Adjunctive technologies

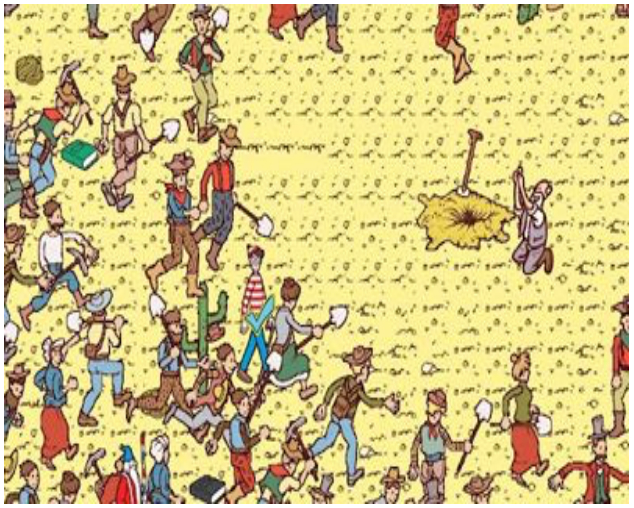
Adjunctive technologies

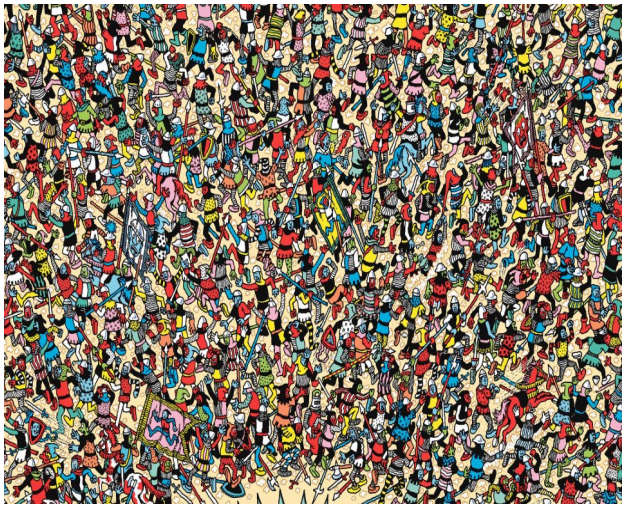
- The problem
- What is out there
- DYSIS
- Zedscan
- My experience

