Does hygiene hypothesis come to an end?

Prof. Dr. Dirk Bockmühl

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Two people in protective workwear cleaning and disinfecting offices.

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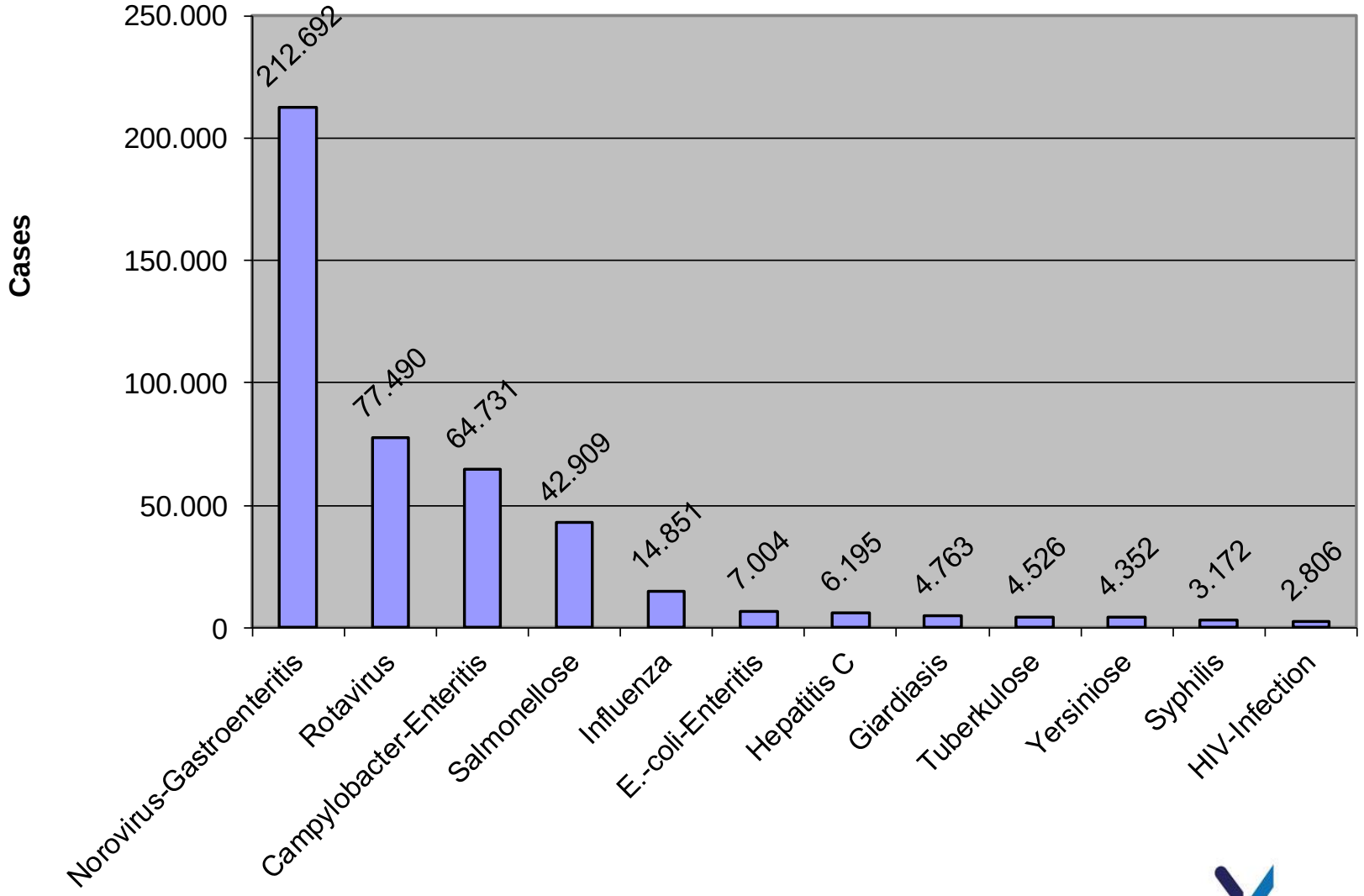

