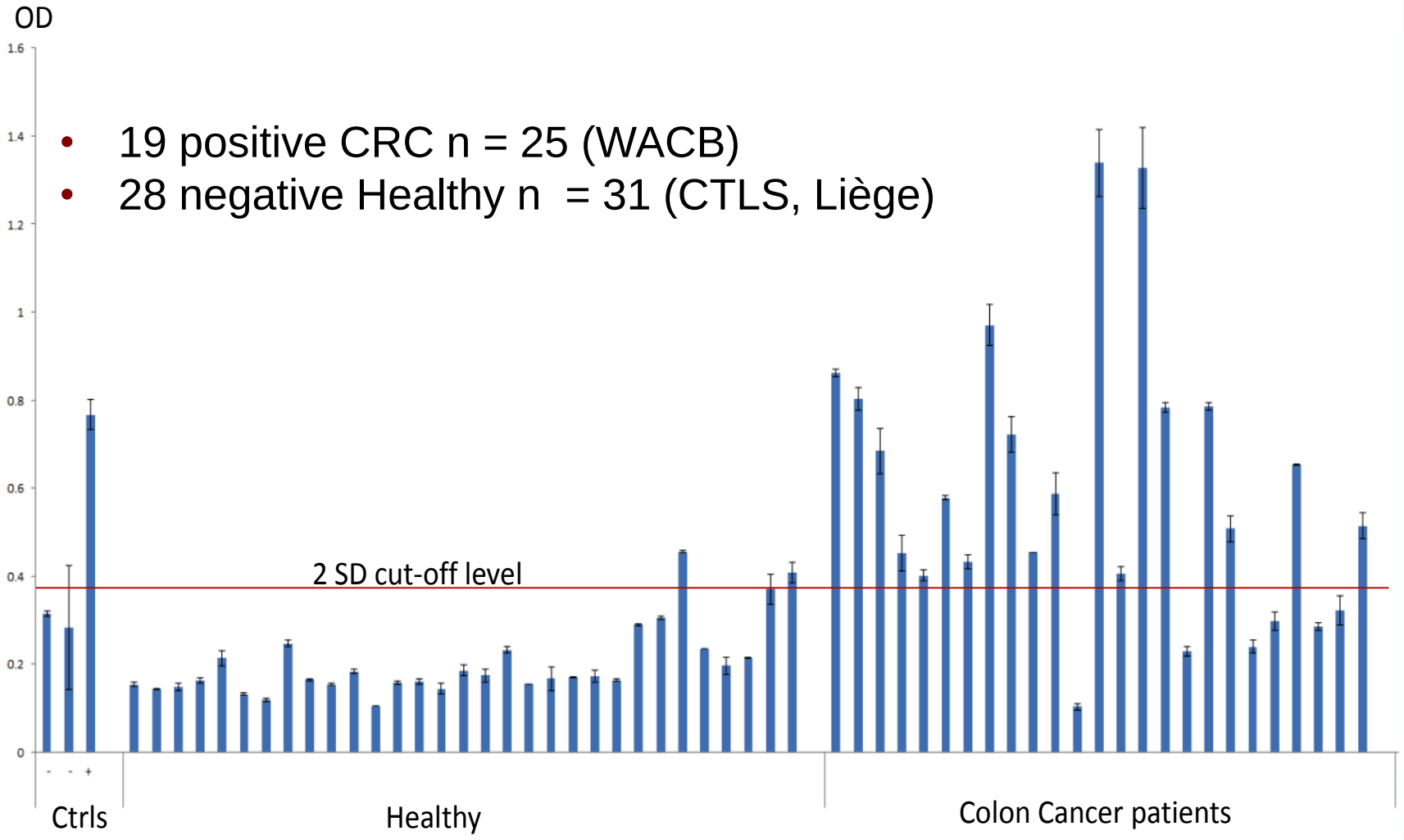
- Age/sex matched healthy controls
- Inclusion of benign disease patients
- Larger studies of clinical sensitivity and specificity

