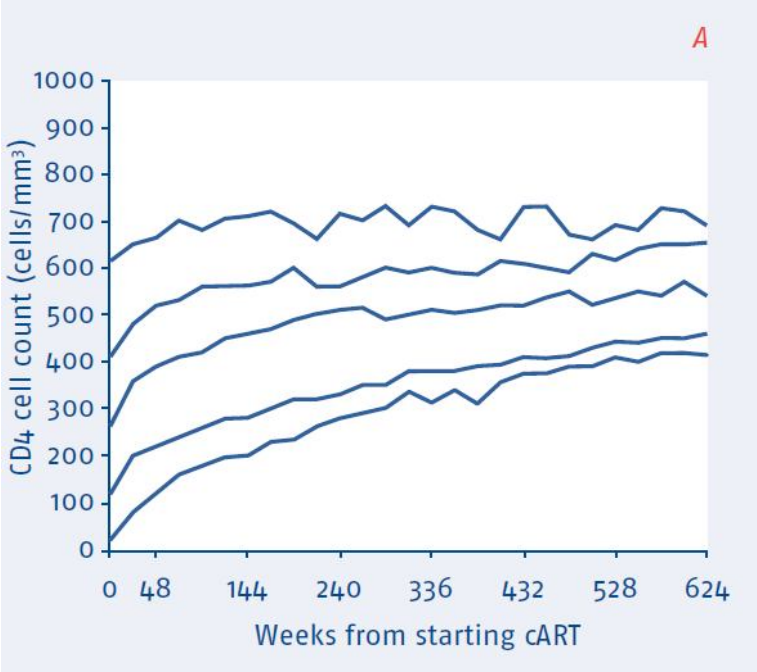
Does (early) cART have a public health benefit?

Ard van Sighem
Frank de Wolf
Stichting HIV Monitoring, NL

State of the cART
5 June 2012

HIV Monitoring

Effect of HIV Treatment



Gras L, et al; J Acquir Immune Defic Syndr 45 (2) 2007

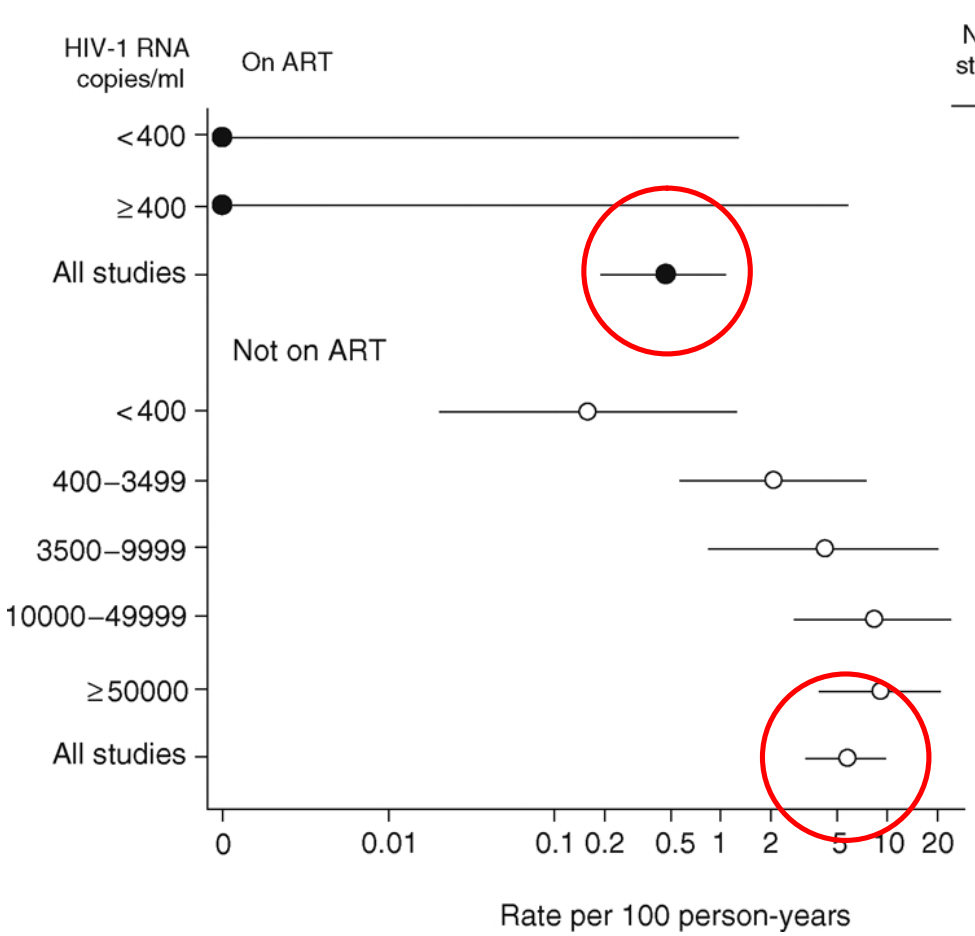
Gras L, et al; Monitoring Report 2011, Stichting HIV Monitoring, Amsterdam, November 2011

What is contribution to new infections from HIV-infected men who have sex with men on suppressive antiretroviral therapy?

Van Sighem, A.I. 2nd International HIV Workshop on Treatment as Prevention Vancouver, 23 April 2012