Source:RKI

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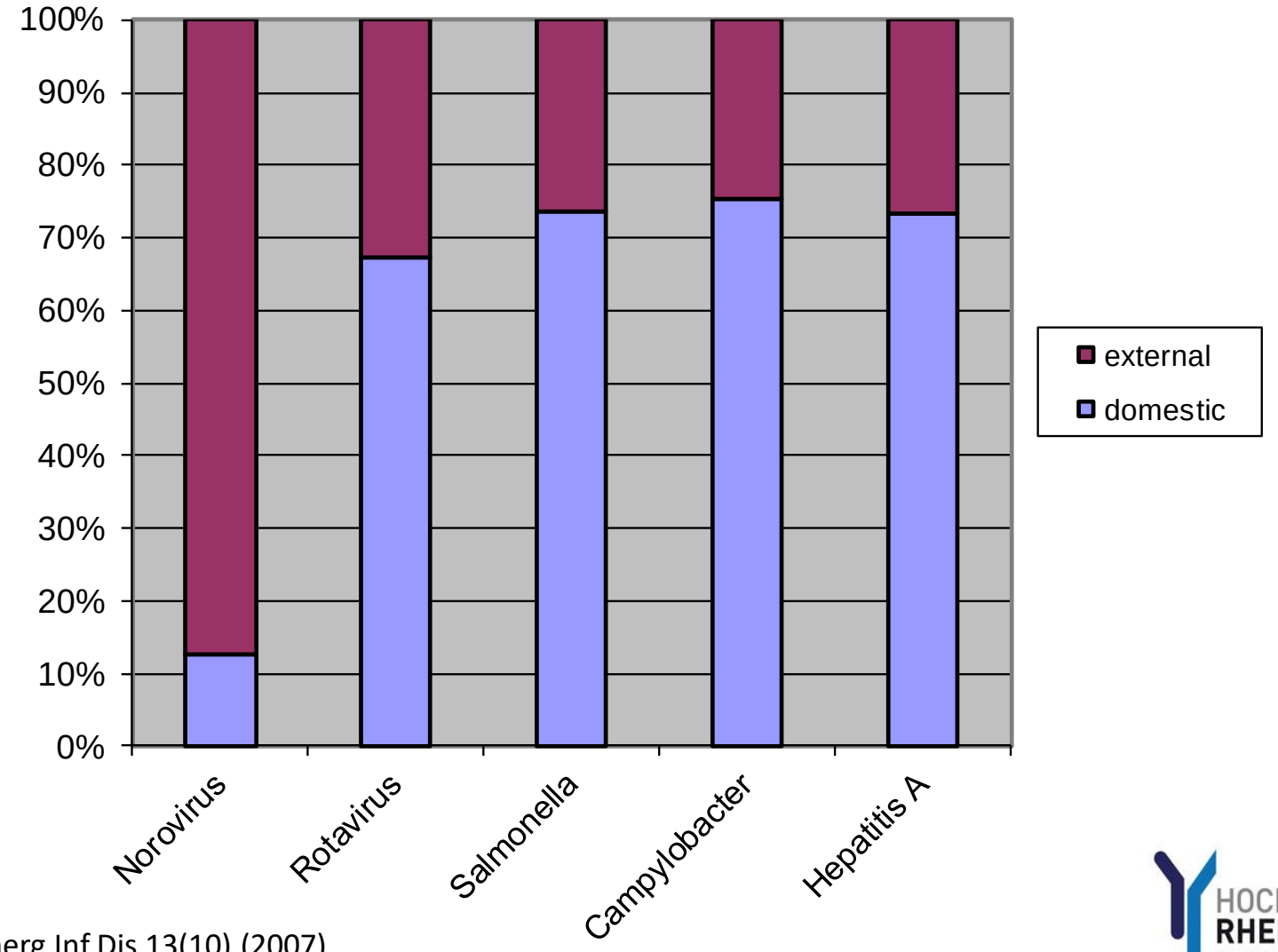
Household-related infections



Krause *et al*.: Emerg Inf Dis 13(10) (2007)

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Let’s keep in mind…

- Many infections are predominately acquired at home!

- These infections are mainly food-borne.

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Microorganisms

- **can make us ill**

Microorganisms

- **can make us ill**
- **can cause malodour**

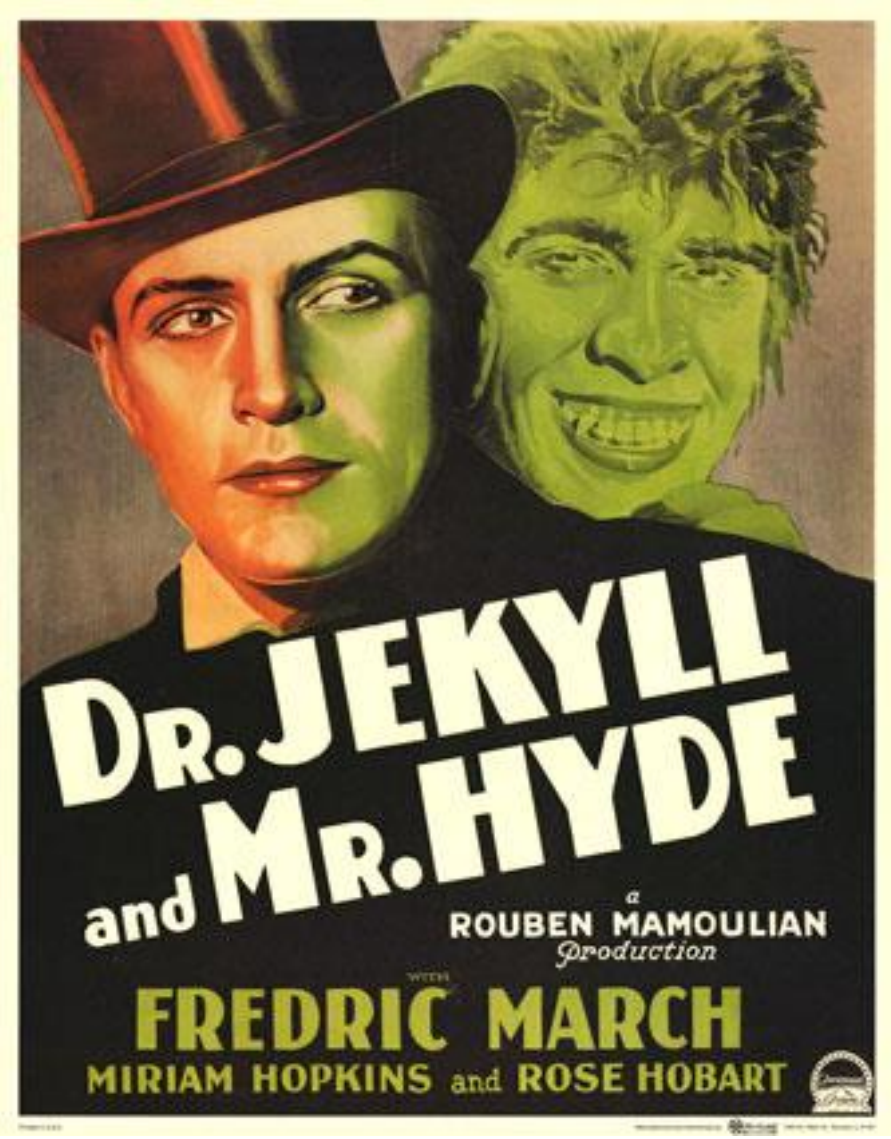
Microorganisms

- **can make us ill**
- **can cause malodour**
- **can destroy materials**

Microorganisms

- can make us ill
- can cause malodour
- can destroy materials
- are looking ugly

But microbes are also useful!



www.wikipedia.de

The hygiene hypothesis starts

Hay fever, hygiene, and household size

David P Strachan

Department of Epidemiology and Population Sciences, London School of Hygiene and Tropical Medicine, London WC1E 7HT
David P Strachan, MRCP, *lecturer in epidemiology*

Br Med J 1989;**299**:1259-60

Hay fever has been described as a "post industrial revolution epidemic,"[1] and successive morbidity surveys from British general practice suggest that its prevalence has continued to increase over the past 30 years.[2] Other evidence suggests a recent increase in the prevalence of asthma[2] and childhood eczema.[3] This paper suggests a possible explanation for these trends over time.