VOLITION RX

Very Encouraging Pilot data

Nucleosomics® - WCG Pilot Study

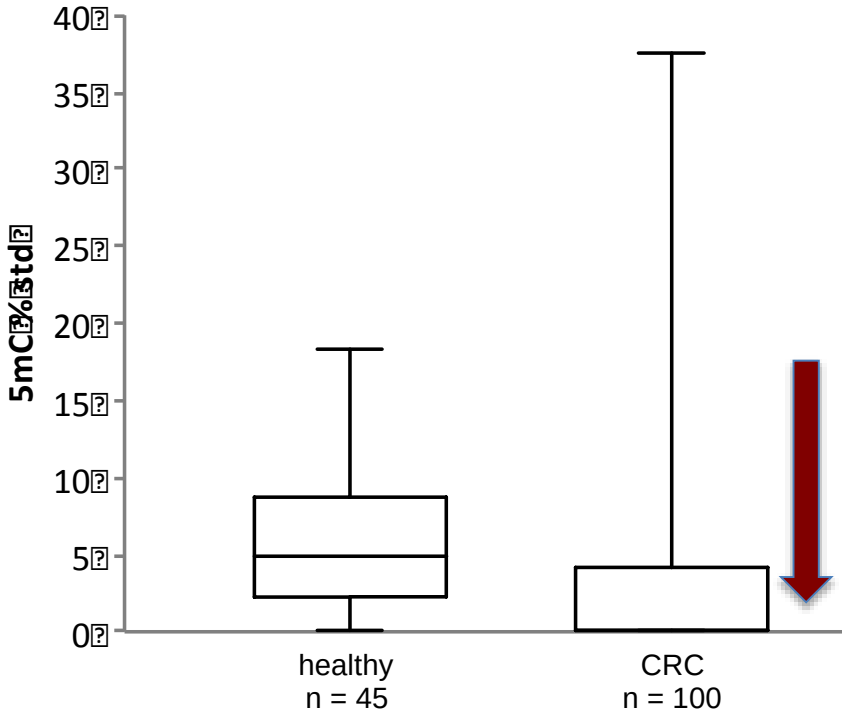
- 19 positive CRC n = 25 (WACB)
- 28 negative Healthy n = 31 (CTLS, Liège)