HIV Monitoring

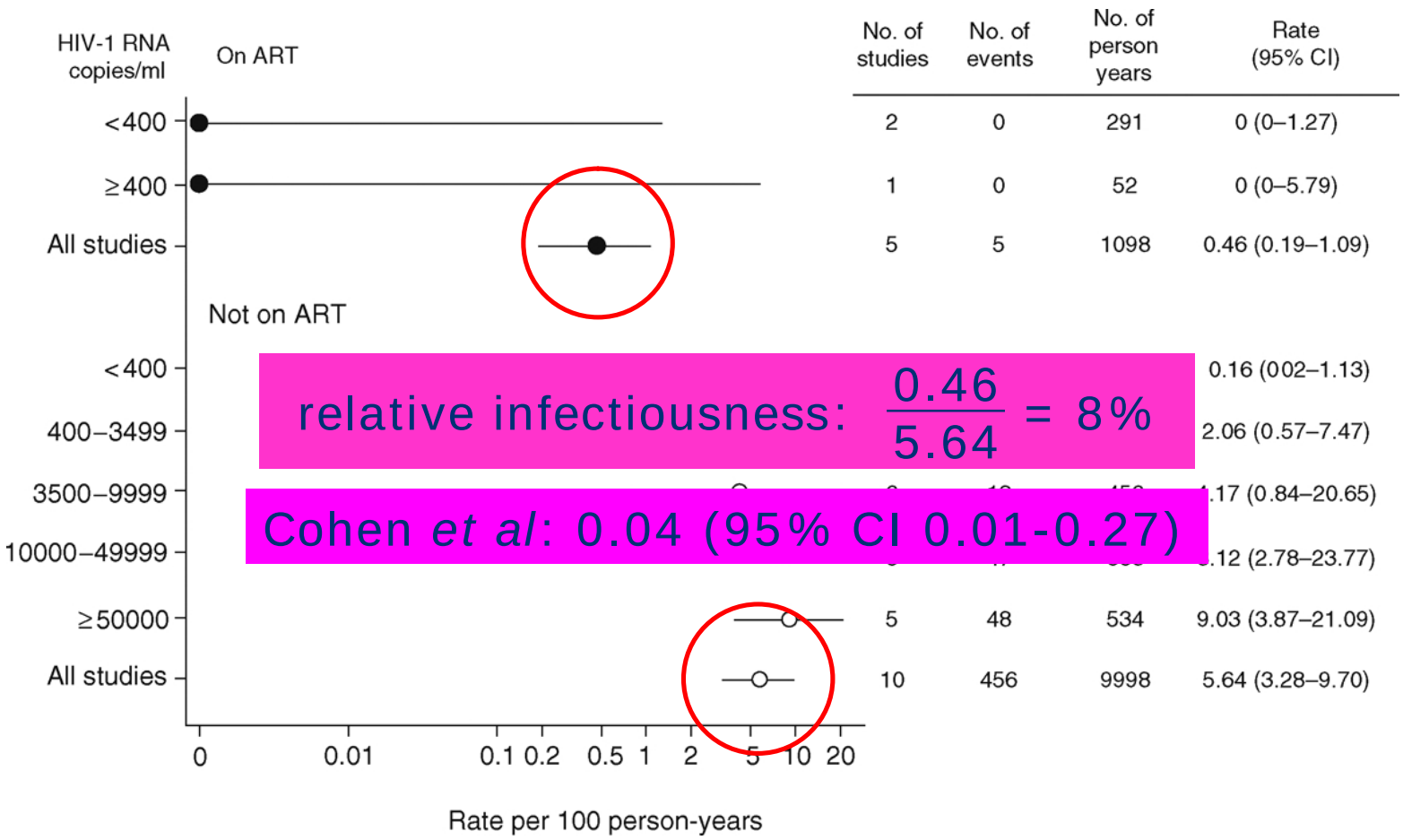
Infectiousness and treatment



	No. of studies	No. of events	No. of person years	Rate (95% CI)
On ART				
<400	2	0	291	0 (0–1.27)
≥400	1	0	52	0 (0–5.79)
All studies	5	5	1098	0.46 (0.19–1.09)
Not on ART				
<400	6	1	631	0.16 (002–1.13)
400–3499	6	7	457	2.06 (0.57–7.47)
3500–9999	6	18	456	4.17 (0.84–20.65)
10000–49999	6	47	668	8.12 (2.78–23.77)
≥50000	5	48	534	9.03 (3.87–21.09)
All studies	10	456	9998	5.64 (3.28–9.70)

Attia *et al.*, AIDS 2009

Infectiousness and treatment



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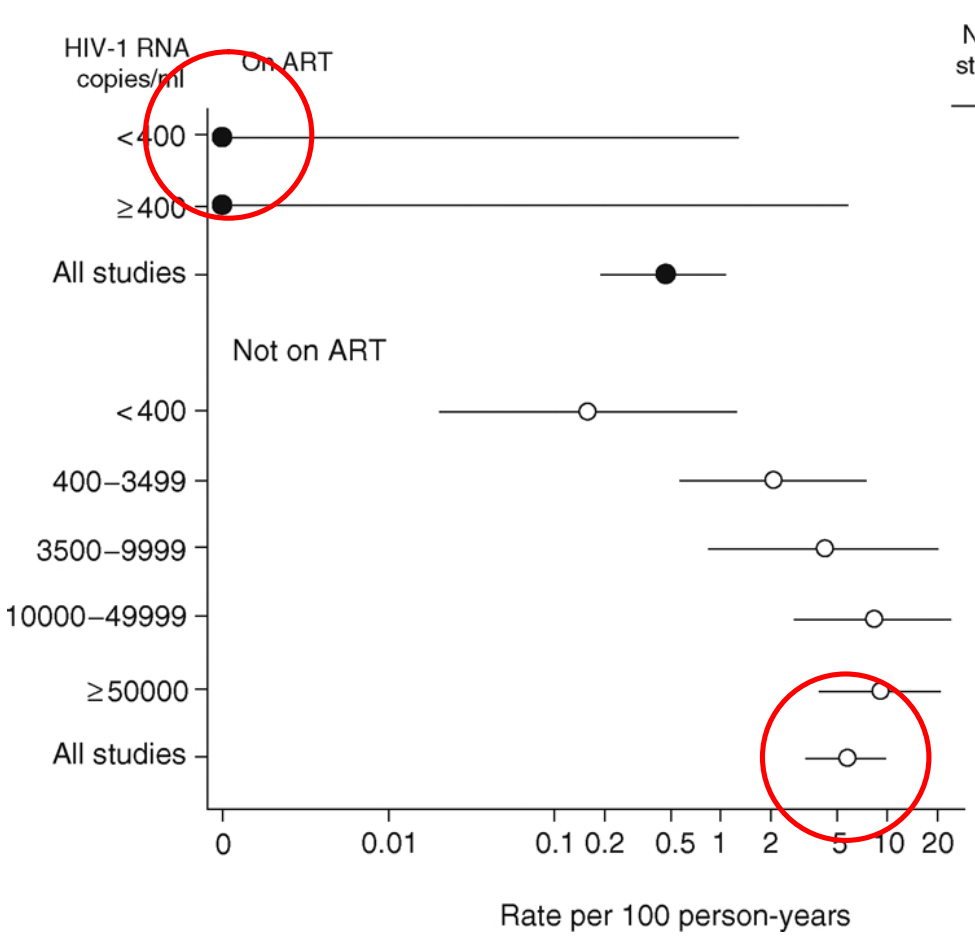
relative infectiousness: $\frac{0.46}{5.64} = 8\%$

Cohen *et al*: 0.04 (95% CI 0.01-0.27)