Subjects, methods, and results

I studied the epidemiology of hay fever in a national sample of 17 414 British children born during one week in March 1958 and followed up to the age of 23 years (the National Child Development Study). Three outcomes were investigated: (*a*) self reported "hay fever during the past 12 months" at age 23; (*b*) parental

Prevalence of hay fever and of eczema in infancy by position in the household. Numbers in parentheses

	Prevalence of hay fever in previous year	
	At age 23	At age 11

Strachan, 1989:

„unhygienic contact“ with siblings

↓

Infections in early childhod

↓

Protection agains allergies

Strachan DP: Hay fever, hygiene, and household size. BMJ. 1989 Nov 18;299(6710):1259-60

What was made of this…

NBC NEWS HOME TOP VIDEOS DECISION 2016 ONGOING: ISIS TERROR EBOLA

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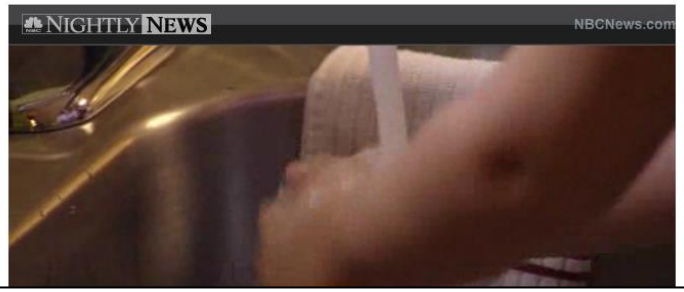
Is it possible to be too clean? Researchers say yes

Monday Oct 8, 2012 4:32 PM

EMAIL Gefällt mir Tweet



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Macht zu viel Hygiene krank?

Was macht unsere Kinder chronisch krank?

"Wir sind ein Zoo aus

22. August 2016 Gesundheit

Macht zu viel Hygiene krank?

Was macht unse

Hygiene

Übertriebene Hygiene

Jeden Tag überschüttet uns die Putzmittelindustrie mit ih
"Porentief rein" müssen der Haushalt, die Kleidung, der K
Bildern wird uns gezeigt, dass überall ein gefährlicher Mik
Staubmilben, Mikroben und Krankheitserreger. Die Forsch

Wahlen in Amerika

Frankfurter Allgemeine

Gesellschaft

Donnerstag, 01. Septemb

POLITIK WIRTSCHAFT FINANZEN FEUILLETON SPORT GESELLSCHAFT STIL TE

Home › Gesellschaft › Gesundheit: Allergien durch zu viel Hygiene

Gesundheit

Allergien durch zu viel Hygiene

Mediziner bewiesen erstmals, dass frühzeitiges Spielen im Dreck das Immunsystem trainiert.

19.09.2002

How dirt can protect you against cancer

Hygiene hypothesis (consumers‘ view)

„We are too clean“

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Can it be that simple?