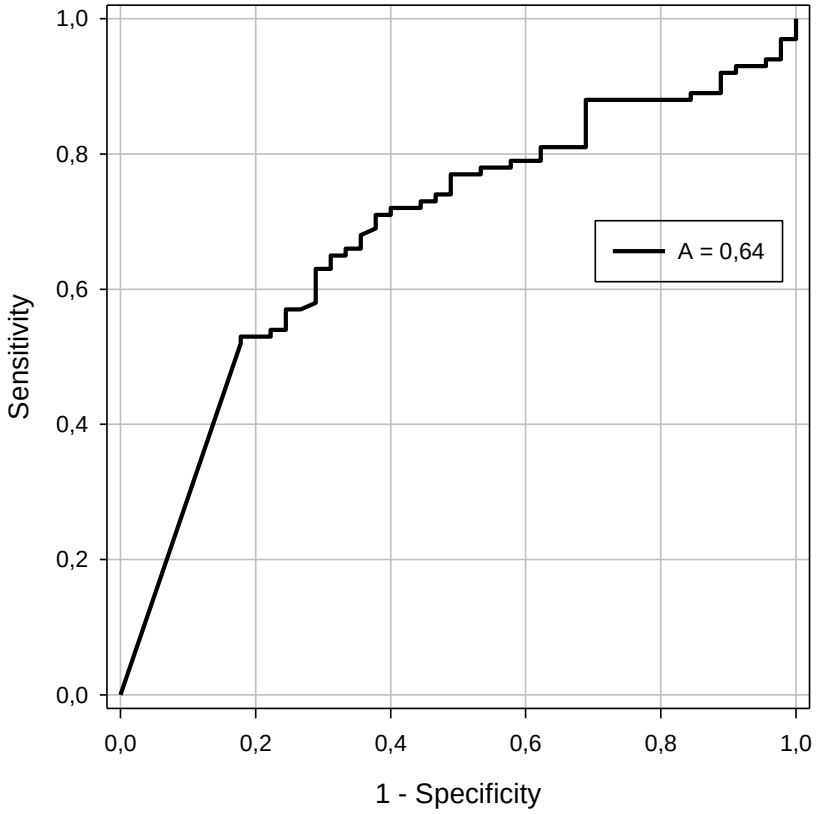


VOLITION RX

NuQ®- 76% Sensitivity / 90% Specificity

Nucleosomics® - 5MC Single Biomarker



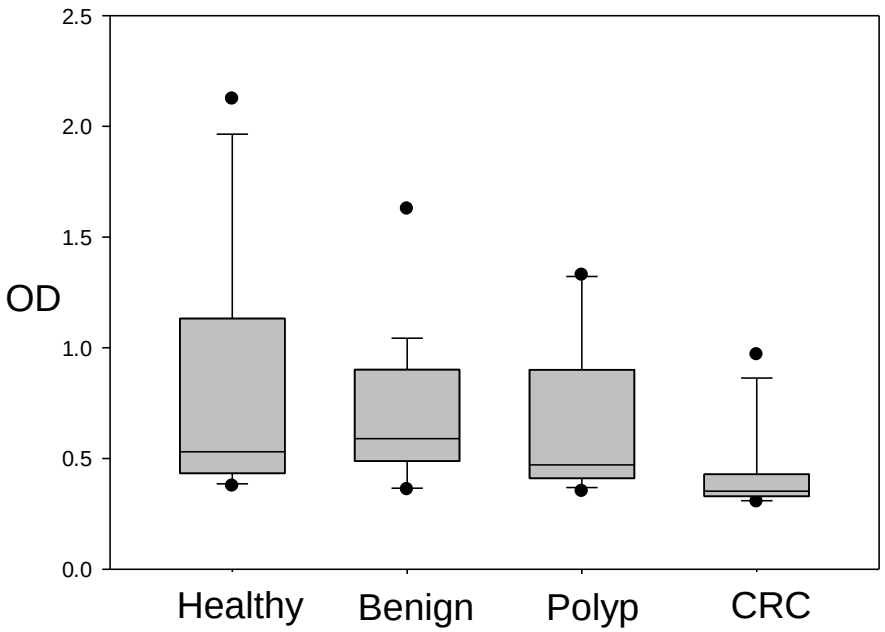


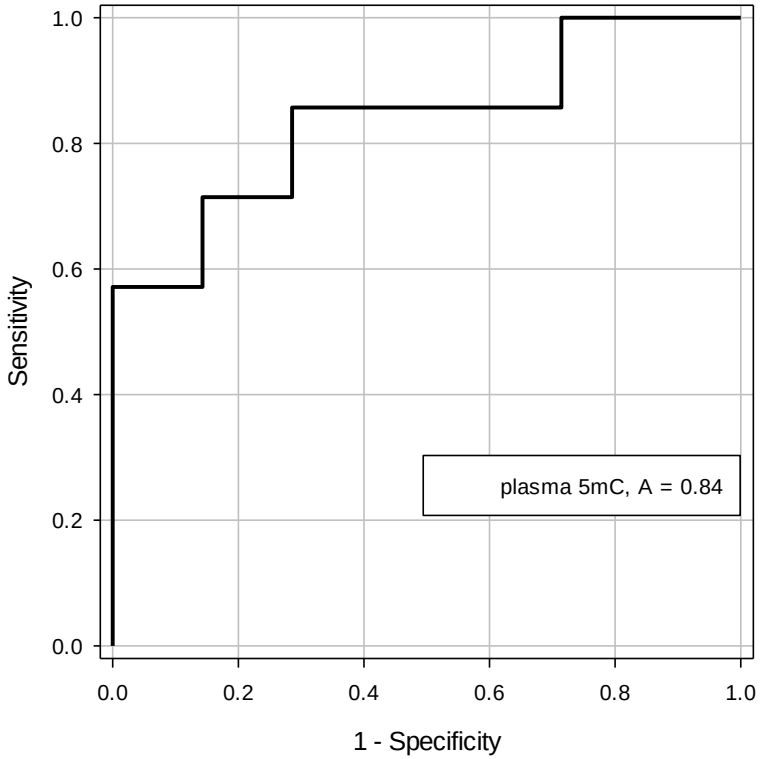
- CRC n = 100 (WACB)
- Healthy n = 45 (CTLS, Seralab, Liège, Imperial)