Attia *et al*., AIDS 2009

Infectiousness and treatment



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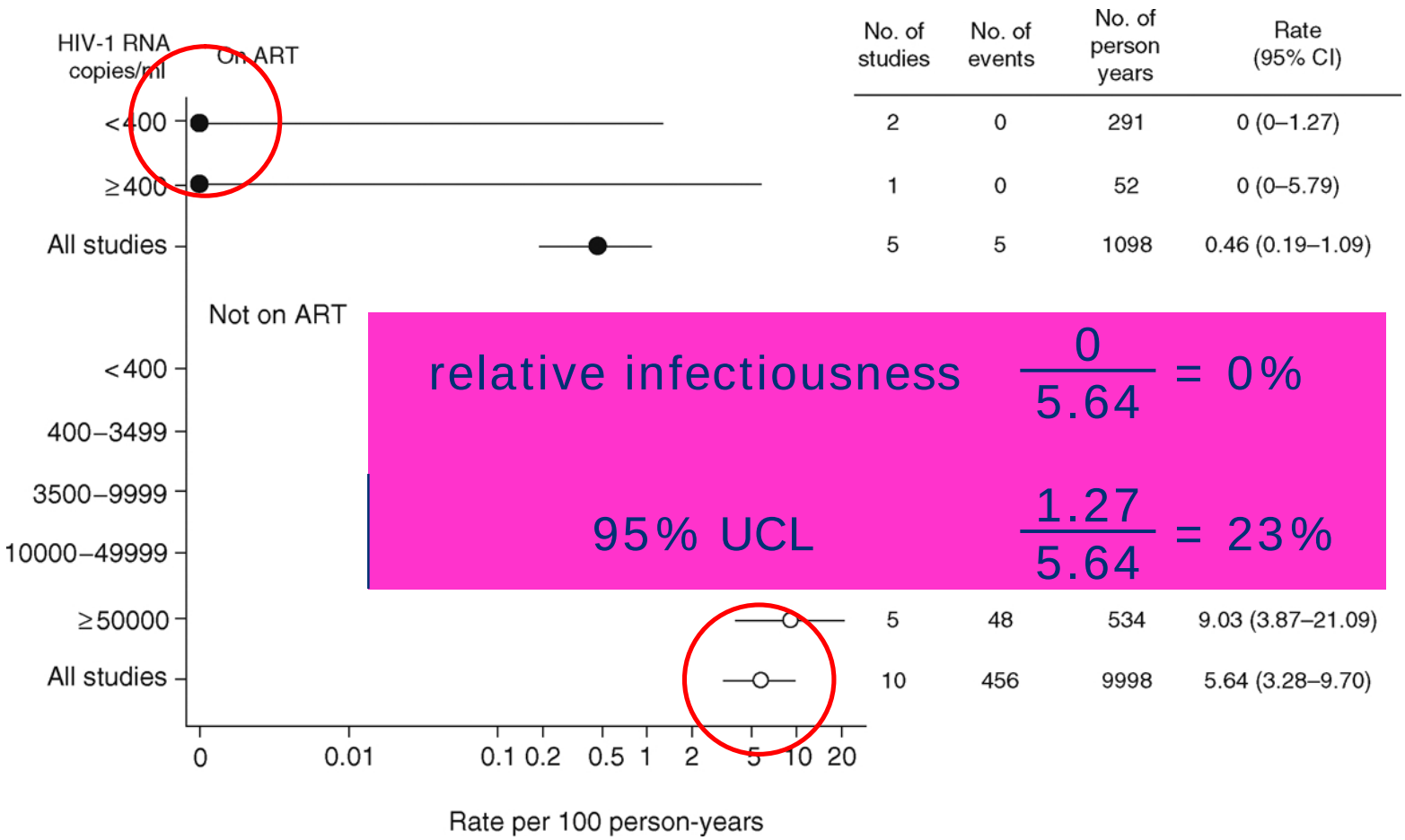
Infectiousness and treatment



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relative infectiousness $\frac{0}{5.64} = 0\%$

95% UCL $\frac{1.27}{5.64} = 23\%$

Attia *et al.*, AIDS 2009

What is the impact of non-zero probability of transmission during successful treatment on the HIV epidemic amongst MSM?

HIV Monitoring

Transmission model

- Mathematical model explaining observed trends in HIV and AIDS diagnoses since 1980 (Bezemer *et al.*, AIDS 2008; Epidemics 2010).

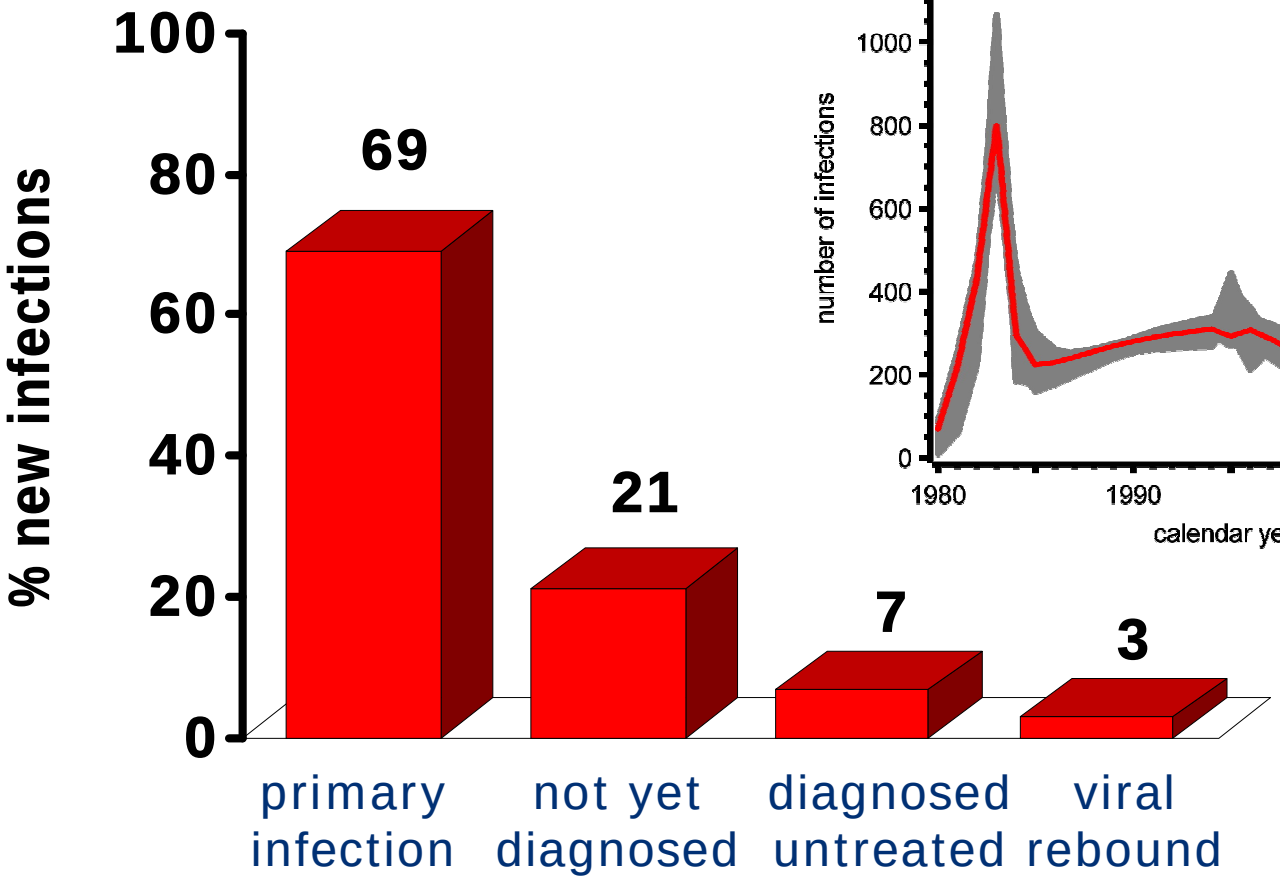
- Simultaneously estimate changes in
  - transmission rates ("risk behaviour")
  - time from infection to diagnosis

