



Infekt vorbei? Die Haut hat noch was zu sagen...

Infektassoziierte Dermatosen

PD Dr. med. Martin Theiler Pang

T-Zell
Dysregulation und
Zytokinsturm

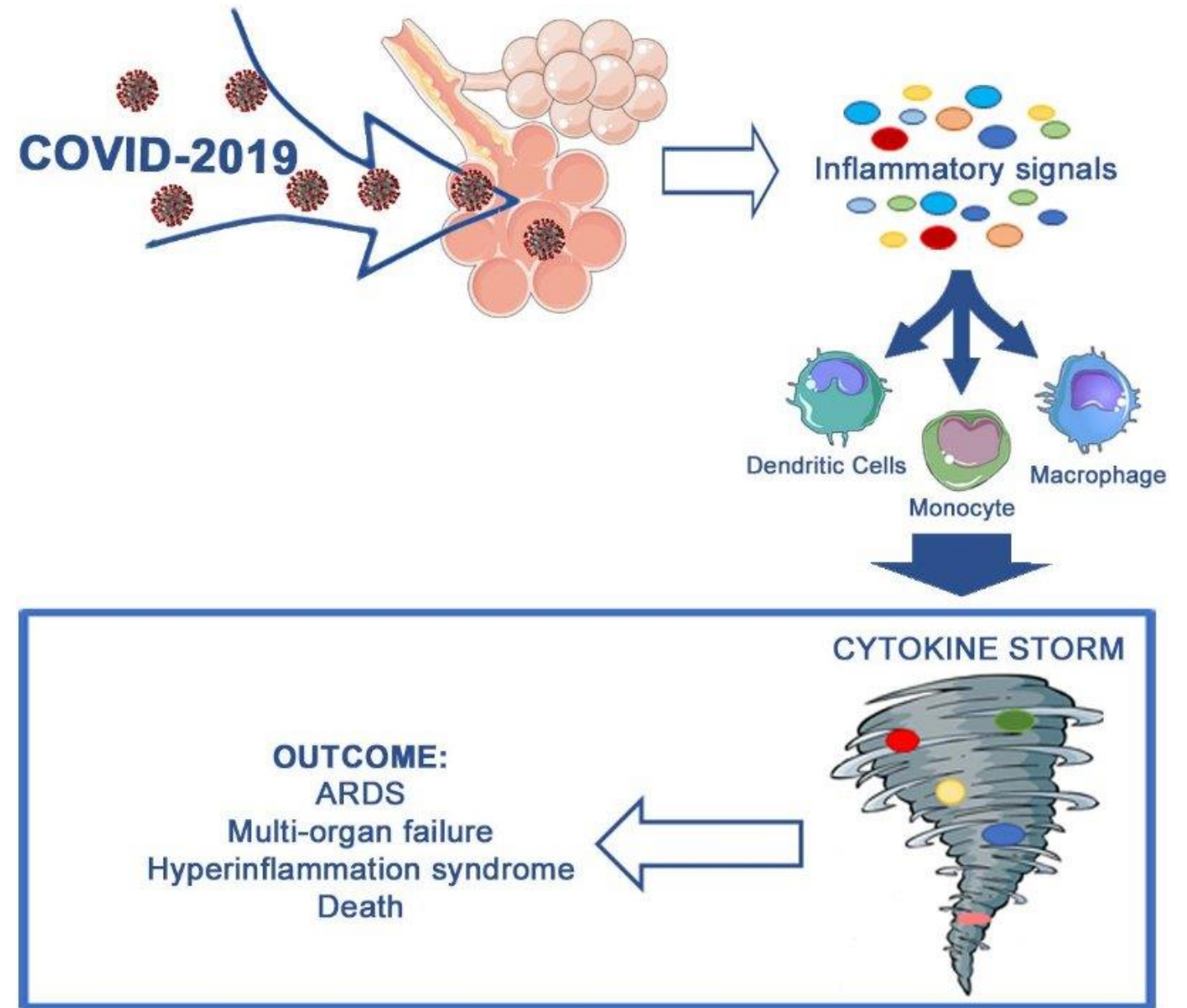
Molecular
mimicry

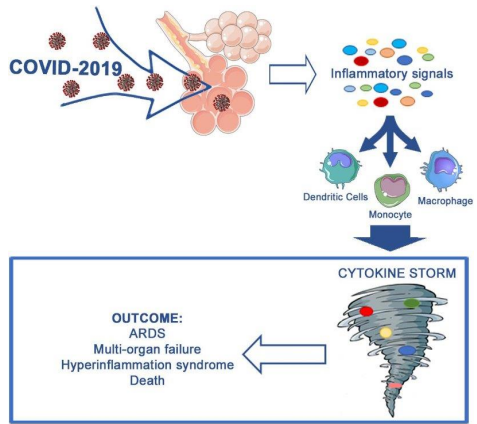
Infektassoziierte Hautmanifestationen

Verzögerte
Hypersensitivität
(Typ IV)

Immunkomplex-
ablagerung (Typ III
Reaktion)

T-Zell- Dysregulation und Zytokinsturm





Multisystem Inflammatory Syndrome in Children (MIS-C)

Lab evidence of current or past infection with SARS-CoV-2



Fever,
Myalgia

Conjunctivitis
Rash, Lymphadenopathy, Stomatitis,
Extremity swelling with erythema
Skin peeling

Headache
Meningismus
Lethargy

High ESR, CRP, ferritin,
LDH, IL-6, Fibrinogen,
Procalcitonin, CPK,
D-dimers etc.,