Challenges facing colposcopy

- Low sensitivity of colposcopy
- HPV primary screening
- HPV vaccination

Needle in the haystack



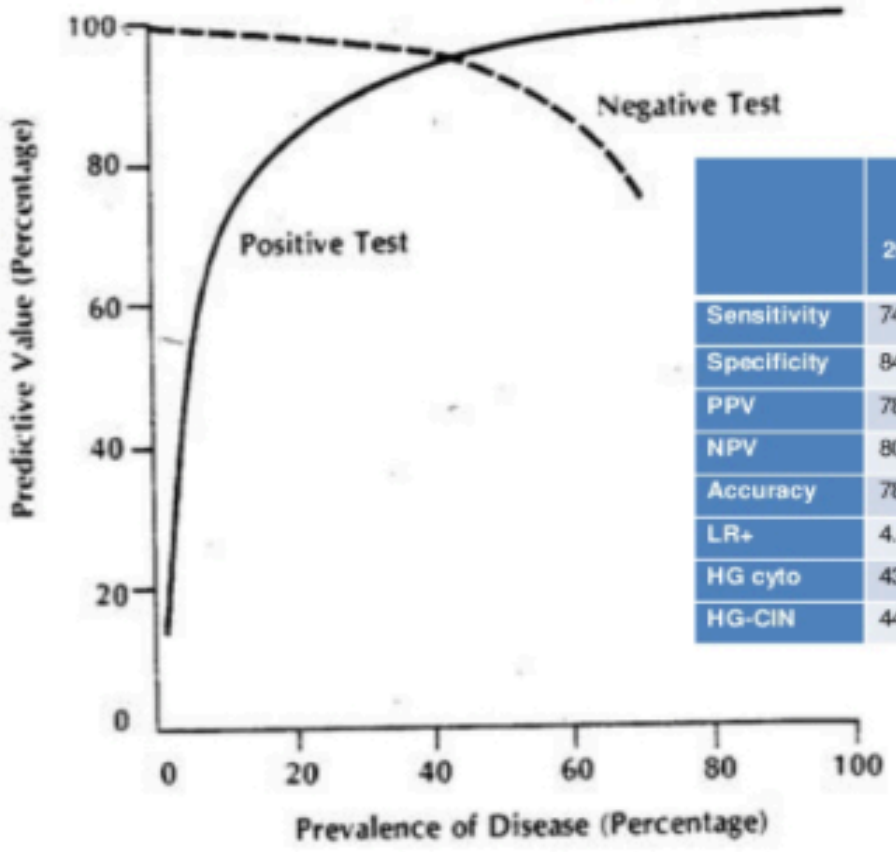


Colposcopy in different populations

	HSIL	LSIL	Neg / HR +ve	Neg / 0 +ve
Tidy 2015	93	55	43	35
Wentzensen 2015	60	32	-	-

PPV depends on prevalence

Relationship between prevalence and PPV



	Tidy et al BJOG 2013;120:400-11	Louwers et al BJOG 2011;118:309-18	van der Marel et al BJOG 2014;121:1117-26
Sensitivity	74% (63-83%)	52% (42-61%)	62 (55-67%)
Specificity	84% (75-90%)	82% (75-88%)	82% (78-86%)
PPV	78% (68-86%)	70% (60-80%)	73% (67-78%)
NPV	80% (71-87%)	67% (60-75%)	73% (69-78%)
Accuracy	78%	70%	74%
LR+	4.46	2.13	3.4
HG cyto	43.7%	33.0%	55.4%
HG-CIN	44.4%	46.0%	60.0%

Relationship between disease prevalence and predictive value in a test with 95% sensitivity and 85% specificity.

How to improve colposcopy

- Training / certification
- Number of biopsies
- Adjunctive technologies

How can adjunctive technology help?

- Increase detection of HG-CIN (sensitivity)
- Improve PPV for S&T (specificity)
- Reduce number of biopsies
- Confirmation of normal colposcopy

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New Technologies

- LuViva - fluorescence + reflectance
- TruScreen – visible light + infra red + voltage decay
- DYSIS – photo-optics to quantify aceto-whiteness
- Zedscan – electical Impedance Spectroscopy

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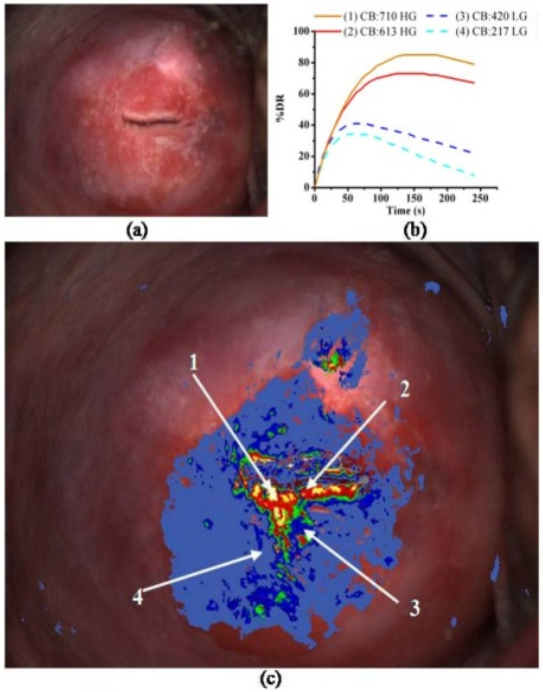
Dynamic Spectral Imaging (DYSIS)



Greater sensitivity than conventional colposcopy

DYSIS performance

	Colposcopy (%)	Colposcopy + DYSIS (%)	p
Sensitivity (TP)	52	80	0.04
Specificity (TN)	82	63	0.11
PPV	76	72	
NPV	68	68	
Accuracy	70	68	
Positive likelihood ratio	2.13	2.83	