- Infectiousness (probability of transmission correcting for risk behaviour) depends on stage of infection:
  - higher during primary infection and AIDS (Hollingsworth *et al.*, JID 2008)
  - higher for patient unaware of their infection (Marks 2005)
  - high during episodes of viral rebound
  - zero or very low during viral suppression

HIV Monitoring

Contributions to new infections 1

relative infectiousness 0%

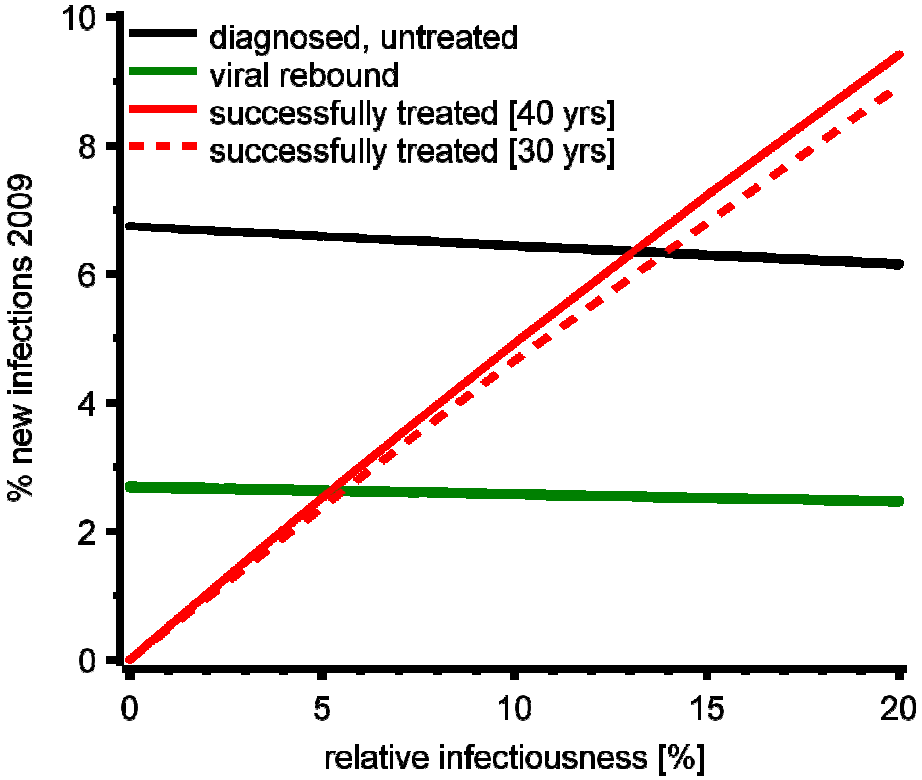


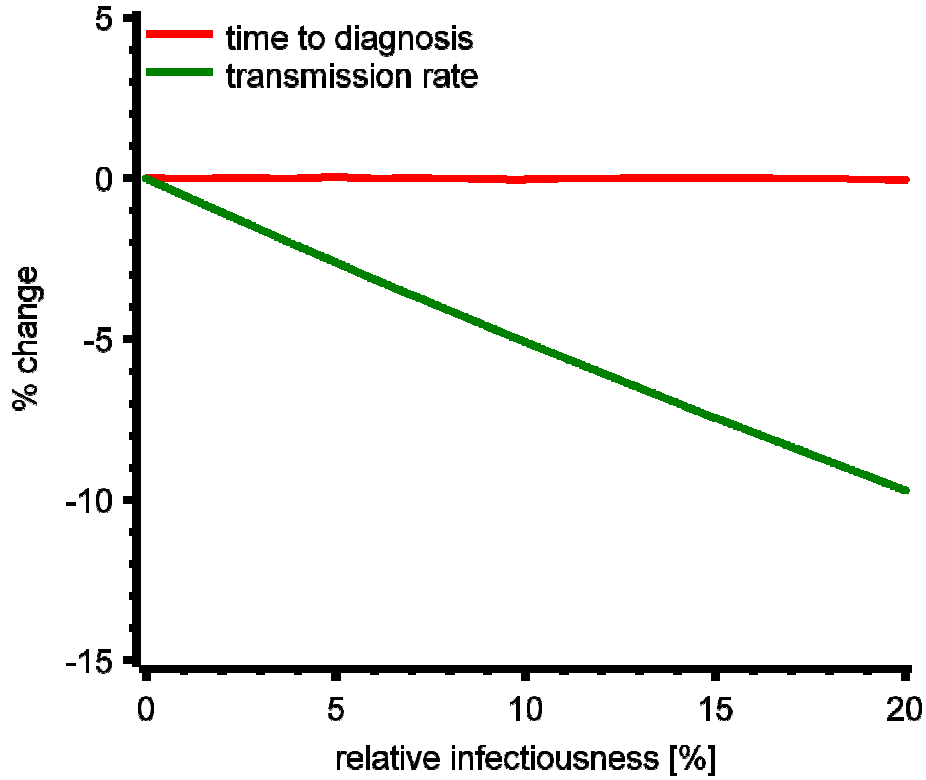
2009: 899 infections

Bezemer *et al.*, AIDS 2008; Epidemics 2010 (updated)