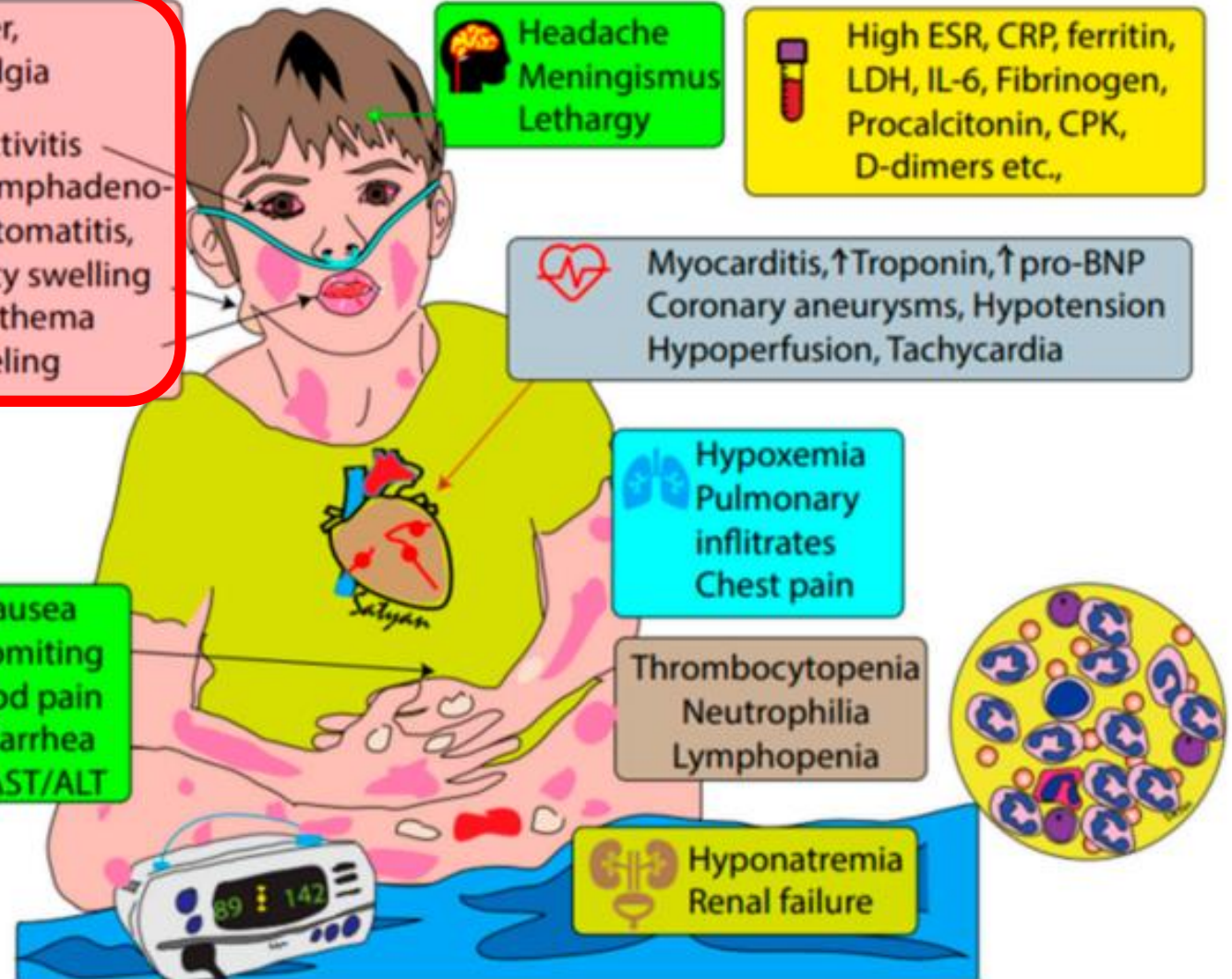
Myocarditis, ↑Troponin, ↑pro-BNP
Coronary aneurysms, Hypotension
Hypoperfusion, Tachycardia

Hypoxemia
Pulmonary infiltrates
Chest pain

Thrombocytopenia
Neutrophilia
Lymphopenia

Hyponatremia
Renal failure

Nausea
Vomiting
Abd pain
Diarrhea
↑AST/ALT



- Kawasaki Syndrom
- COVID-19: Multisystem inflammatory syndrome in children (MIS-C, PIMS)
- Toxic shock Syndrom
- sJIA, Makrophagenaktivierungssyndrom







IgA-Vaskulitis (Purpura Schönlein-Henoch)

- häufigste Form der Kleingefässvaskulitis im Kindesalter mit günstiger Prognose
- tritt oft nach oberem Atemwegsinfekt auf
- Tetrade:
 - Palpable Purpura
 - Arthritis/Arthralgien
 - Abdominale Beschwerden
 - Nierenbeteiligung
- Management
 - topische/systemische Steroide
 - NSAR
 - Follow-up bezüglich Nierenbeteiligung