http://solvingtheibspuzzle.com/g

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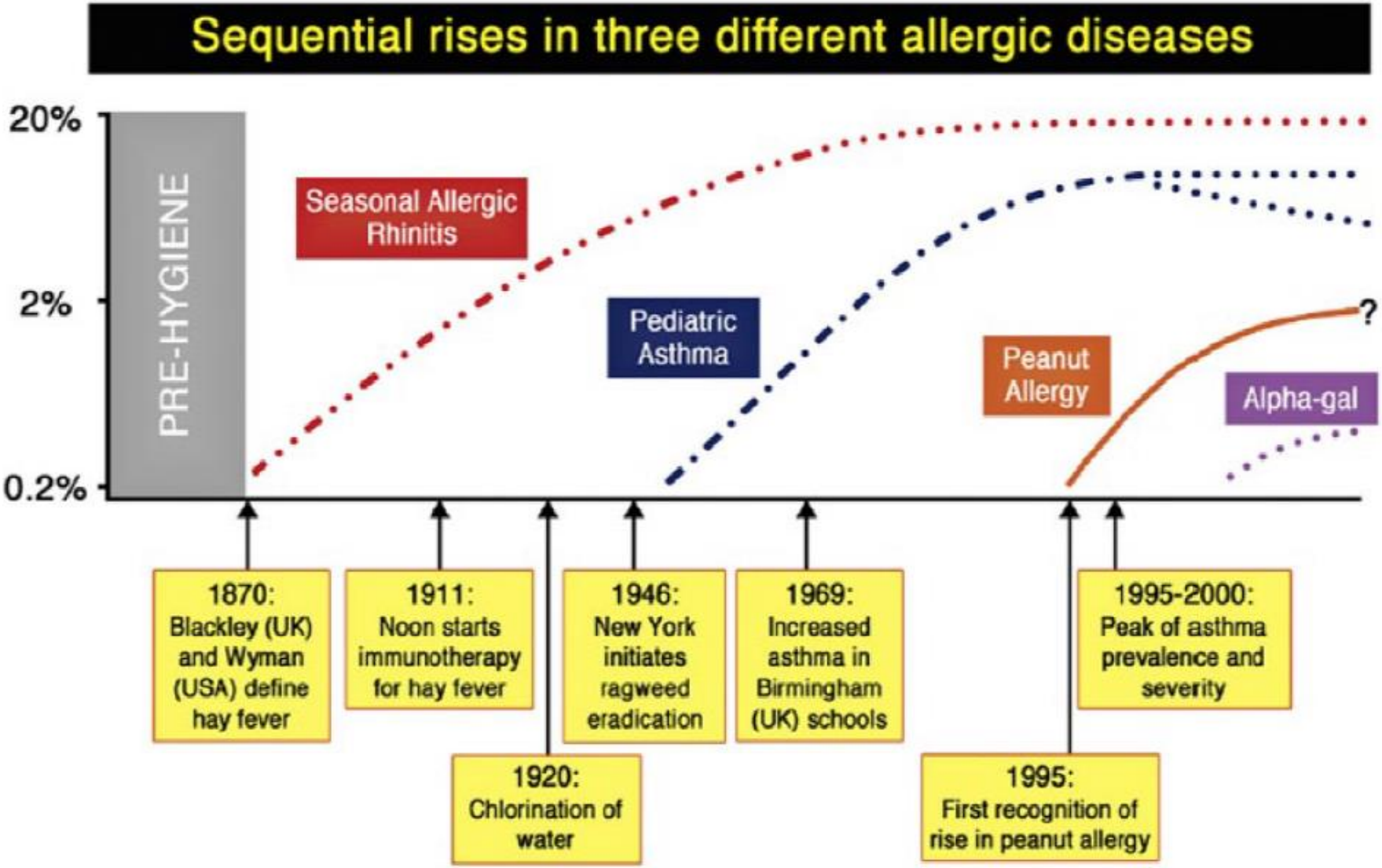
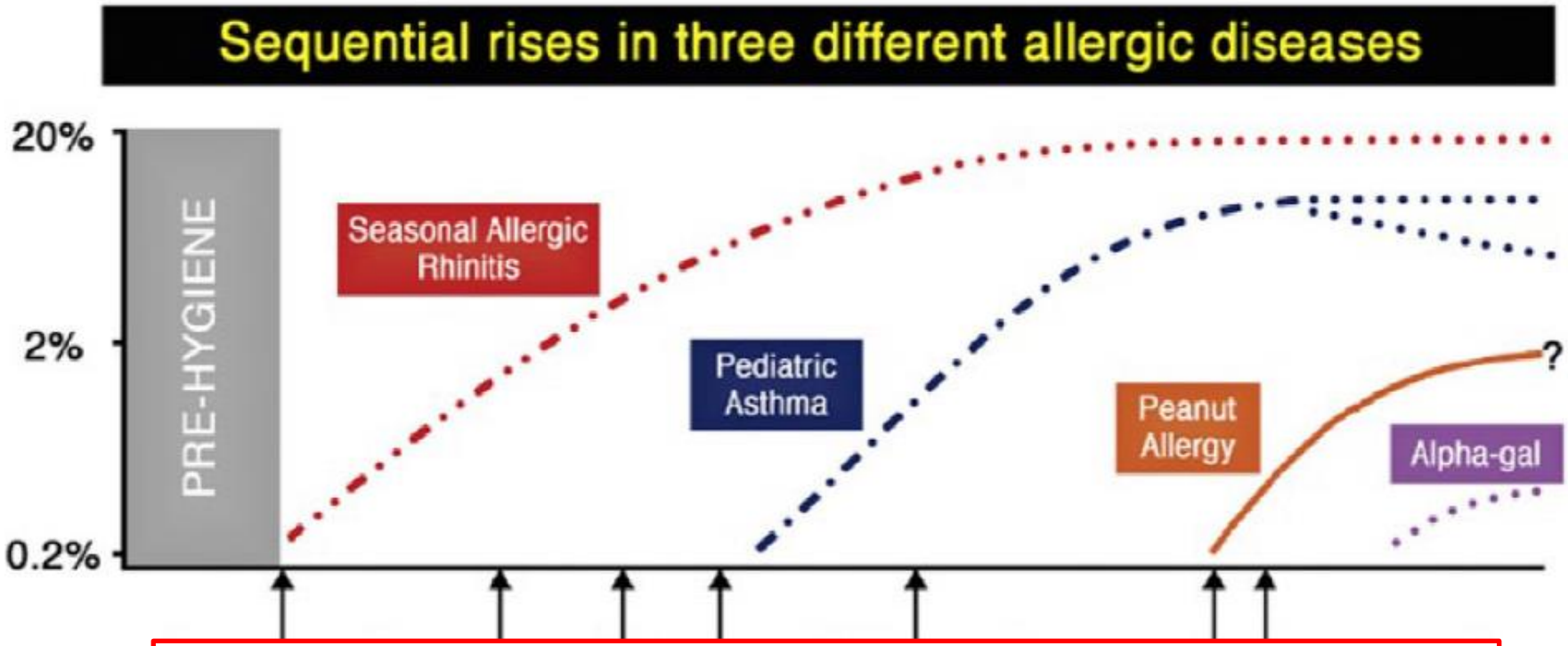
Not only one reason for an increase in allergies…



Platts-Mills TA. *Journal of Allergy and Clinical Immunology* 2015; 136: 3–13.