HIV Monitoring

Contributions to new infections 2

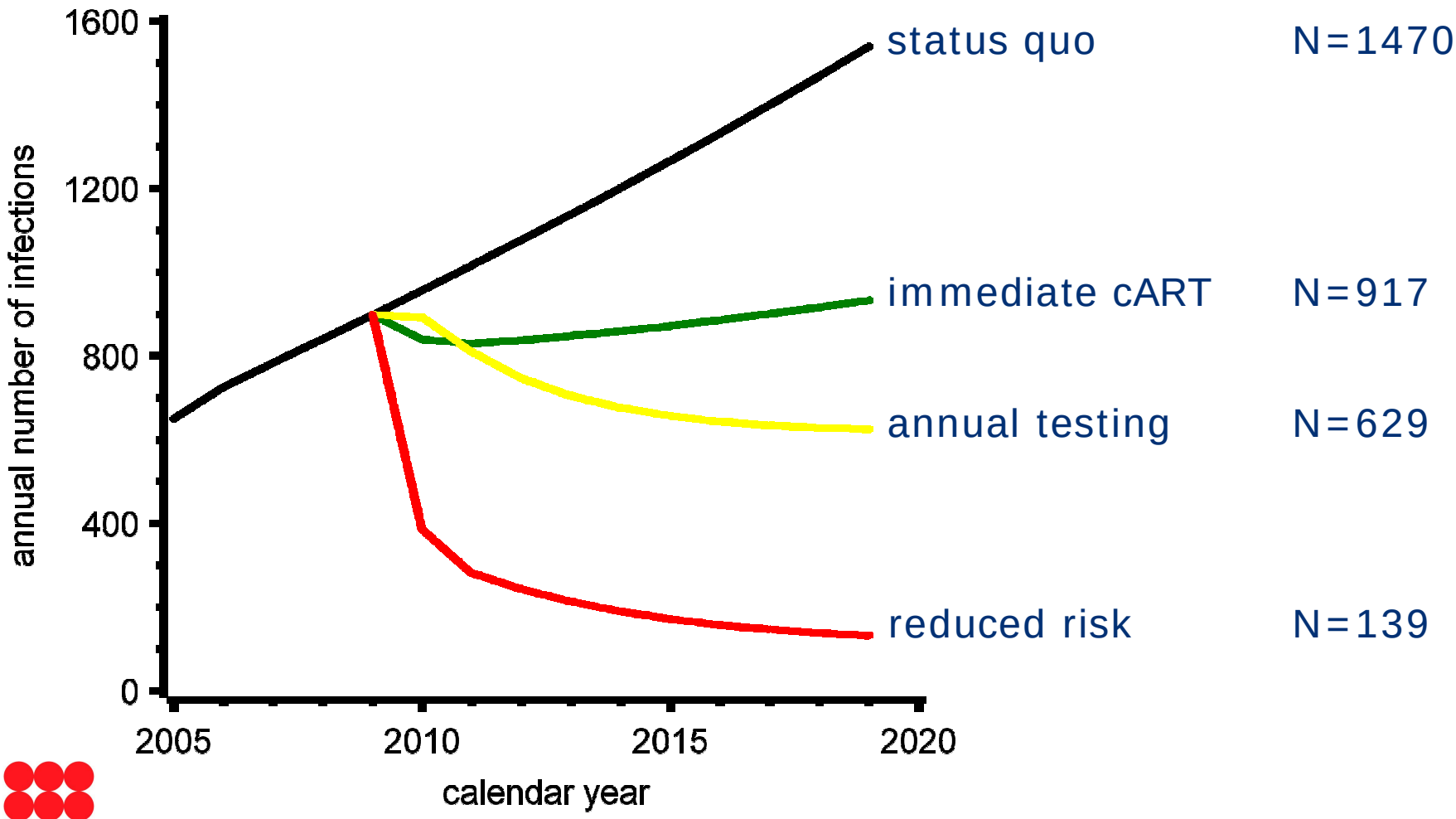




relative infectiousness: infectiousness during suppressive treatment compared to diagnosed but untreated

HIV Monitoring

Controlling the epidemic



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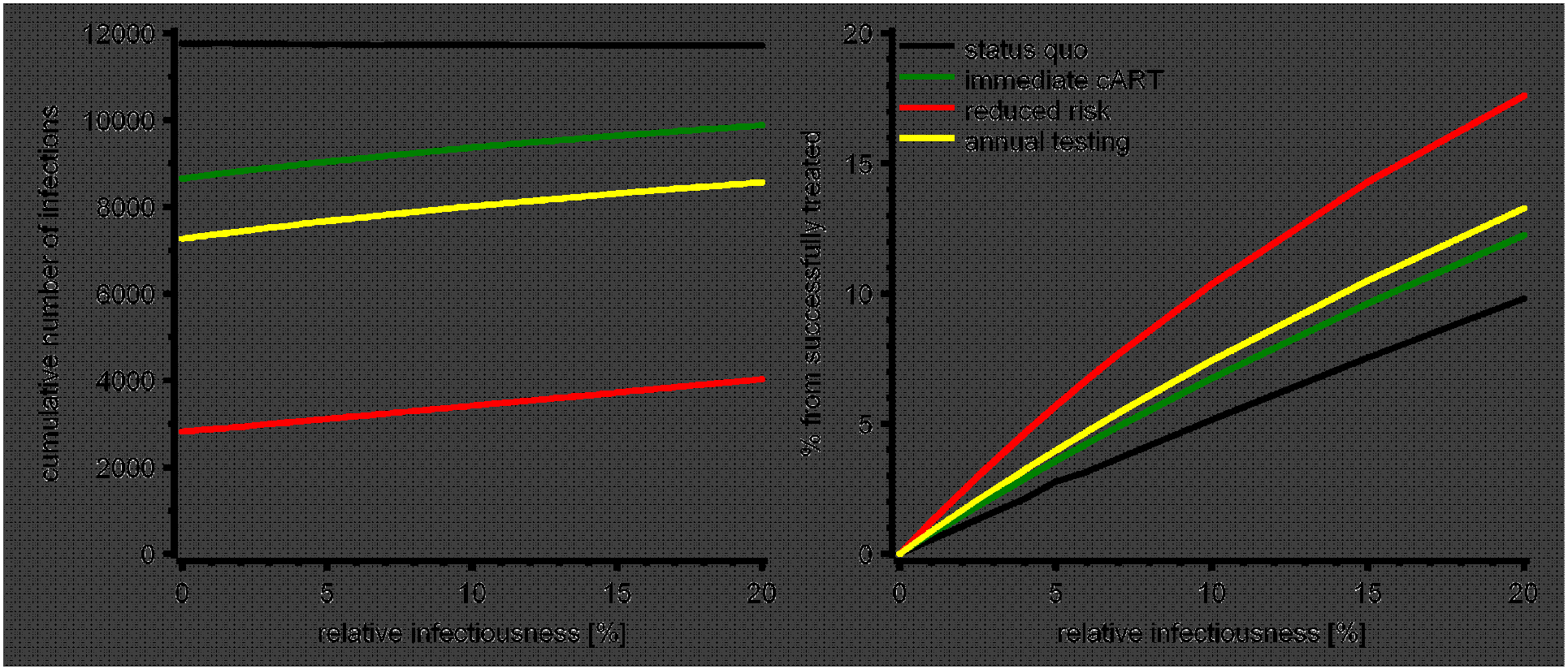
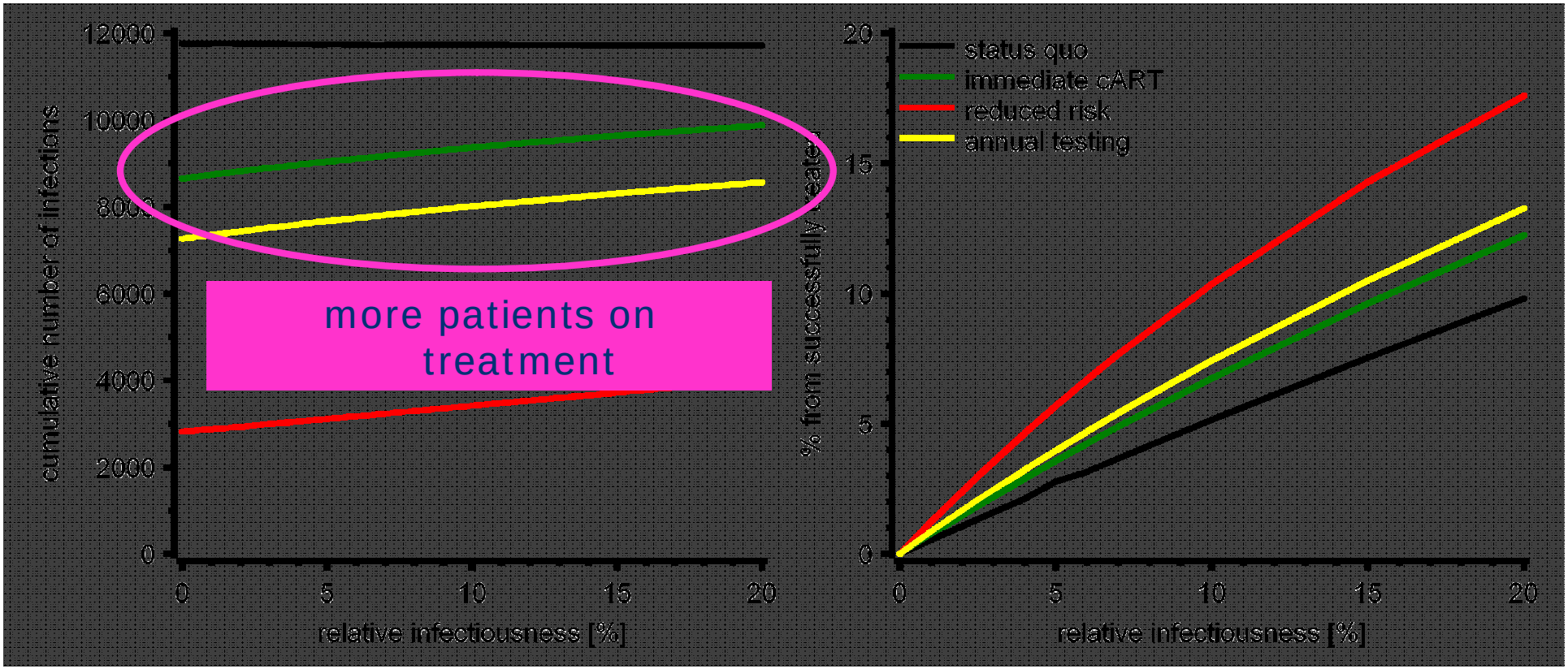
Infections 2010 – 2018