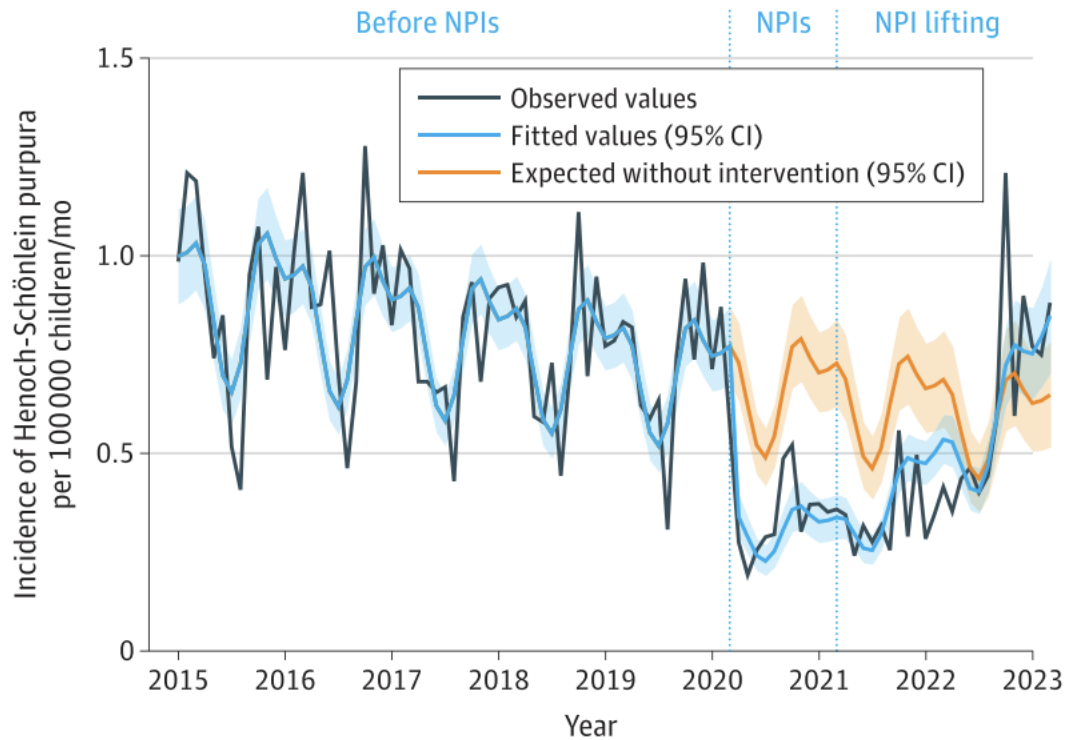


Original Investigation | Rheumatology

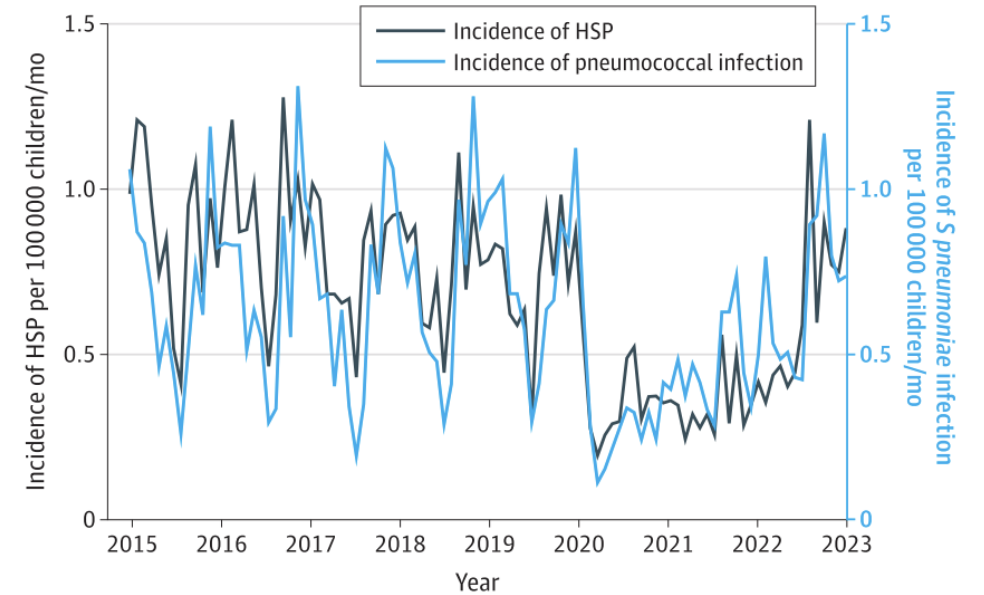
Common Seasonal Pathogens and Epidemiology of Henoch-Schönlein Purpura Among Children

Arthur Felix, MD; Zein Assad, MD; Philippe Bidet, MD, PhD; Marion Caseris, MD; Cécile Dumaine, MD; Albert Faye, MD, PhD; Isabelle Melki, MD, PhD; Florentia Kaguelidou, MD, PhD; Zaba Valtuille, MSc; Naïm Ouldali, MD, PhD; Ulrich Meinzer, MD, PhD

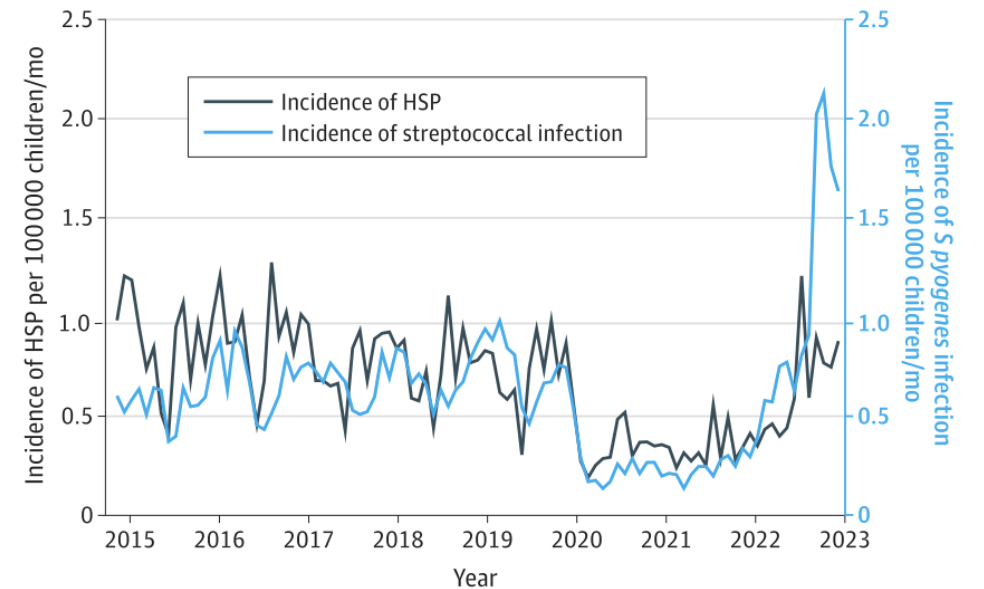
A Monthly incidence of Henoch-Schönlein purpura



A Incidences of HSP and *S pneumoniae* infection



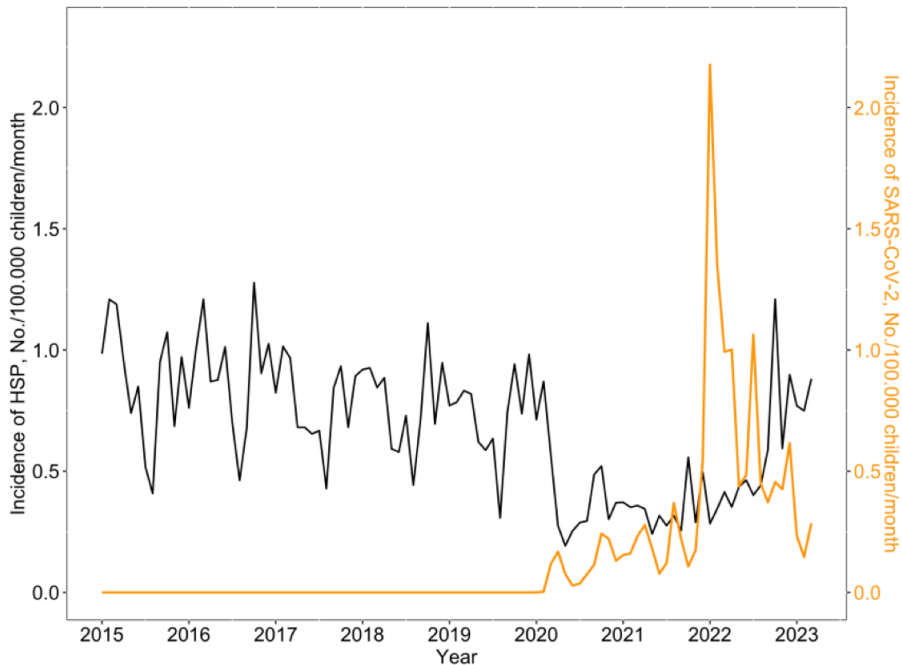
B Incidences of HSP and *S pyogenes* infection



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eFigure 1. Seasonal Pattern of the Incidence of HSP and SARS-CoV-2 Infections (N=41,484) per 100,000 Children Aged <18 Years in France



The black line shows the monthly incidence of HSP per 100,000 children. The orange line shows the monthly incidence of SARS-CoV-2 infections per 100,000 children.