Prevalence of CIN2+ 45%

Louwers et al BJOG 2011

DYSIS increases detection of HPV related CIN – Zaal et al BJOG 2012

Increases sensitivity irrespective of referral cytology – Louwers et al 2015

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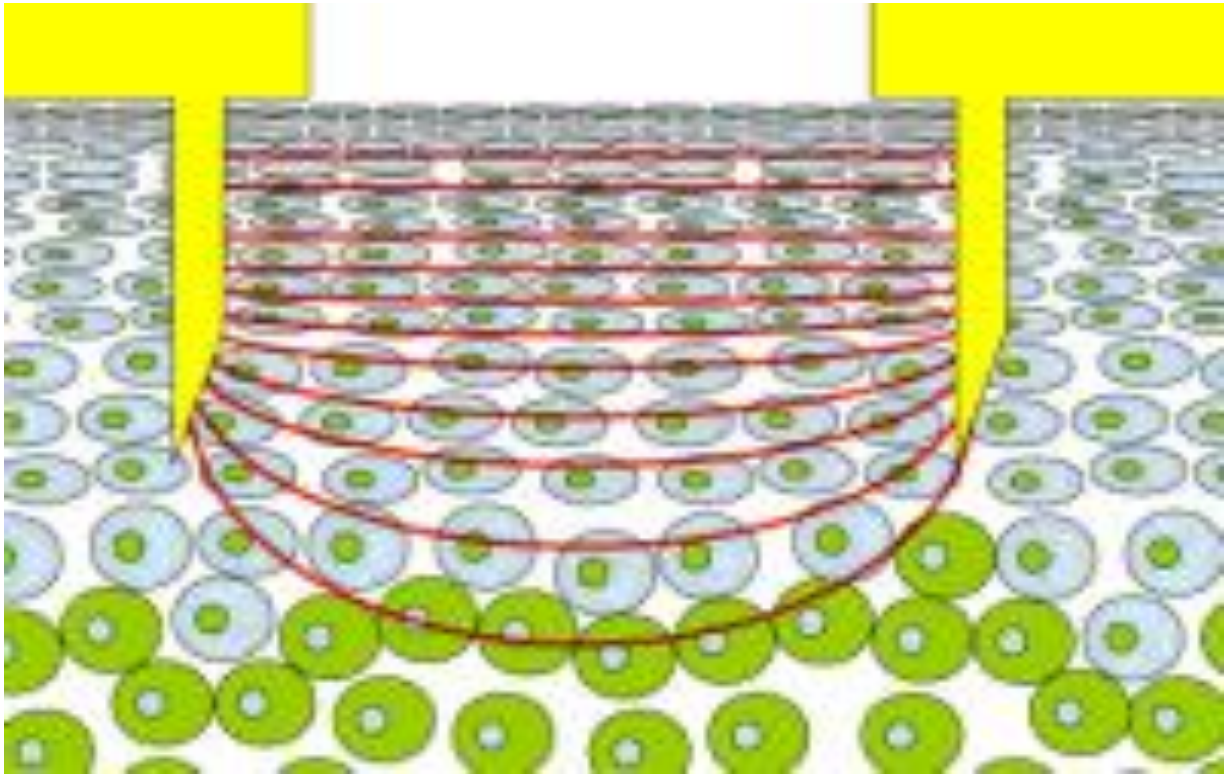
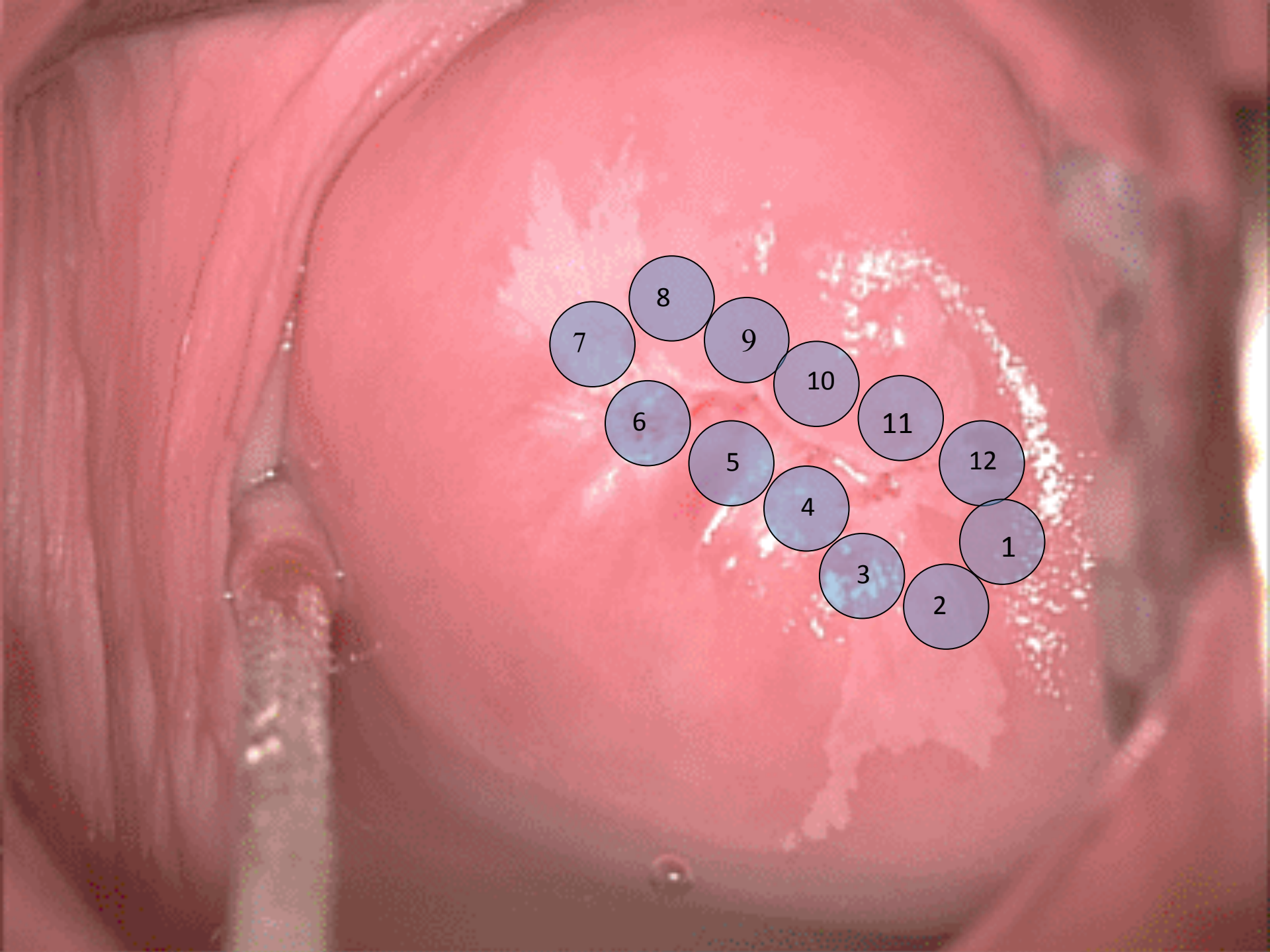
Electrical Impedance Spectroscopy