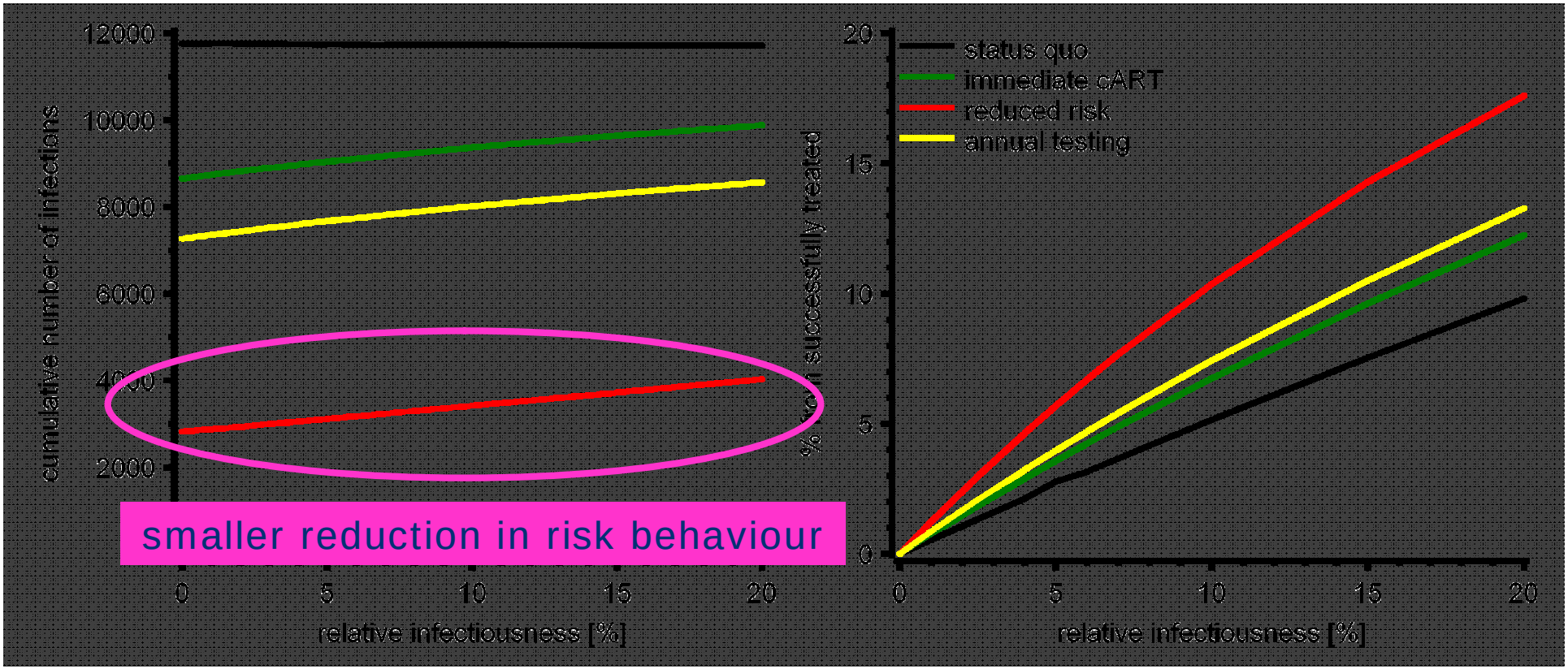
relative infectiousness: infectiousness during suppressive treatment compared to diagnosed but untreated

Infections 2010 – 2018



relative infectiousness: infectiousness during suppressive treatment compared to diagnosed but untreated

Infections 2010 – 2018



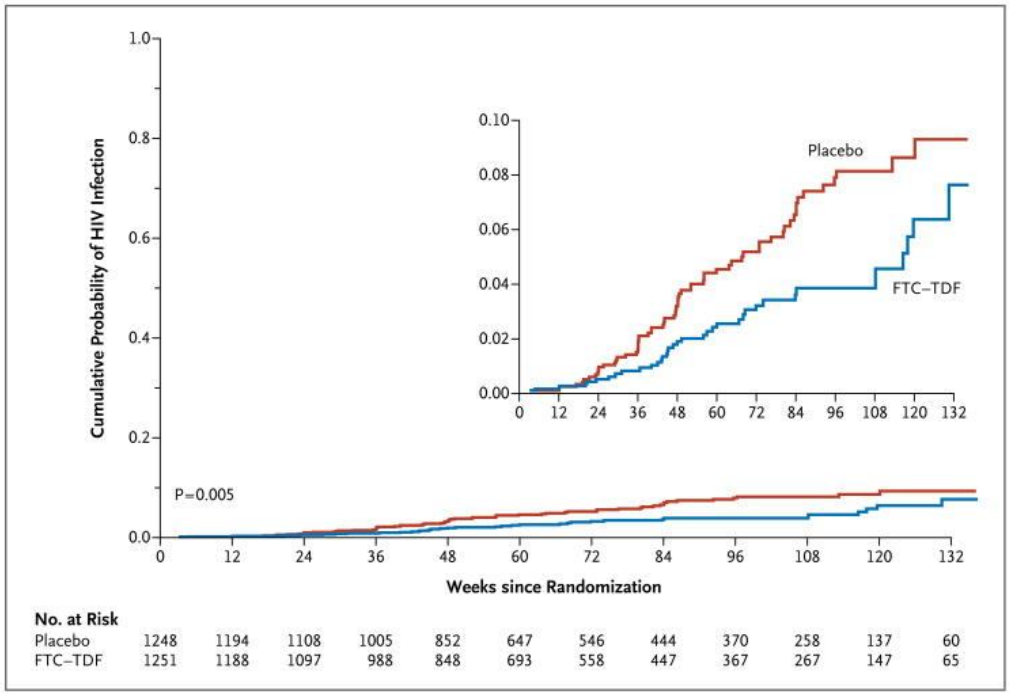
relative infectiousness: infectiousness during suppressive treatment compared to diagnosed but untreated