VOLITION RX

5MC - 68% Sensitivity / 64% Specificity

Nucleosomics® - 5MC Single Biomarker

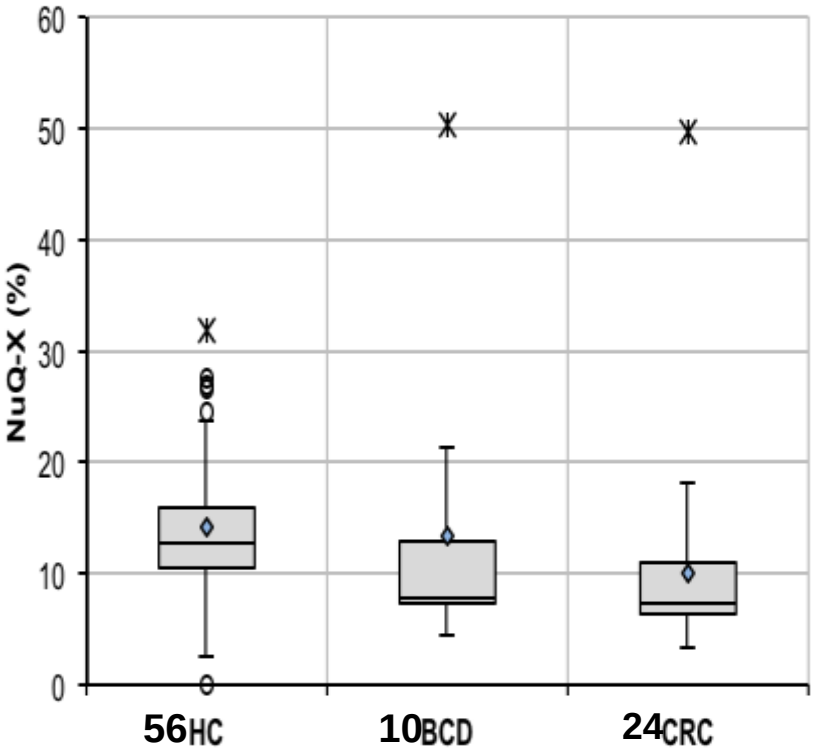


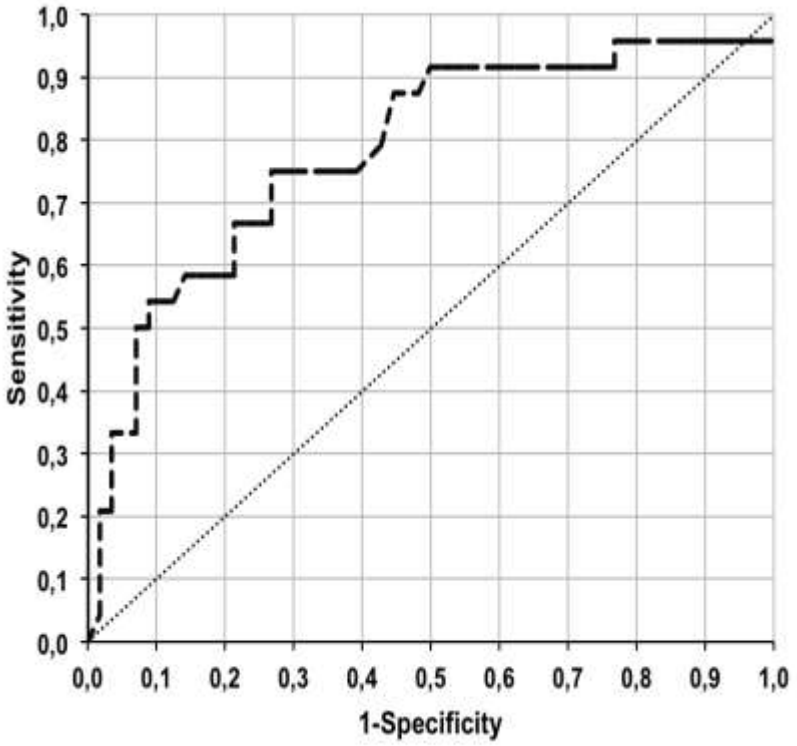


VOLITION RX

5MC - 70% Sensitivity / 75% Specificity

Nucleosomics® - 5MC Single Biomarker



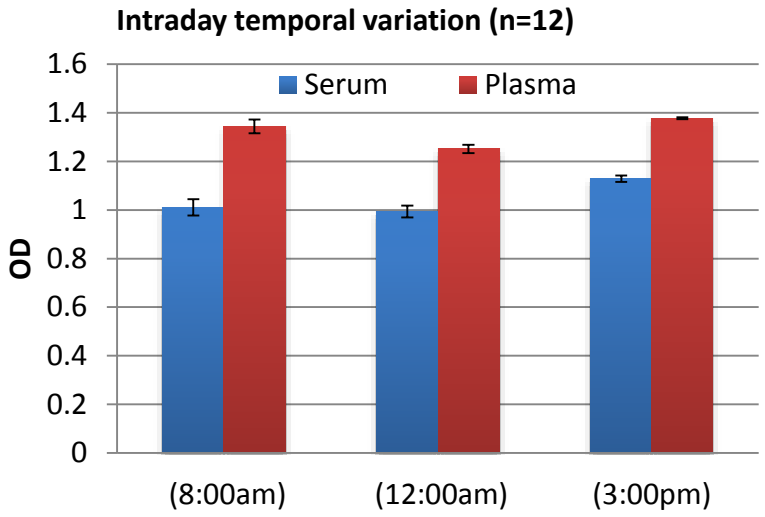


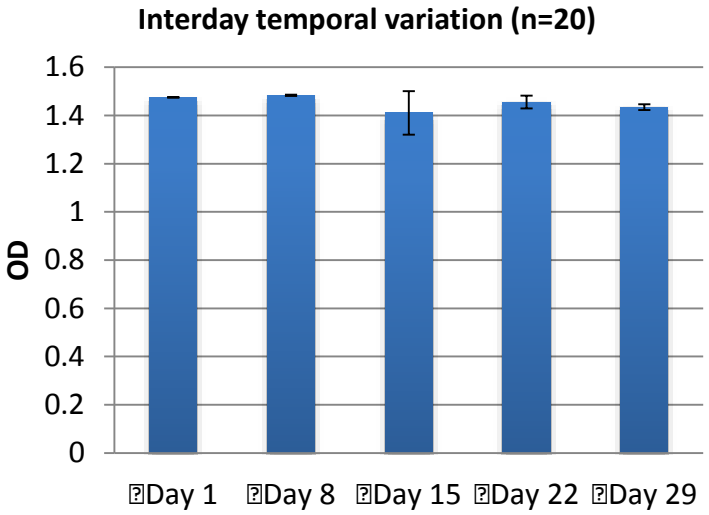
Holdenrieder *et. al.* ANTICANCER RESEARCH 34**: 2357-2362 (2014)**