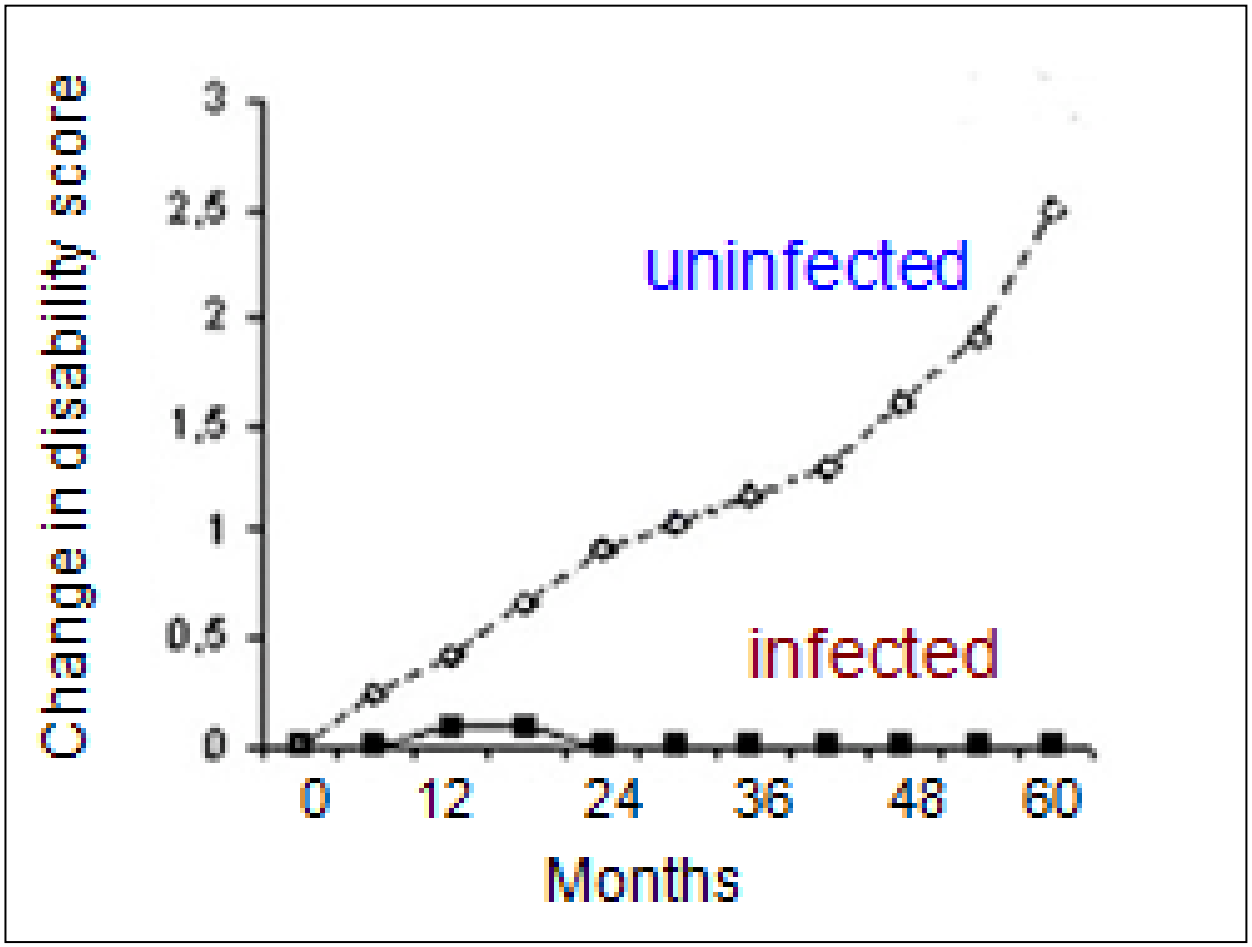
Not only one reason for an increase in allergies…



Different triggers for different types of allergies!

Platts-Mills TA. *Journal of Allergy and Clinical Immunology* 2015; 136: 3–13.

Old friends may help…



Infections with parasitic worms may help to cure autoimmune diseases

Elliott &Weinstock: Adv Exp Med Biol. 2009;666:157-66.

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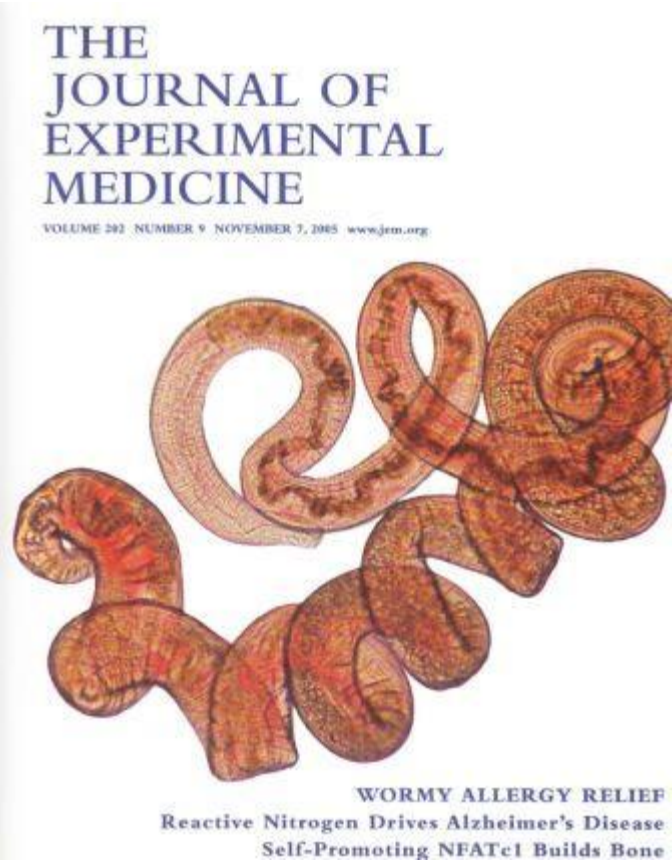
„Old friends“ hypothesis (Graham Rook)

Microorganisms that we used to „encounter“ (but not any more) are crucial for training our immune system:

- **Environmental germs**
- **Lactic acid bacteria**
- **(Certain) mycobacteria**
- **Parasitic worms**



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Antibiotics and asthma: it's not only biocides!

J Pediatr. 2013 Apr;162(4):832-838.e3. doi: 10.1016/j.jpeds.2012.09.049. Epub 2012 Nov 6.

Use of antibiotics during pregnancy increases the risk of asthma in early childhood.