Summarising…

- The contribution to new infections by patients on suppressive treatment is limited.
- Transmission from treated patients becomes more important in the presence of interventions.
- The risk of transmission may be larger
  - in the presence of other STIs.
  - when perceived protection leads to increased risk behaviour.

HIV Monitoring

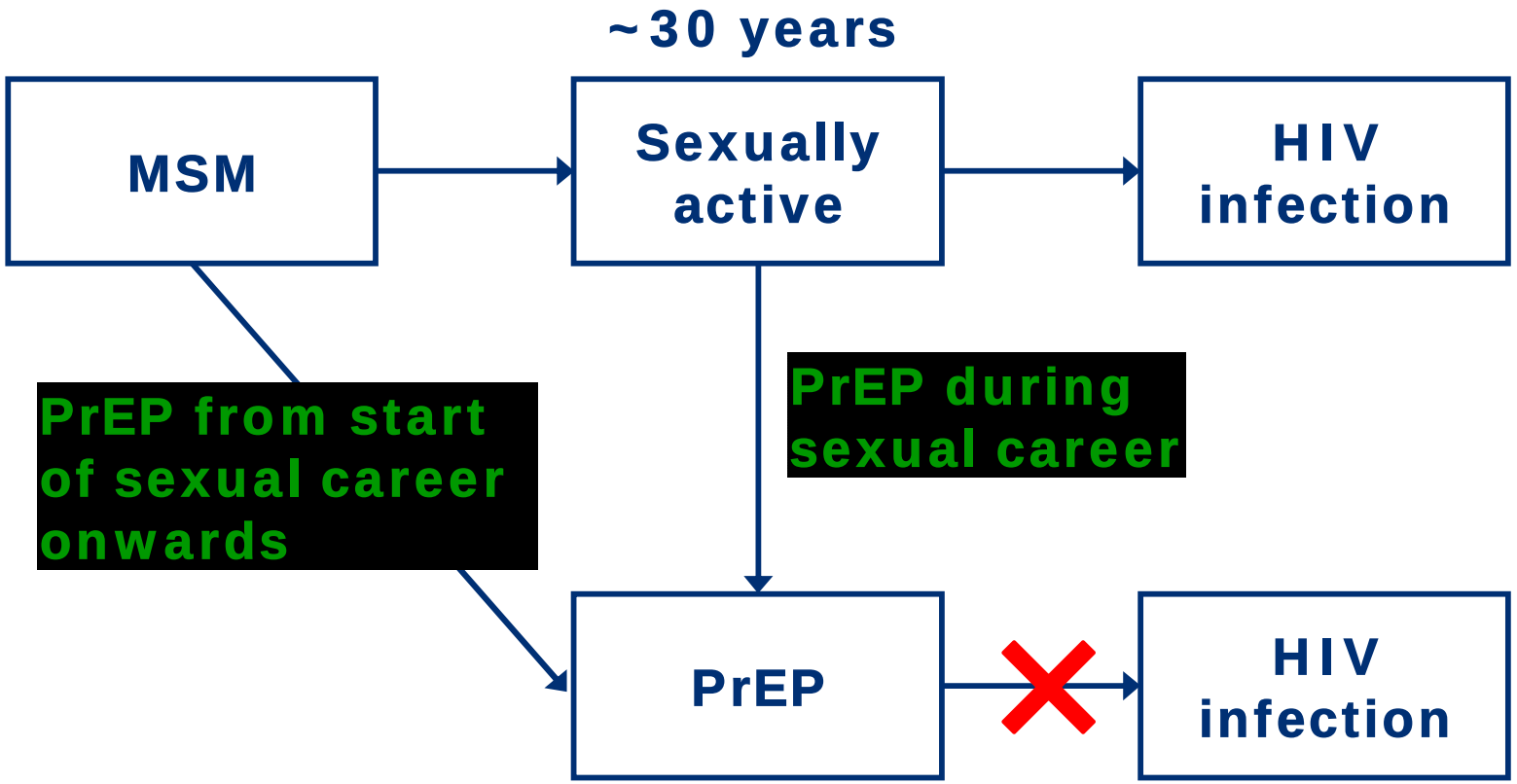
PrEP



PrEP, using truvada, reduced the risk of transmission of healthy gay men and among HIV-negative heterosexual partners of people who are HIV positive by between 44% and 73% Grant, R *et al.*, AIDS 2010