Erreger	potentieller Anteil an der HSP-Inzidenz
Pneumokokken	37.3%
Gr. A-Streptokokken	25.6%
Rhino/Enteroviren	17.1%

Säuglinge/Kleinkinder



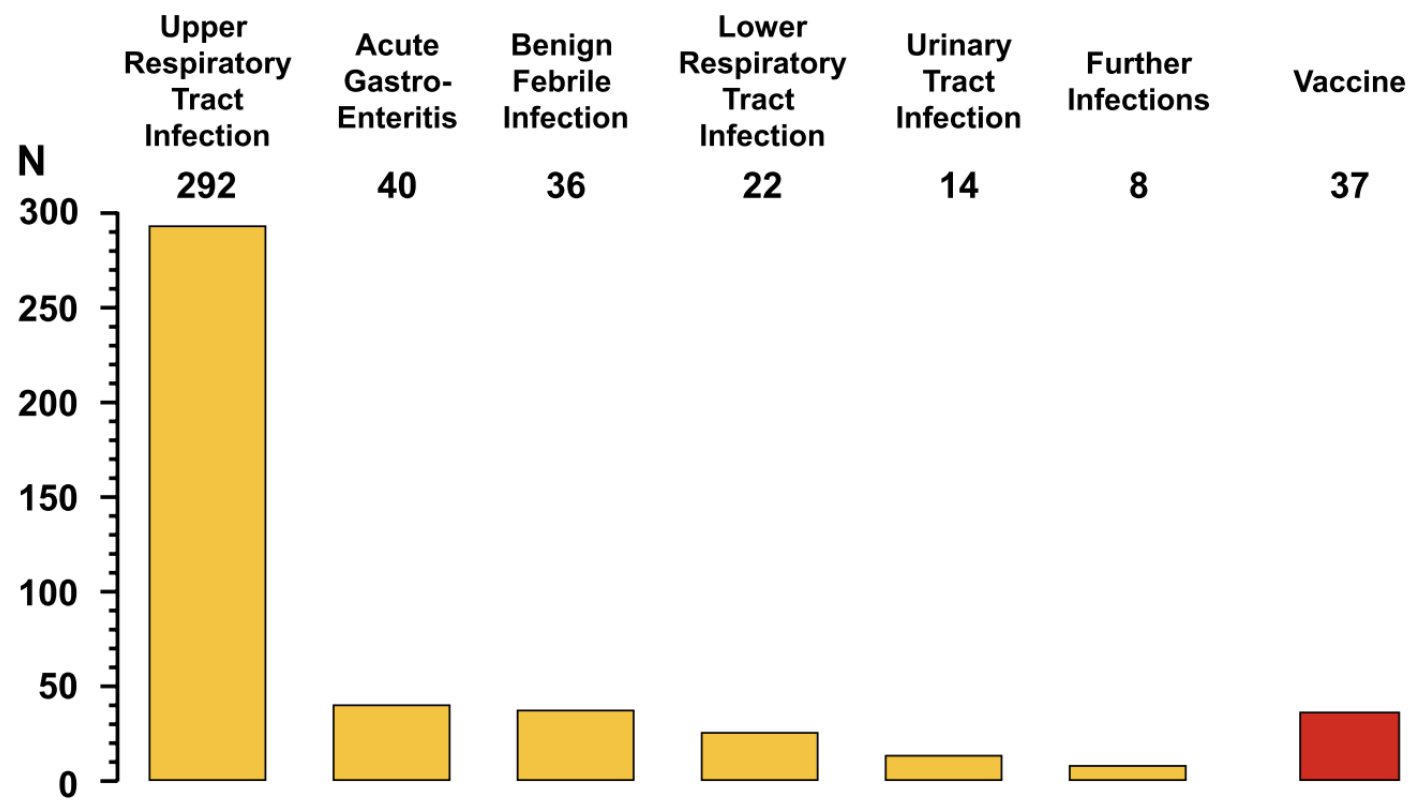
Akutes hämorrhagisches Ödem des Kleinkindesalters



Akutes hämorrhagisches Ödem des Kleinkindesalters

Infections or Vaccines Associated with Finkelstein-Seidlmayer Vasculitis: Systematic Review

Gabriel Bronz¹ · Céline Betti¹ · Pietro O. Rinoldi¹ · Lisa Kottanattu^{1,2} · Mario G. Bianchetti^{2,3} · Danilo Consolascio³ · Marcel M. Bergmann^{4,5} · Gregorio P. Milani^{6,7} · Benedetta Terziroli Beretta Piccoli^{2,8}  · Sebastiano A. G. Lava^{9,10}



Bacteria	N
Streptococcus species	54 ^a
Streptococcus pyogenes	20
Streptococcus pneumoniae	11
Streptococcus not otherwise specified	5
Streptococcus viridans	3
Escherichia coli	1
Mycoplasma pneumoniae	12
Staphylococcus species	6
Staphylococcus aureus	4
Staphylococcus not otherwise specified	2
Campylobacter species	2
Campylobacter jejuni	3
Campylobacter mucosalis	2
Proteus mirabilis	1
Mycobacterium tuberculosis	3
Gram-positive bacterium, not otherwise specified	2
Gram-negative bacterium, not otherwise specified	1
Haemophilus influenzae	1
Salmonella not otherwise specified	1
Viruses	41 ^b
Herpesviridae	9
Human Herpes Virus 3 (Varicella Zoster Virus)	4
Human Herpes Virus 1 (Herpes simplex 1)	2
Human Herpes Virus 4 (Epstein-Barr Virus)	2
Human Herpes Virus 5 (Cytomegalovirus)	1
Adenovirus	5
Rhinovirus	4
Coronaviruses	4
Severe acute respiratory syndrome coronavirus 2	3
Coronavirus NL63	1
Picornaviruses	6
Coxsackievirus not otherwise specified	1
Coxsackievirus B4	1
Coxsackievirus B5	1
Enterovirus not otherwise specified	3
Parvovirus B19	3
Rotavirus	3
Bocavirus	1
Echovirus	1
Hepatitis A virus	1
Human metapneumovirus	1
Parainfluenza virus	1
Paramyxovirus	1
Fungi	2
Candida albicans	2