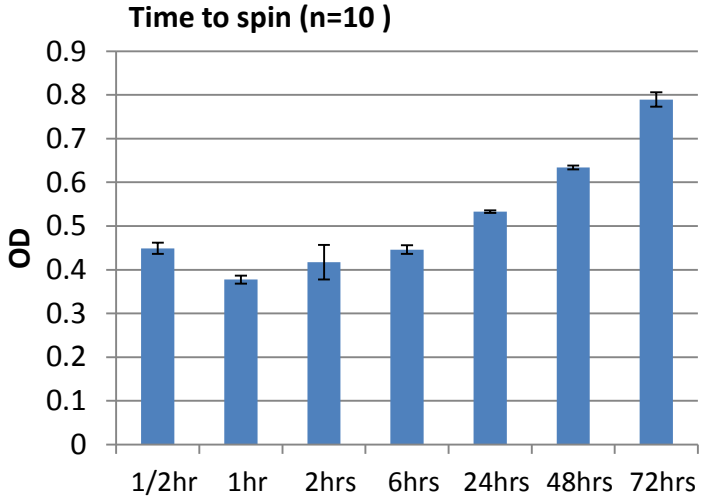
VOLITION RX

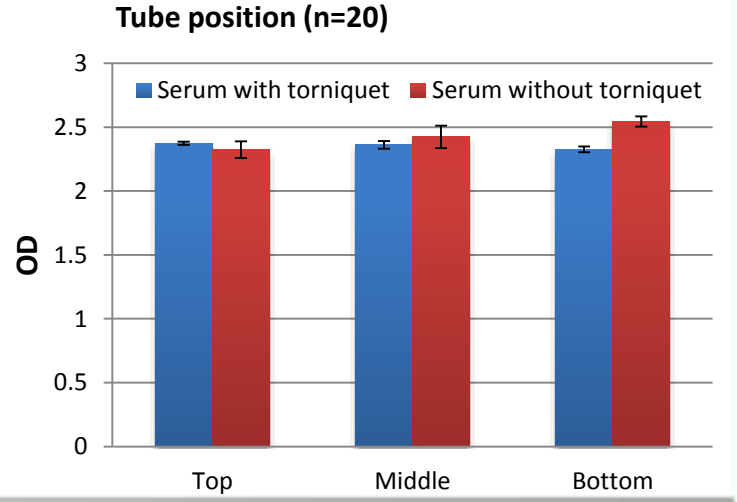
Reproducible data sets

Nucleosomics® - 5MC Preanalytics





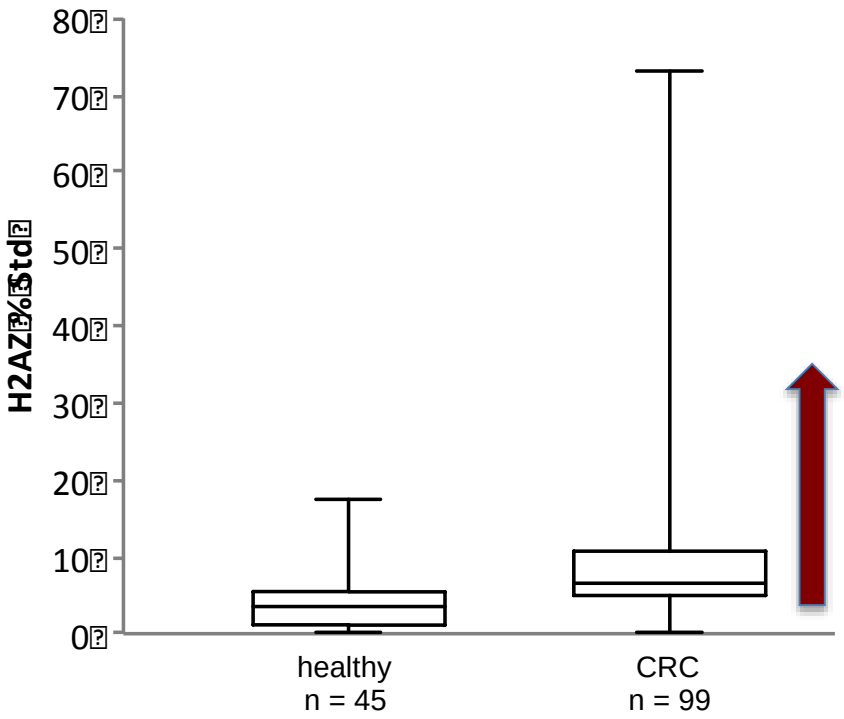


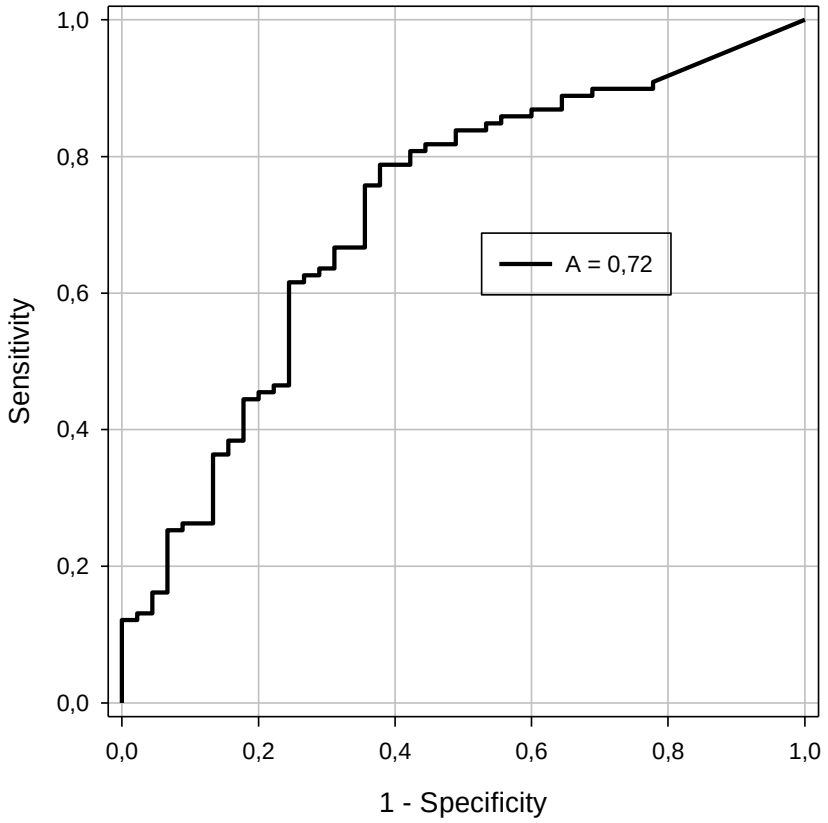