Measures resistance by applying a weak alternating current between two electrodes on the tip of the probe.



Zedscan


8
7
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12
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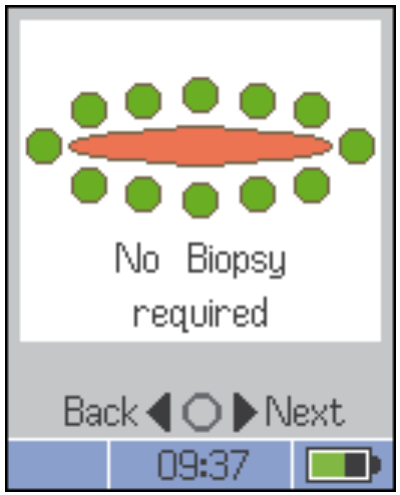
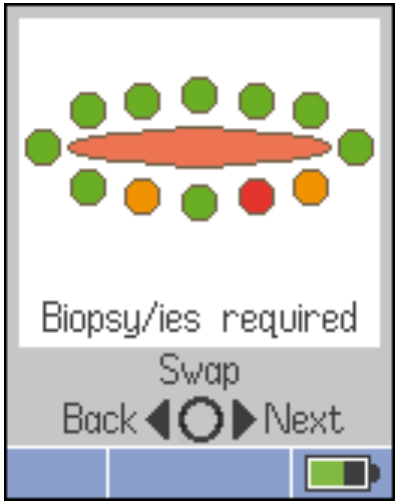
4
1
3
2