Stensballe LG, Simonsen J, Jensen SM, Bønnelykke K, Bisgaard H.

Copenhagen Prospective Studies on Asthma in Childhood, Faculty of Health Sciences, University of Copenhagen, and The Danish Pediatric Asthma Center, Copenhagen University Hospital, Gentofte, Copenhagen, Denmark. LGN@ssi.dk

Abstract

OBJECTIVES:

To investigate the hypothesis that mother's use of antibiotics in pregnancy could influence asthma and eczema in early life.

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There's some evidence to consider…

Downloaded from http://oem.bmj.com/ on March 30, 2018 - Published by group.bmj.com

ORIGINAL ARTICLE

Association of household cleaning agents and disinfectants with asthma in young German adults

Tobias Weinmann,[1] Jessica Gerlich,[1] Sabine Heinrich,[1] Dennis Nowak,[2] Erika von Mutius,[3] Christian Vogelberg,[4] Jon Genuneit,[5] Stefanie Lanzinger,[5] Saba Al-Khadra,[6] Tina Lohse,[7] Irina Motoc,[8] Viola Walter,[9] Katja Radon[1]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/oemed-2016-104086).

For numbered affiliations see end of article.

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Received 12 September 2016
Revised 28 March 2017
Accepted 13 April 2017
Published Online First
8 May 2017

ABSTRACT

Objectives We scrutinised the association of private use of household sprays and disinfectants with asthma incidence in young adults in the transition from school to working life.

Methods Between 2007 and 2009, 2051 young adults aged 19–24 years living in two major German cities took part in the Study on Occupational Allergy Risks II. Self-reported exposure to household sprays and disinfectants was characterised according to a composite score for frequency of use as no use (score=0), low use (score between 1 and the median), medium use (score between the median and the 90th percentile) and high use (score above the 90th percentile). Two outcome variables (current asthma and current wheezing) with four mutually exclusive categories (never, incident, persistent and remittent) were used for the risk analyses. Multinomial logistic regression models examined the association between the frequency of using household sprays and disinfectants with asthma and wheezing adjusting for potential confounders.

Results Compared with no use, high use of disinfectants was associated with a more than twofold increased odds of incident asthma (OR 2.79, 95% CI 1.14 to 6.83). In addition, low/medium use of disinfectants was associated with remittent asthma (OR 2.39, 95% CI 1.29 to 4.47). The evidence for an association between high usage of household sprays and asthma incidence was weak (OR 2.79, 95% CI 0.84 to 9.20).

Conclusion Our results support the hypothesis of an association between the use of cleaning products and elevated risks for asthma and wheezing in young adults at the start of working life.

What this paper adds

- Studies examining health risks in cleaners suggest that exposure to cleaning agents is associated with an increased risk of asthma and wheezing.
- This is one of the first studies to investigate the effects of domestic use of cleaning products and respiratory outcomes in young adults.
- Our results point towards an association between the private use of disinfectants and asthma incidence in young adults.
- While further research should disentangle the underlying pathological mechanisms, awareness campaigns to enhance the general knowledge about detrimental health effects of sprays and disinfectants as well as development of less harmful products could be useful preventive measures in the mean time.

Among the latter, indoor exposures constitute an especially meaningful group as people spend the vast majority of their time within buildings—at the workplace and in their home environment.[6] One group of agents that are mainly used indoors are household cleaning sprays and disinfectants. Their role in the aetiology of asthma has been scrutinised by several studies.[8–11] A systematic review published in 2014 identified 24 such studies and concluded that there is sufficient evidence to postulate an association between occupational exposure to cleaning products and elevated risks for asthma and rhinitis.[12]

However, almost all published studies so far

Causality unclear!

Hygiene hypothesis (consumers‘ view)

„We are too clean“

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Hygiene hypothesis (consumers‘ view)

It‘s not that easy!

are too clean“

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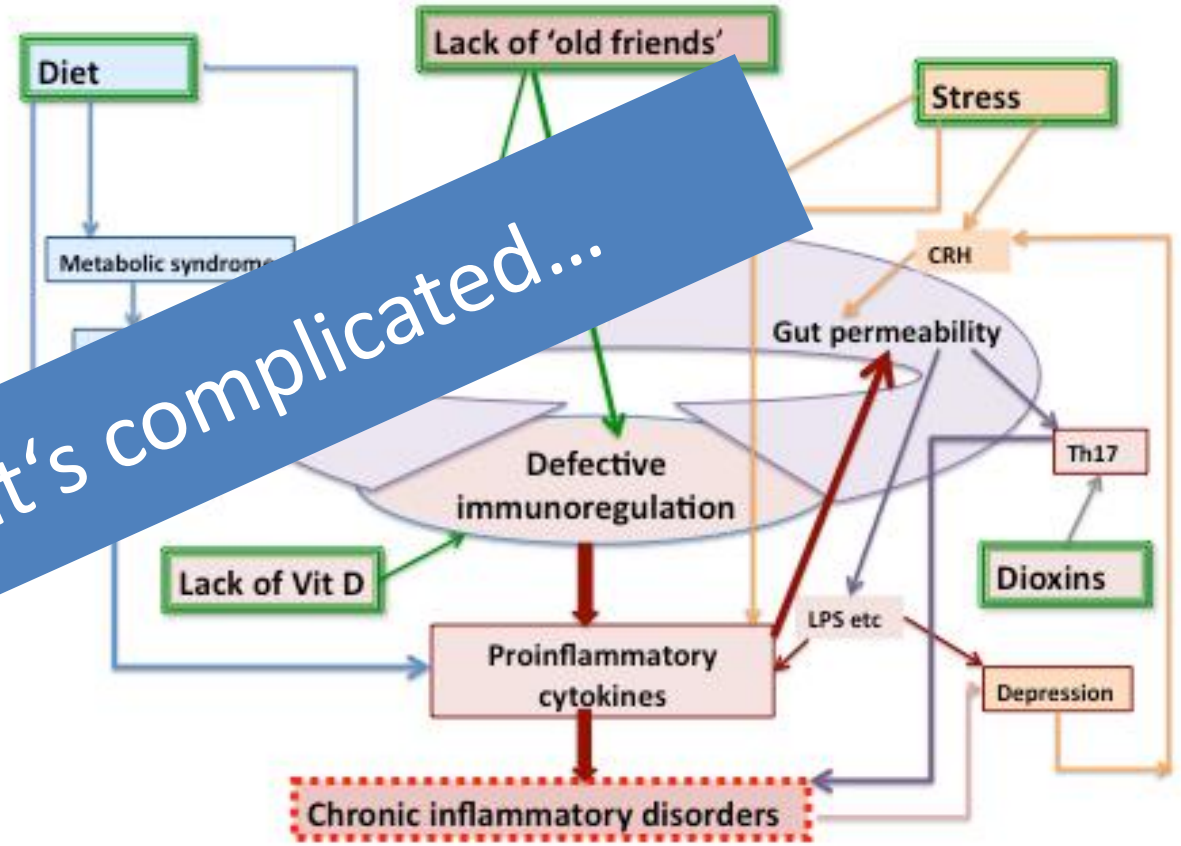
Hygiene hypothesis (scientific view)