VOLITION RX

5MC - Clinically robust Biomarkers

Nucleosomics® - NuQ® V001 Single Biomarker



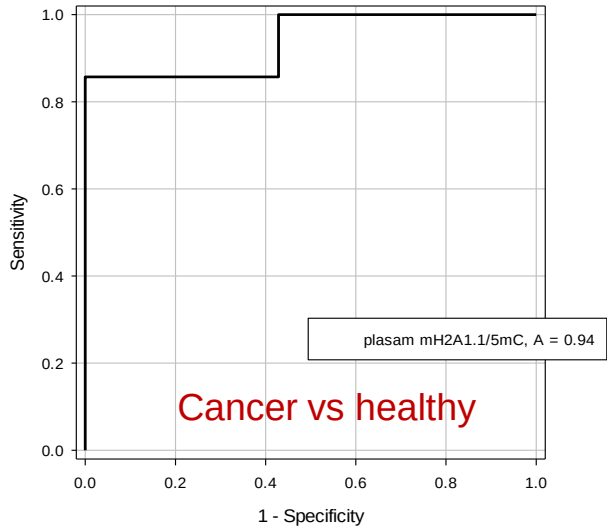


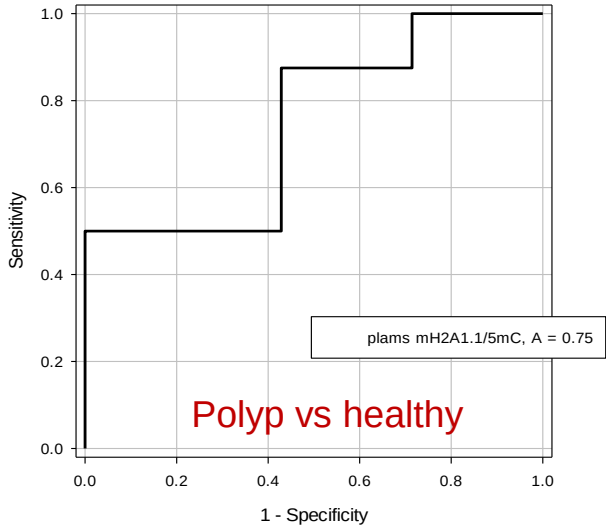
- CRC n = 99 (WACB)
- Healthy n = 45 (CTLS, Seralab, Liège, Imperial)