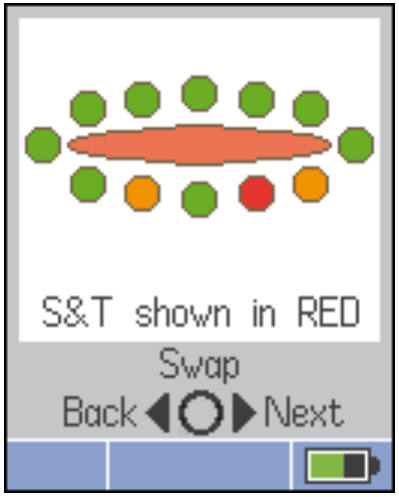
Real time data processing and display



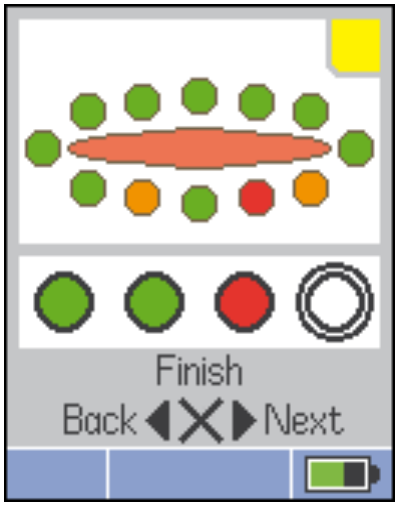
Confirms negative result



Identifies areas to biopsy



Identifies areas that pass threshold for ‘see & treat



Single point mode to accurately identify site to biopsy

What it does

- Improves sensitivity
- Improves specificity
- Facilitates see-and-treat

Tidy JA et al. BJOG. 2013

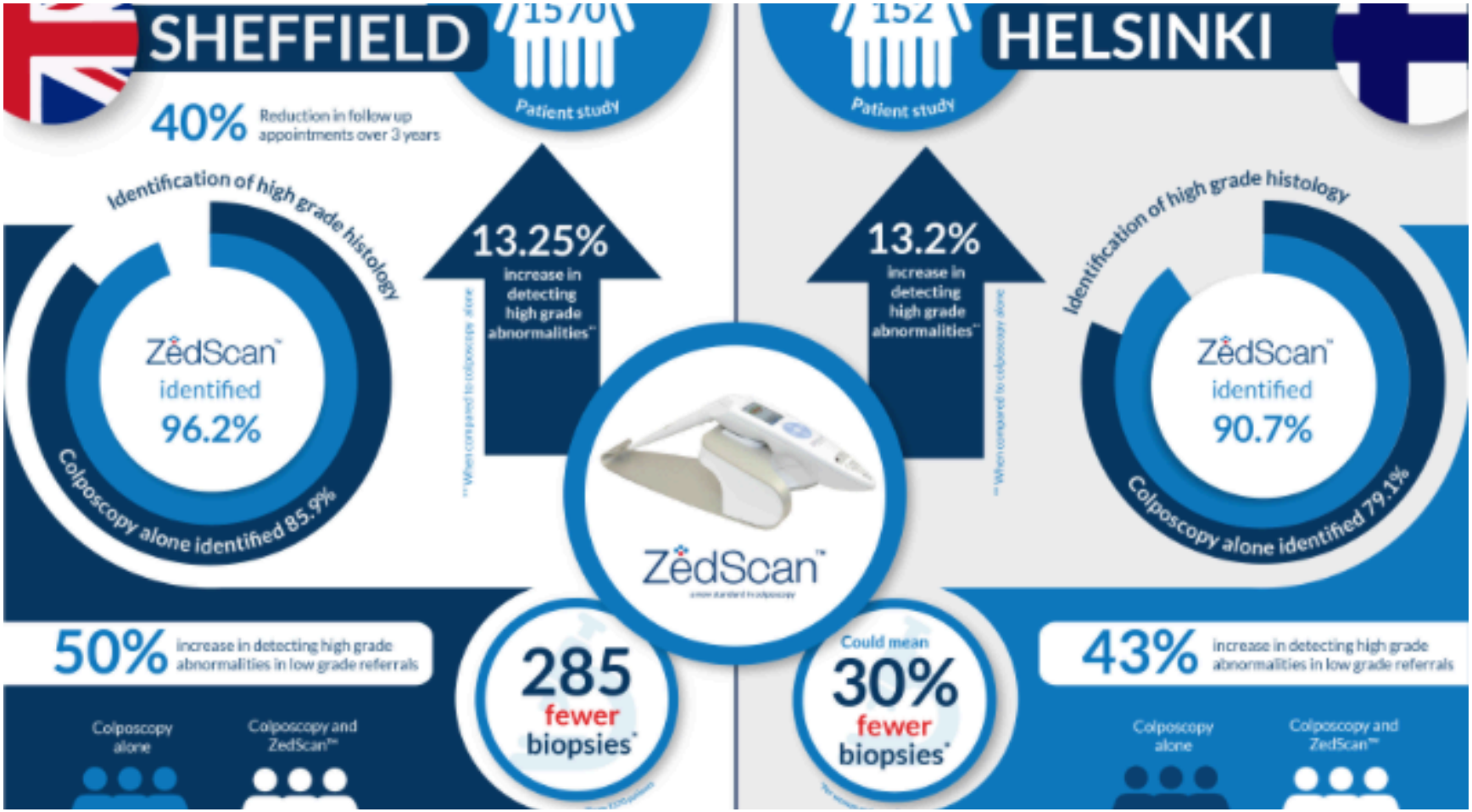
Sheffield (n=1570)