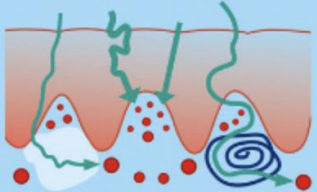
Kinderdermatologie

Differenzialdiagnostik und Therapie bei Kindern und Jugendlichen

Peter H. Höger

Online-Version in der eRef

4. Auflage



Thieme



Abb. 31.9 Manifestationen des akuten hämorrhagisches Ödems.

a–d Purpuriforme, ödematöse Kokarden verschiedenen Stadien der Einblutung. c Typisches urtikarielles Vorstadium und die beginnende Häorrhagie innerhalb der Urticae. e 15 Monate altes Kleinkind mit großflächigen urtikariellen Plaques, die eine livide bzw. hämorrhagische Randzone zeigen. f 2 Tage später sind die Urticae abgeklungen; die hämorrhagischen Randzonen imponieren wie Hämatome.

Accurate diagnosis of acute hemorrhagic edema of infancy: a French multicenter observational study

Sophie Leducq^{1,2} · Annabel Maruani^{1,2} · Christine Bodemer³ · Sandra Biscardi⁴ · Olivia Boccaro³ · Marie-France Chinazzo⁵ · Emmanuel Mahé⁶ · Patrice Plantin⁷ · Sylvie Fraitag⁸ · Juliette Mazereeuw-Hautier⁹ · Christine Chiaverini¹⁰ · Irene Lemelle¹¹ · Didier Bessis¹² · Emmanuelle Bourrat¹³ · Stéphanie Mallet¹⁴ · Bertille Bonniaud¹⁵ · Martine Grall-Lerosey¹⁶ · Ludovic Martin¹⁷ · Franck Boralevi¹⁸ · Maryam Piram¹⁹

69 Kinder diagnostiziert mit “AHEI”
durch KinderdermatologInnen, KinderreumatologInnen
oder PädiaterInnen

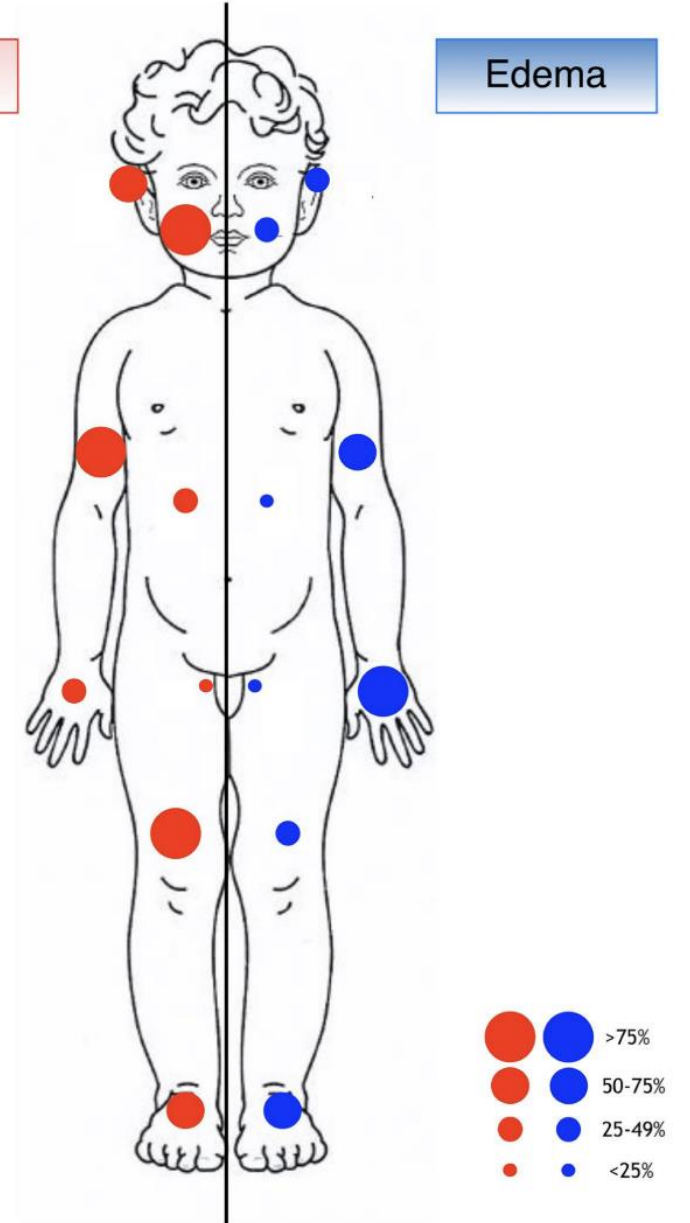
Expert Review
→ 40% der Diagnosen revidiert

Clues for AHEI

- Kind < 3 Jahren in gutem AZ
- Purpura Gesicht, Ohren, Arme, Beine; Rumpf mehrheitlich ausgespart
- Ödeme der Hände
- fehlender Juckreiz

Purpura

Edema







Urtikaria multiforme

- VIEL häufiger als AHEI
- Spielform der akuten Urtikaria
- Quaddeln, wandernd, ekchymotische Areale möglich
- Juckreiz