Yes, it's complicated...

Taken from: Smith *et al*.: The Hygiene Hypothesis and its implications for home hygiene, lifestyle and public health, IFH review 2012; based on: Rook G Clin Exper Immunol 2010; 160:70-79.

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Hygiene hypothesis (simple version)

We need (certain) microorganisms to train our immune system
– when we are very young!

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Graham Rook‘s view

- **In most cases, the microorganisms found inside homes are not the ones needed for immunity.**
- **Vaccines help strengthen the immune system, so people don't need exposure to potentially dangerous bacteria and viruses to build immunity.**
- **The microorganisms that people are exposed to within the womb, from family members and in the environment contribute to the development of the immune system — not those found on home surfaces.**

After: https://www.phillyvoice.com/hygiene-hypothesis-antibacterial-soaps-cleaning-chemicals-microbiota-asthma-allergies/
cp.: Rook and Bloomfield (2021) :Microbial exposures that establish immunoregulation are compatible with targeted hygiene. J Allergy Clin Immunol

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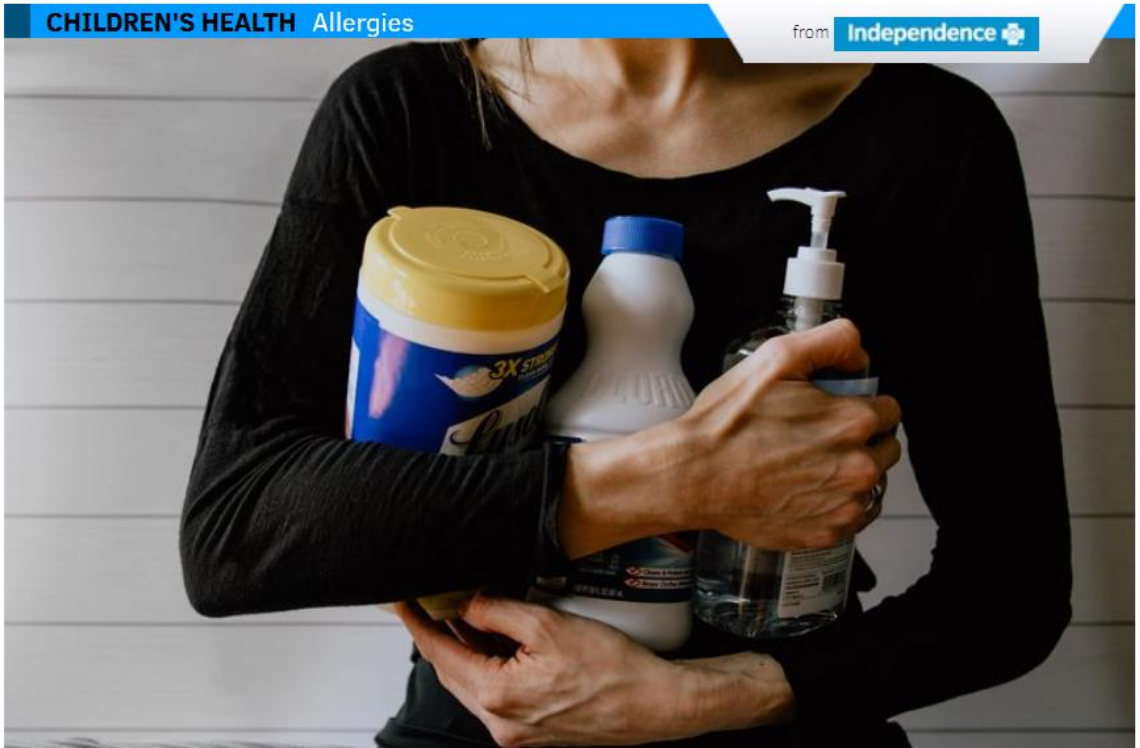
JULY 05, 2021

Is modern hygiene bad for childhood immunity? New research says no

Some bacteria benefit the immune system, but cleaning practices aren't making people more vulnerable to allergies, study finds