- Detects more disease
  - An additional 13.25% of HG CIN identified.
  - 50% increase in women with low grade abnormalities
- Less biopsies
- Increased in S&T from 36-39% to 68% (PPV =94.2)
- Less FU appointments

International evaluations

- 562 at 8 centres
- Increased sensitivity
- Increased detection of CIN2+
- Performance independent of context

Even in Finland!



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UHNM Feasibility Exercise

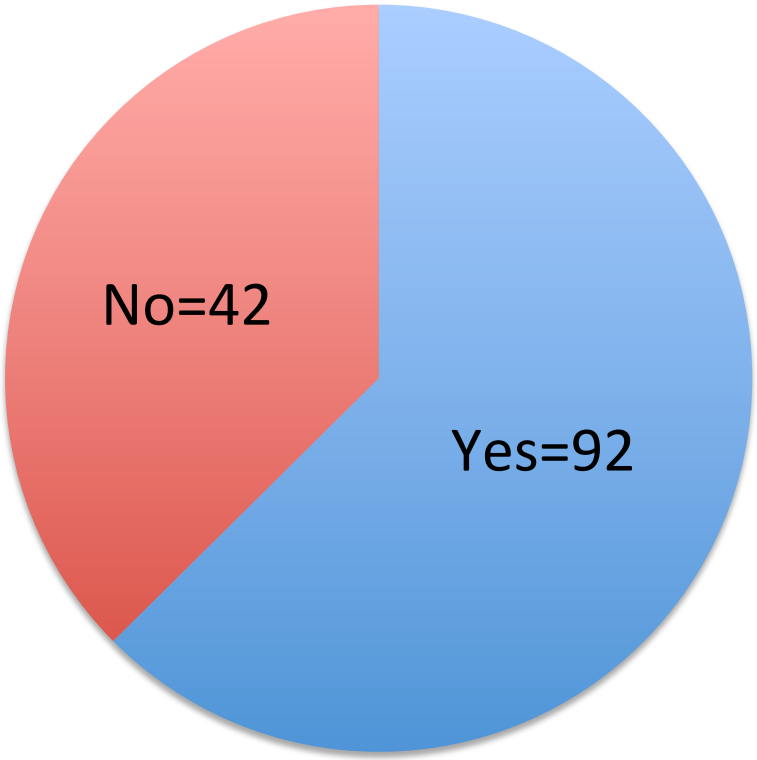
Population – single operator

- May 2016 – November 2017
- Total of 275 colposcopy patients
- 134 Zedscan eligible

EXCLUSIONS:

- **TZ 3**
- **Clinical referral**
- **? Invasive**
- **Glandular**
- **No cervix**

Zedscan in eligible cases (N=134)



Increased use in eligible patients (was 37%)

Non-usage in eligible patients(n=42)

Reason	No biopsy	Loop	Punch	Total
HG disease	0	19	0	19
Failure	0	0	9	9
Completion	0	5	0	5
Not known	1	0	2	3
TZ2	0	1	2	3
Pregnancy	2	0	0	2
CIN2	0	1	0	1

- Scope for improving specificity in patients with HG referrals?
- Use in pregnancy?
- Teething problems

Alter Management?