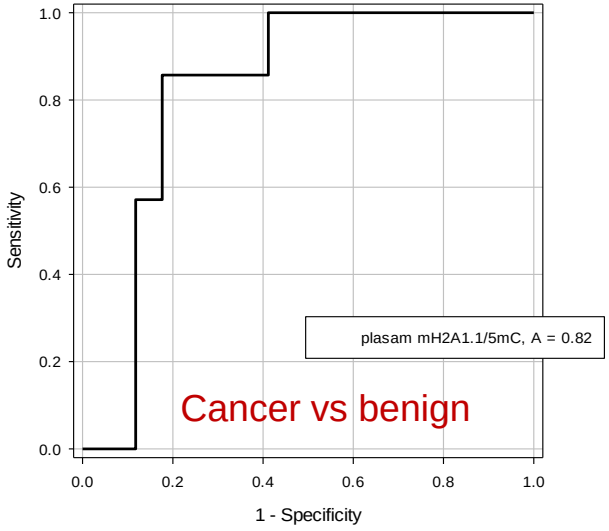
VOLITION RX

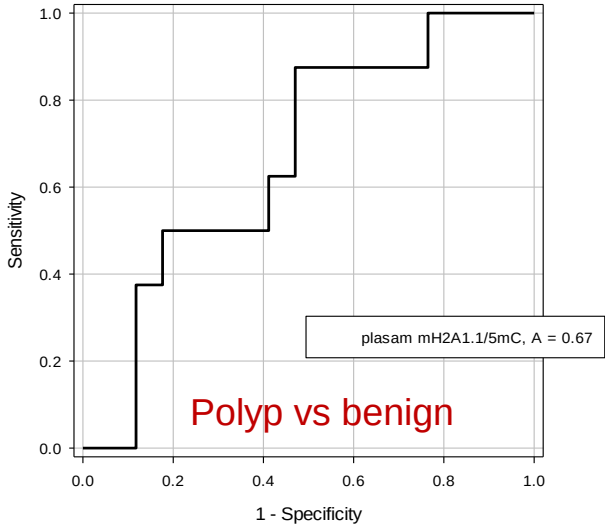
NuQ® V001 - 75% Sensitivity / 64% Specificity

Nucleosomics® - mH2A1.1/5MC Multiple Biomarker









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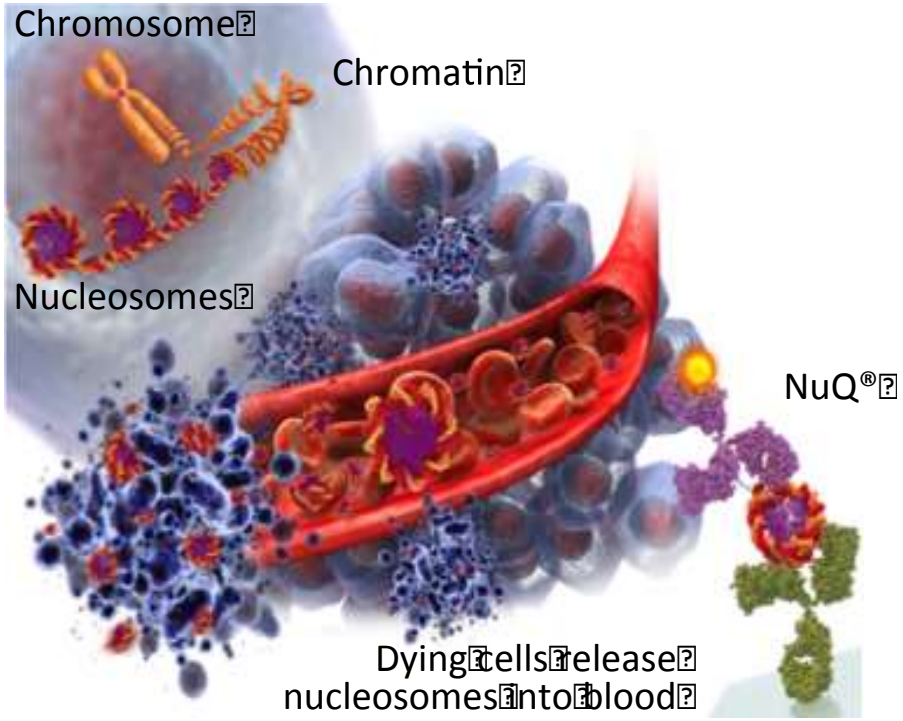
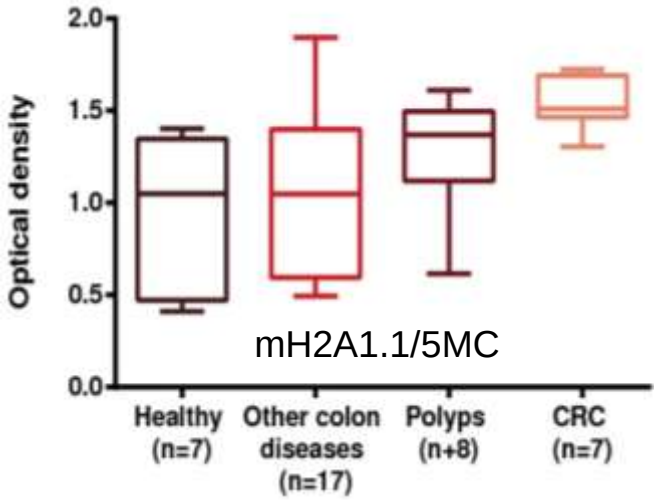
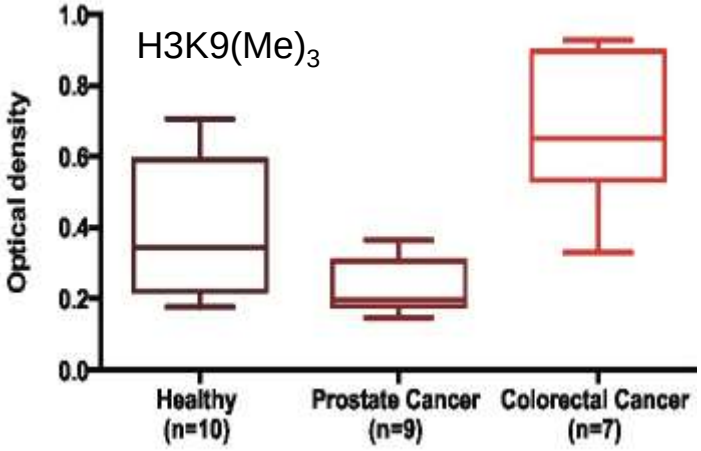
Multiple markers improve sensitivity/specificity