BY **TRACEY ROMERO**
PhillyVoice Staff



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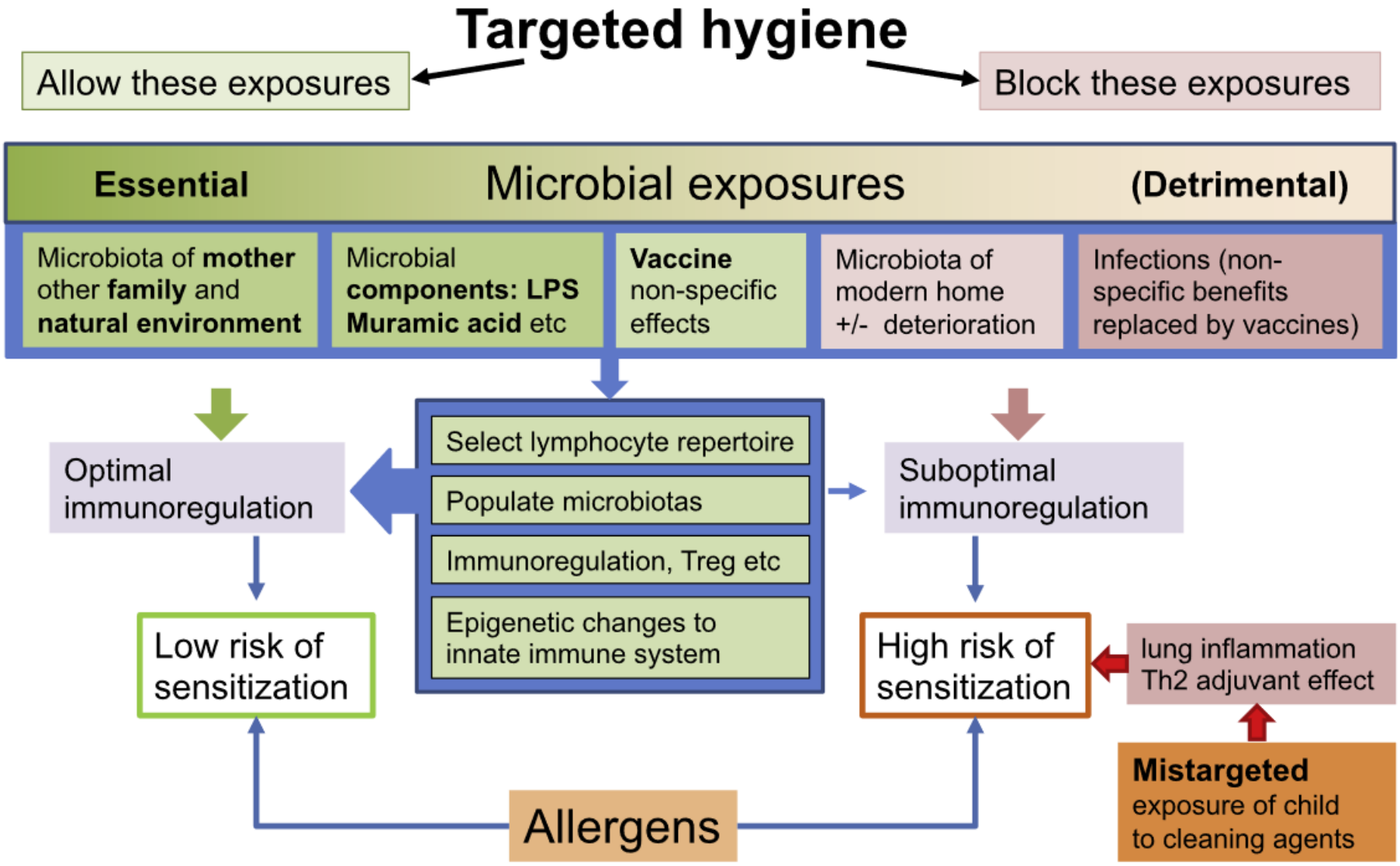
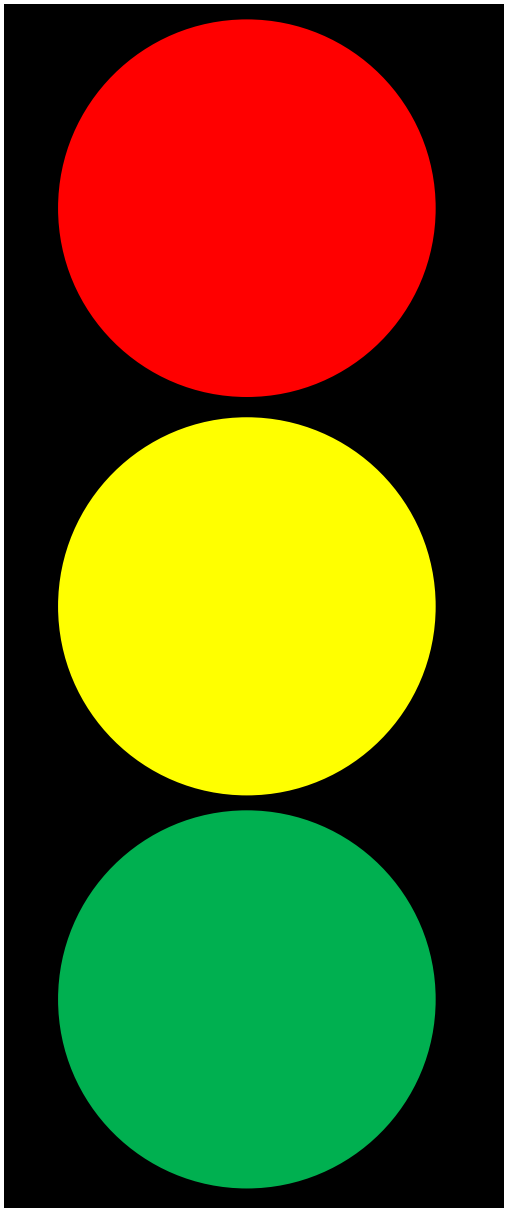
Must Read

The hygiene hypothesis and targeted hygiene



Rook and Bloomfield (2021) :Microbial exposures that establish immunoregulation are compatible with targeted hygiene. J Allergy Clin Immunol

A simple view on targeted hygiene



Pathogens

Unwanted microorganisms

Harmless microorganisms

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Can you train your immune system by cleaning?

Can you train your immune system by cleaning?