Akute anuläre Urtikaria / Urtikaria multiforme

20 Stunden nach Therapiebeginn
(Antihistaminika, Betnesol)



Akute anuläre Urtikaria / Urtikaria multiforme

Differentialdiagnosen zur Urticaria multiforme

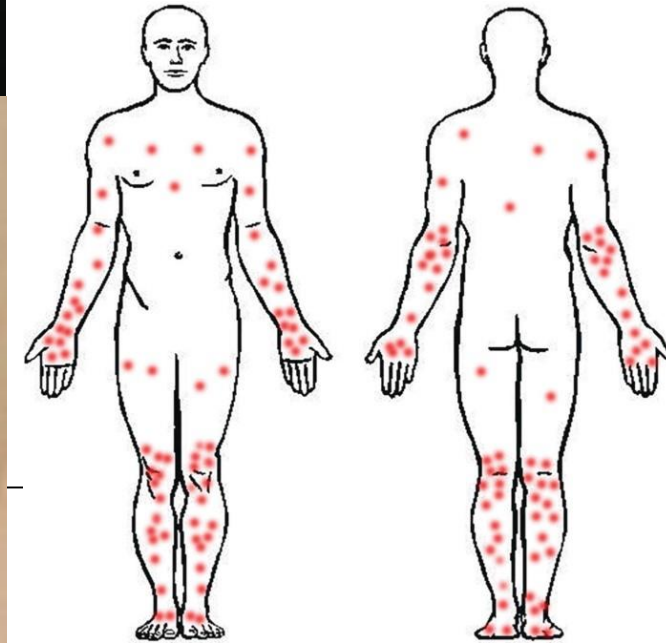


Erythema multiforme

Arthralgien
Fieber
Amoxicillinexposition

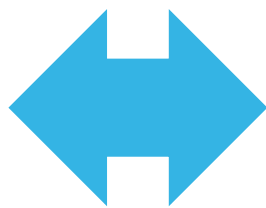


Serum Sickness-like reaction

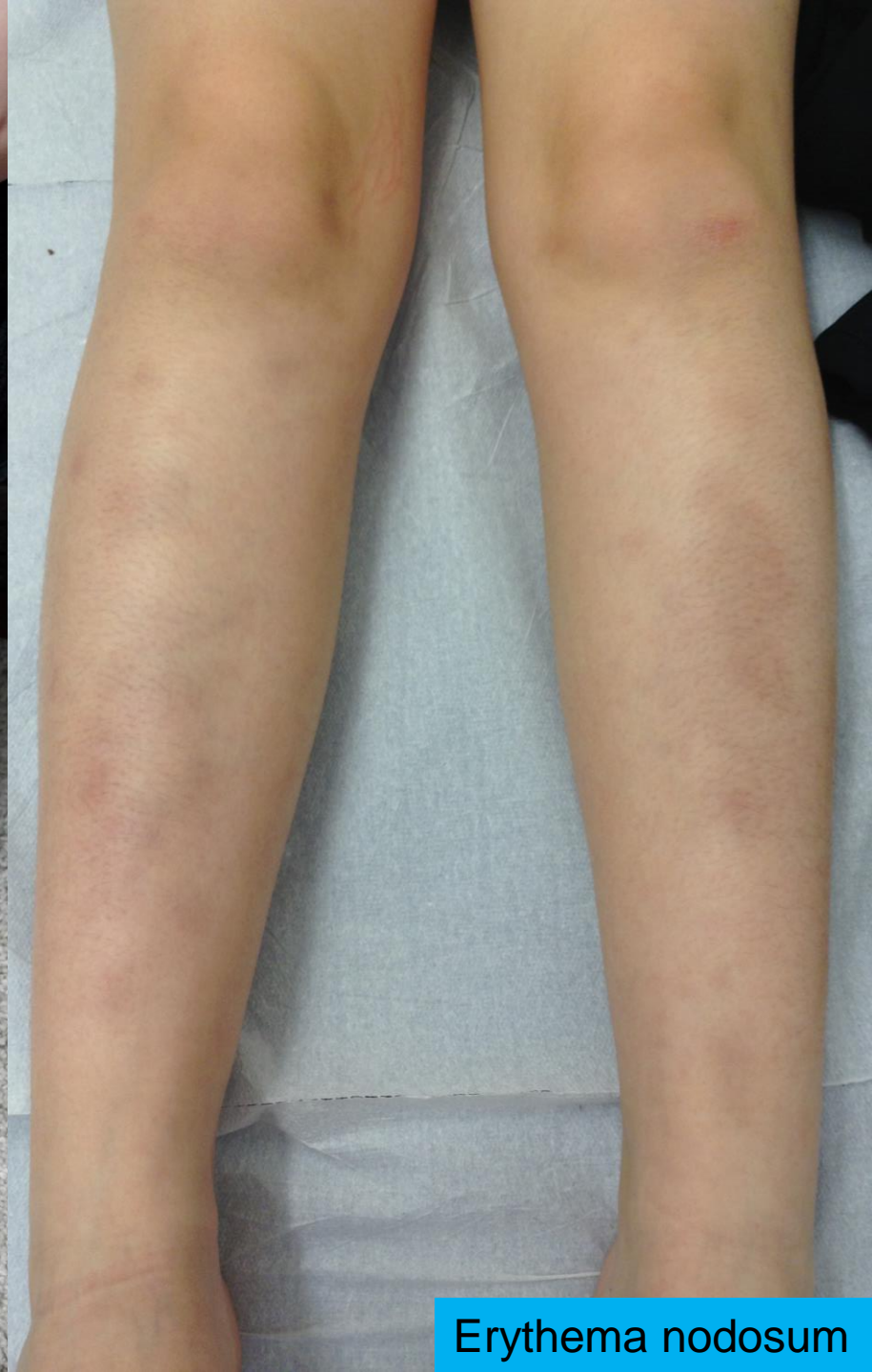




AHEI



Purpura fulminans



Erythema nodosum

Erythema nodosum

- insgesamt selten, aber mit Abstand häufigste Pannikulitis
- fast immer an Streckseiten der Unterschenkel, schmerzhaft
- Reaktionsmuster auf eine Vielzahl von Stimuli, meist Infektionen
- oft selbstlimitiert über 2-6 Wochen
- Therapie
 - Grunderkrankung behandeln, sofern möglich
 - körperliche Schonung
 - NSAID
 - topische Steroide
 - (systemische Steroide, Dapson, Colchicin, Hydroxychloroquin, Tetrazykline)



Erythema nodosum - Ätiologie	%	
idiopathisch	50	
Infektionen	22-48	Streptokokken Gr. A, <i>M. pneumoniae</i> , ...
Medikamente		orale Antikonzeption, Antibiotika, ...
Sarkoidose	2-4	
chron. entzündliche Darmerkrankungen	2-10	
Autoimmunerkrankungen	2.5-8	SLE, JIA, M. Behçet, ...
paraneoplastisch (selten)	2	M. Hodgkin