Nucleosomics®- Revolutionizing Cancer Diagnostics







- Clinical trials colon and prostate cancer
- CE mark application for lead indication
- Expand to US and pilot new indications

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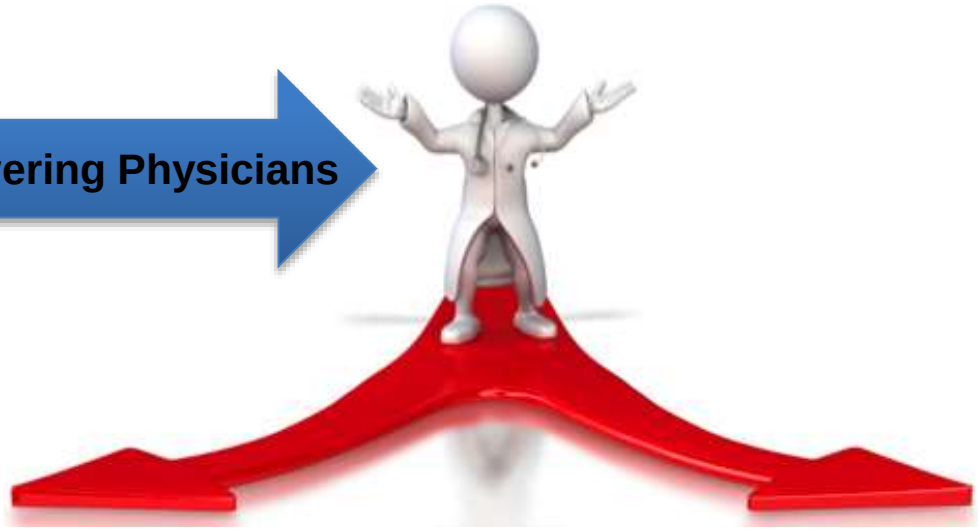
Simple, affordable, accessible cancer diagnostics

Nucleosomics®- Revolutionising Cancer Diagnostics

- Easily implemented
- Point of Care diagnosis

Empowering Physicians



High Sensitivity

(identifies patients with disease)

Rapid Specialist referral and treatment selection

High Specificity

(identifies healthy)

Peace of mind

VOLITION RX

Earlier diagnosis improves outcome

Nucleosomics® - Commercial and Patient Impact

The Market – our target

- "Blockbuster" population screening – $4Bn for colorectal cancer
- Third most common cancer worldwide
  - 1 230 000 newly diagnosed and 609 000 deaths annually
- Second most common cancer in EU
  - 450 000 newly diagnosed and 230 000 deaths annually
- Mainly affects over 50s i.e. 175M citizens in Eu

The Patient – our goal

- Earlier diagnosis of major cancers
- Stratification and treatment selection
- Monitoring for high risk groups e.g. genetically predisposed and relapse
- Non Invasive, affordable technology accessible by all

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Significant unmet clinical need

VolitionRx - Current Trials

Cancer Banks

- Wales - 500 patient retrospective study in breast cancer
- Manchester - 100 patient prospective study - renal, bladder and prostate (Urine)

Hvidovre Hospital, University of Copenhagen, *Denmark*

- Retrospective 5000 patient study – Colorectal population screening
- Prospective 14 000 patient study – Colorectal population screening

Bonn University Hospital, *Germany*

Retrospective 800 patient study – various cancers (completed)

- Retrospective 1500 patient study - Lung cancer
- Prospective 4000 patient study - various cancers, healthy and disease controls
- Neo-adjuvant therapy stratification – breast cancer

Mont-Godinne Hospital, *Belgium*

- 250 patient longitudinal study - early detection/prognosis of colorectal cancer.

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EU trials to support CE mark application in 2014

VolitionRx - Partnering opportunities

Volition is seeking collaborators with well-annotated blood or urine samples from various stages of disease as well as suitable control materials for further clinical studies particularly from therapeutic trials for patient stratification

Hardware platform providers – research and diagnostic

CROs - epigenetic assays and generic efficacy/toxicity biomarkers

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VOLITION RX

Seeking additional development partners