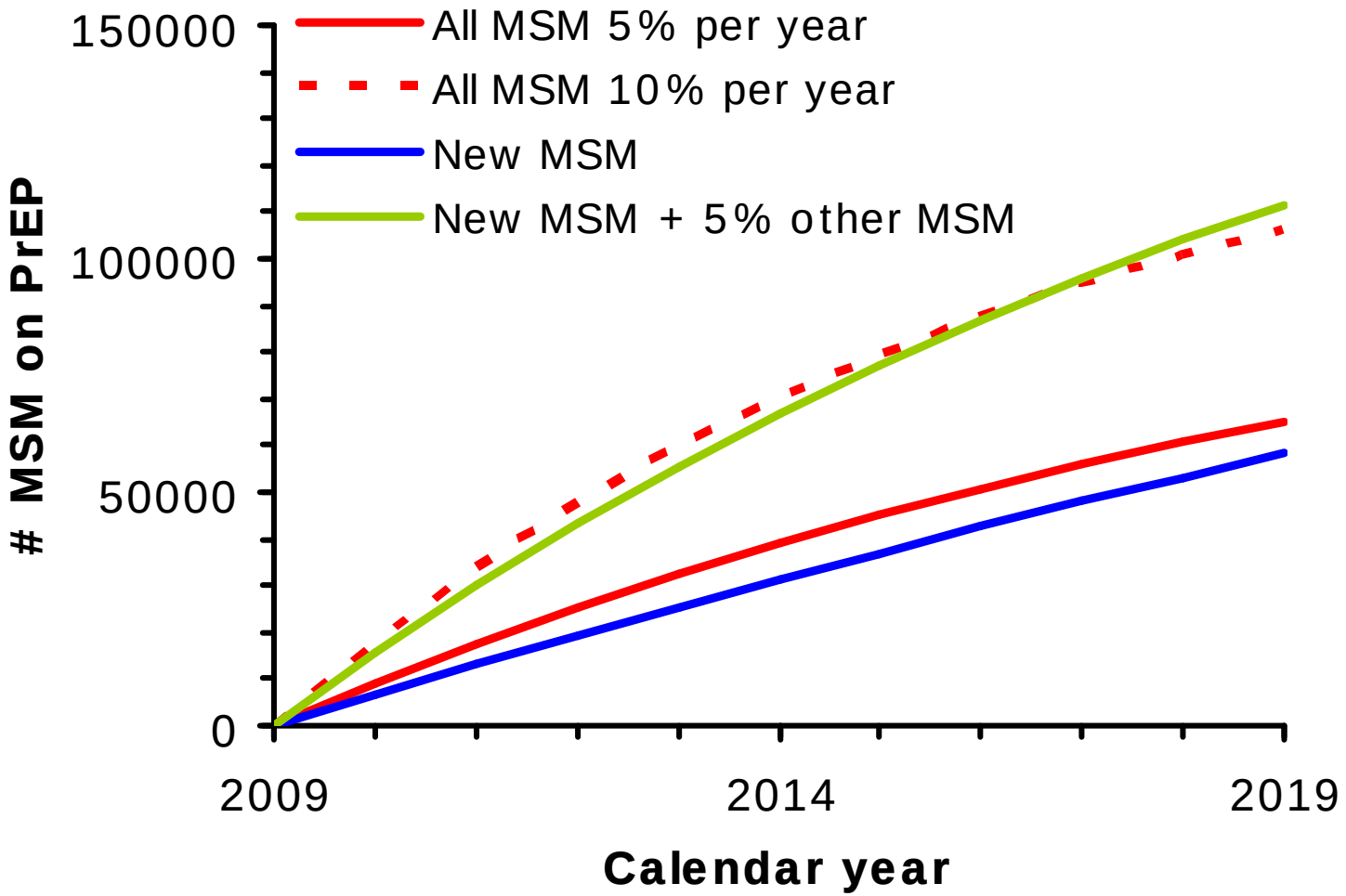
HIV Monitoring

MSM and PrEP



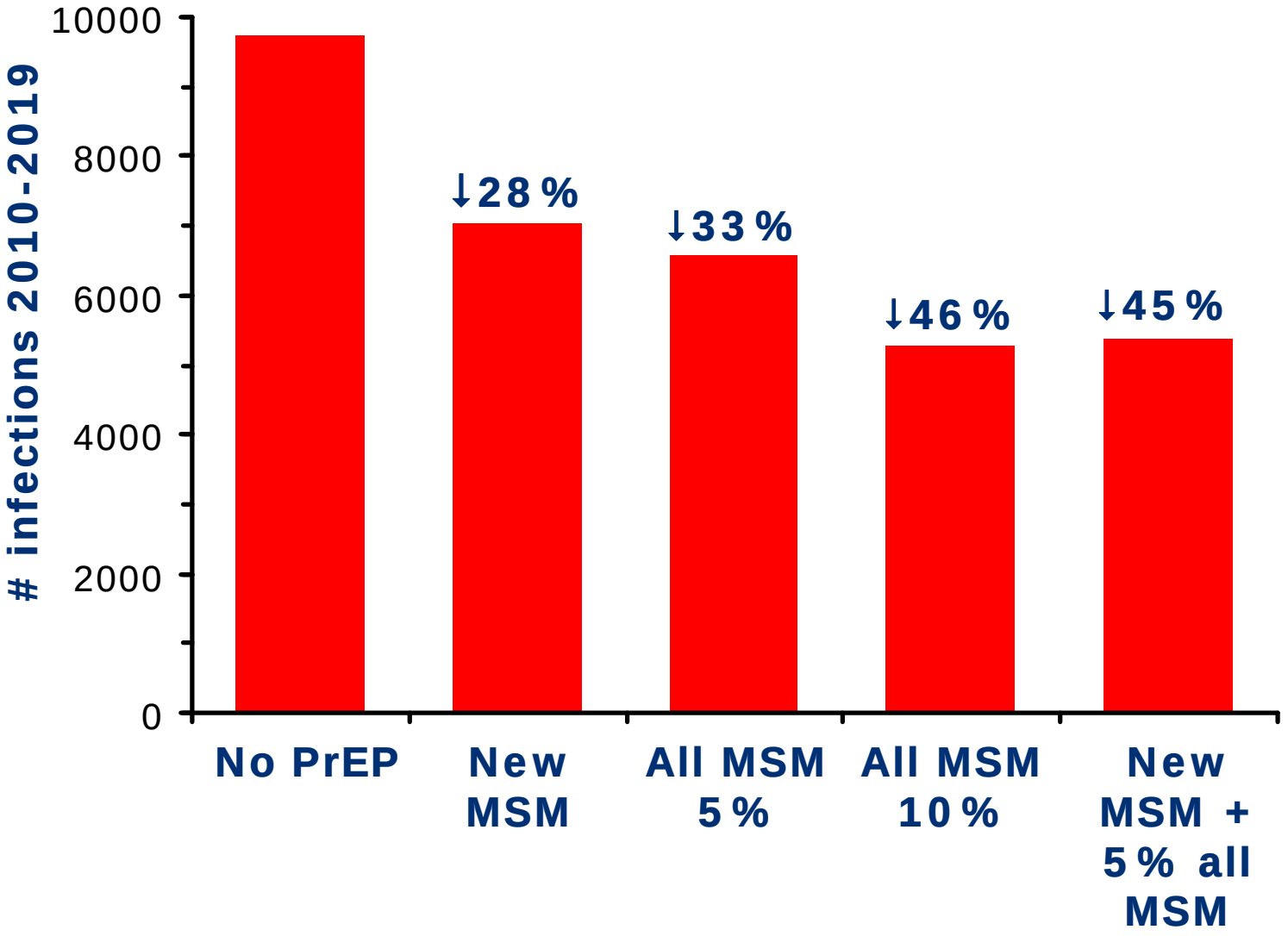
Bezemer *et al.*, AIDS 2008; Epidemics 2010 (updated)

MSM on PrEP



HIV Monitoring

Number of new infections 2010-2019



HIV Monitoring

Summarising…

- The contribution to new infections by patients on suppressive treatment is limited.
- Transmission from treated patients becomes more important in the presence of interventions.
- The risk of transmission may be larger
  - in the presence of other STIs.
  - when perceived protection leads to increased risk behaviour.
- PrEP of MSM may have a substantial impact on reducing the annual number of new infections.

HIV Monitoring

Acknowledgements

Stichting HIV Monitoring, Amsterdam, NL

Ard van Sighem

Daniela Bezemer

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