Bacterial	Viral	Fungal	Protozoal
GAS	EBV	Candida albicans	Giardia lamblia
Mycobacterium tuberculosis	HBV	Trichophyton mentagrophytes	Entamoeba histolytica
Atypical mycobacteria	HCV	Coccidioides immitis	Toxoplasma gondii
Yersinia enterocolitica	HPV B19	Blastomices dermatitidis	
Salmonella spp.	HIV	Histoplasma capsulatum	
Campylobacter jejuni	CMV	Sporothrix schenckii	
Mycoplasma pneumoniae	Parapoxvirus		
Chlamydia trachomatis	VZV		
Chlamydia psittaci	SARS-CoV-2		
Coxiella burneti			
Bartonella henselae			
Helicobacter pylori			
Gardnerella vaginalis		y	
Francisella tularensis			

Abklärungen bei EN

- Labor (BB diff, CRP, BSR)
- Rx Thorax
- (Rachenabstrich)
- alles weitere gemäss Anamnese/Klinik

Leung AKC et al, World J Pediatr 2018
Perez-Garza DM et al, Am J Clin Dermatol 2021
Trapani S et al, Children 2022



- 2.5-jähriges Mädchen
- Auftreten dieser Papeln über 1-2 Wochen
- minimal juckend





Gianotti-Crosti-“Syndrom“

Gianotti-Crosti «Syndrom» – Acrodermatitis papulosa juvenilis

- weltweite Verbreitung, unklare Inzidenz
- Kinder 1-6 Jahre >> Adoleszente/Erwachsene
- Reaktionsmuster auf einen infektiösen Trigger
 - **EBV**, Hepatitis B, Hepatitis A and C virus, *Parvovirus B19*, CMV, Parainfluenza, Enteroviren, Rotavirus, Echovirus, Influenza, RSV, Rubella, Adenovirus, HHV6...
 - Streptokokken Gr. A, *Mycoplasma pneumoniae*, *Mycobacterium avium-intracellulare*, *Bartonella henselae*
 - Impfungen
- Spontanverlauf über 4-10 Wochen
- Behandlung symptomatisch



Gianotti-Crosti-like reaction (GCLR) bei Mollusken

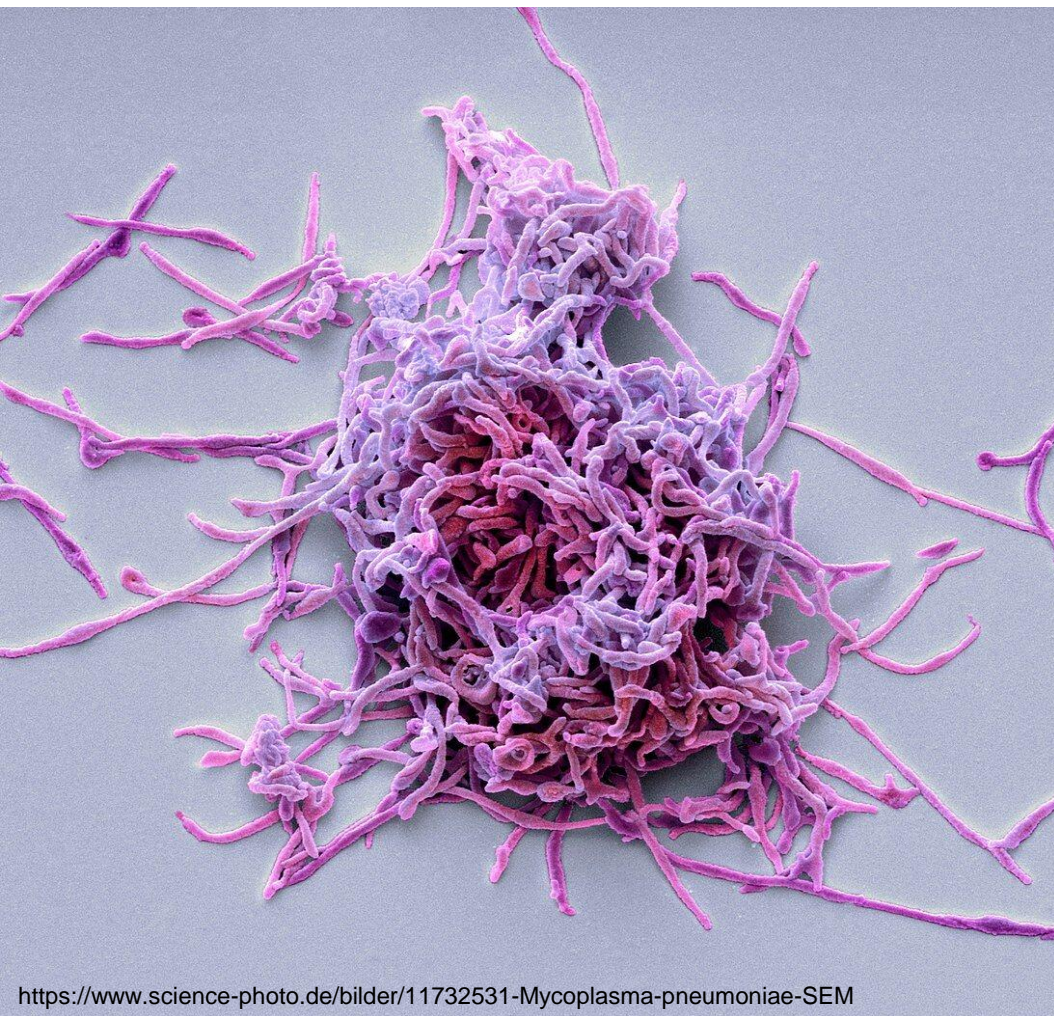


Christina Bürgler^{1,2}, Lisa Weibel¹,
Agnes Schwieger-Briel¹, Nicole
Knöpfel¹, Isabelle Luchsinger¹,
Martin Theiler¹

Gianotti-Crosti syndrome-like reaction
to molluscum contagiosum–Clinical
characteristics and response to
treatment