YES
N=32

POSITIVE
N=36

NO
N=4

	No CIN	CIN 1	CIN 2+	Total
Would not have taken bx	12	4	2	18
Single bx only	6	3	5	14

Improve sensitivity
Reduces number of biopsies taken per patient

Alter Management?

YES
N=32

POSITIVE

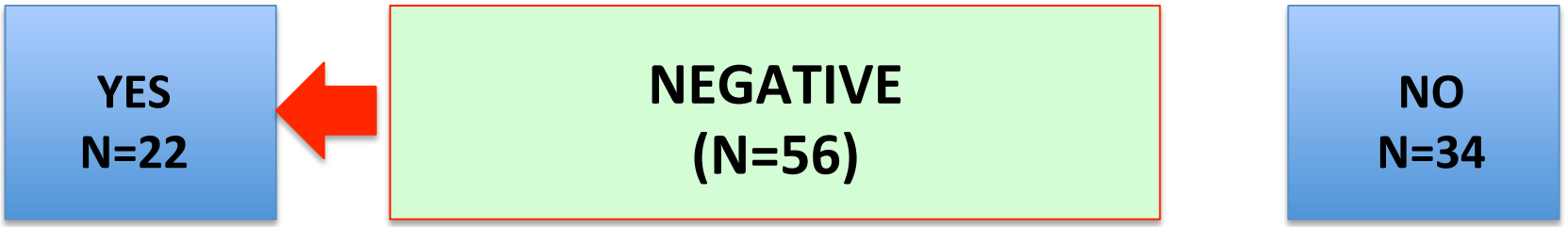
NO
N=4

Biopsies (n=3)	No CIN	CIN 1	CIN 2	Total
Would taken bx anyway	0	0	3	3

No biopsy (n=1)

- Pregnant – LG smear/findings – awaiting FU

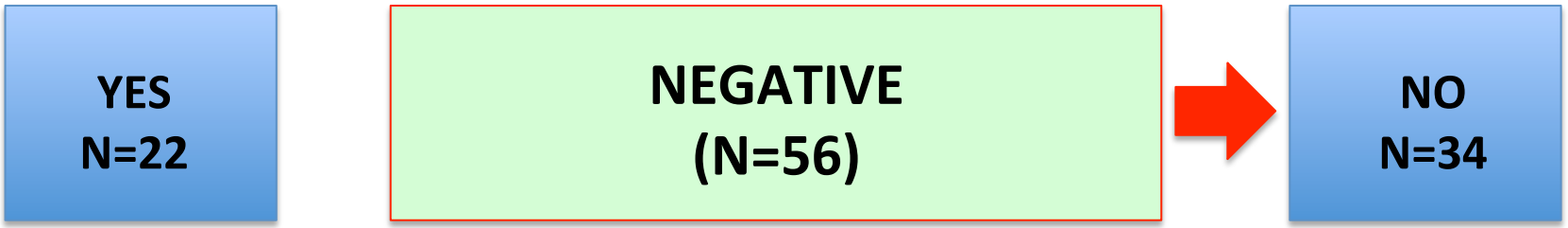
Alter Management?



	Total
Would otherwise have taken biopsies	21
Might have performed Rx (CIN2)	1

Reduced number of patients biopsied
Might aid conservative management of CIN2

Alter Management?



	Total
Would not have taken biopsies in any event	26
Biopsy taken despite Zedscan findings	9

Provides reassurance and facilitates adherence to PHE HPV Triage / TOC algorithm

Zedscan – No influence (n=38)

	No CIN	LG CIN	HG CIN	Total
Pregnant	-	-	-	1
See-and-Treat	0	0	3	3
Bx despite ZS	4	2	1	7
No biopsy				27

Zedscan – Effects (n=54)

	No CIN	LG CIN	HG CIN	Total
Additional Bx	13	4	2	19
Single Bx only	6	3	5	14
No biopsy				21

Summary

- Relatively easy for clinician + patient
- Can’t use in all cases
- Does not influence no women biopsied
- Reduces the number of biopsies taken
- Should improve specificity / sensitivity
- Provides reassurance

Comments

- Helpful
- Flexible / not intrusive
- Provides objectivity
- Use and usefulness will depend on context

Thank you!