	GCLR	Classic GCS
Trigger	Molluscum contagiosum	Epstein-Barr virus, Hepatitis B virus, vaccinations, many other (mostly viral) pathogens
Morphology	<i>Polymorphic:</i> papules/plaques > papulovesicles, urticarial or target-like lesions	<i>Monomorphic:</i> papules
Distribution	Relatively <i>localized</i> , predominantly over extensor surfaces of large joints: elbows, knees, Achilles tendon	More <i>generalized</i> : extensor surfaces of the extremities, buttocks, face
Pruritus	Severe	Slight/absent
Duration	2–6 weeks	6–10 weeks
Response to topical corticosteroid treatment	Good	Minimal





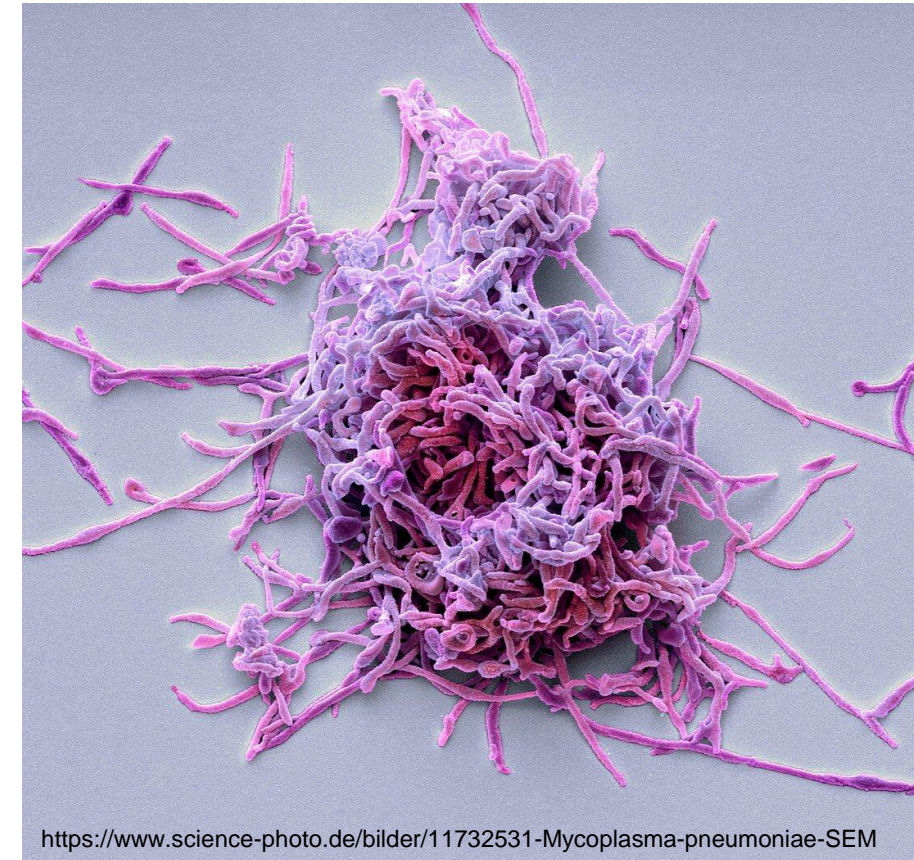
25 – 33%



SKIN DISEASE

Quick facts zu *Mycoplasma pneumoniae*

- häufiger Erreger von oberen Atemwegsinfektionen und CAP («atypical pneumonia», «walking pneumonia»)
- einer der kleinsten, selbst-replizierenden Organismen
- keine Zellwand
- wächst langsam (Generationszeit 6 Stunden)
- Inkubationszeit 1-4 Wochen
- zyklische Epidemien alle 1-3 Jahre

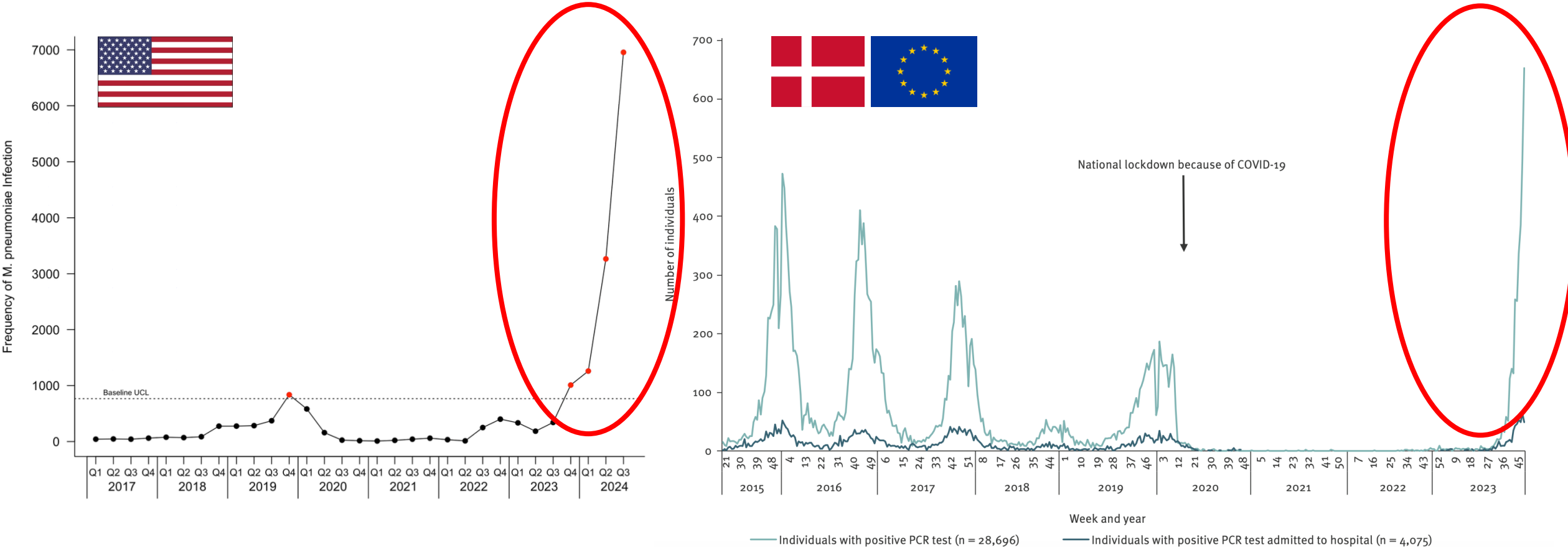


<https://www.science-photo.de/bilder/11732531-Mycoplasma-pneumoniae-SEM>

Mycoplasma pneumoniae: delayed re-emergence after COVID-19 pandemic restrictions



Lancet Microbe 2024

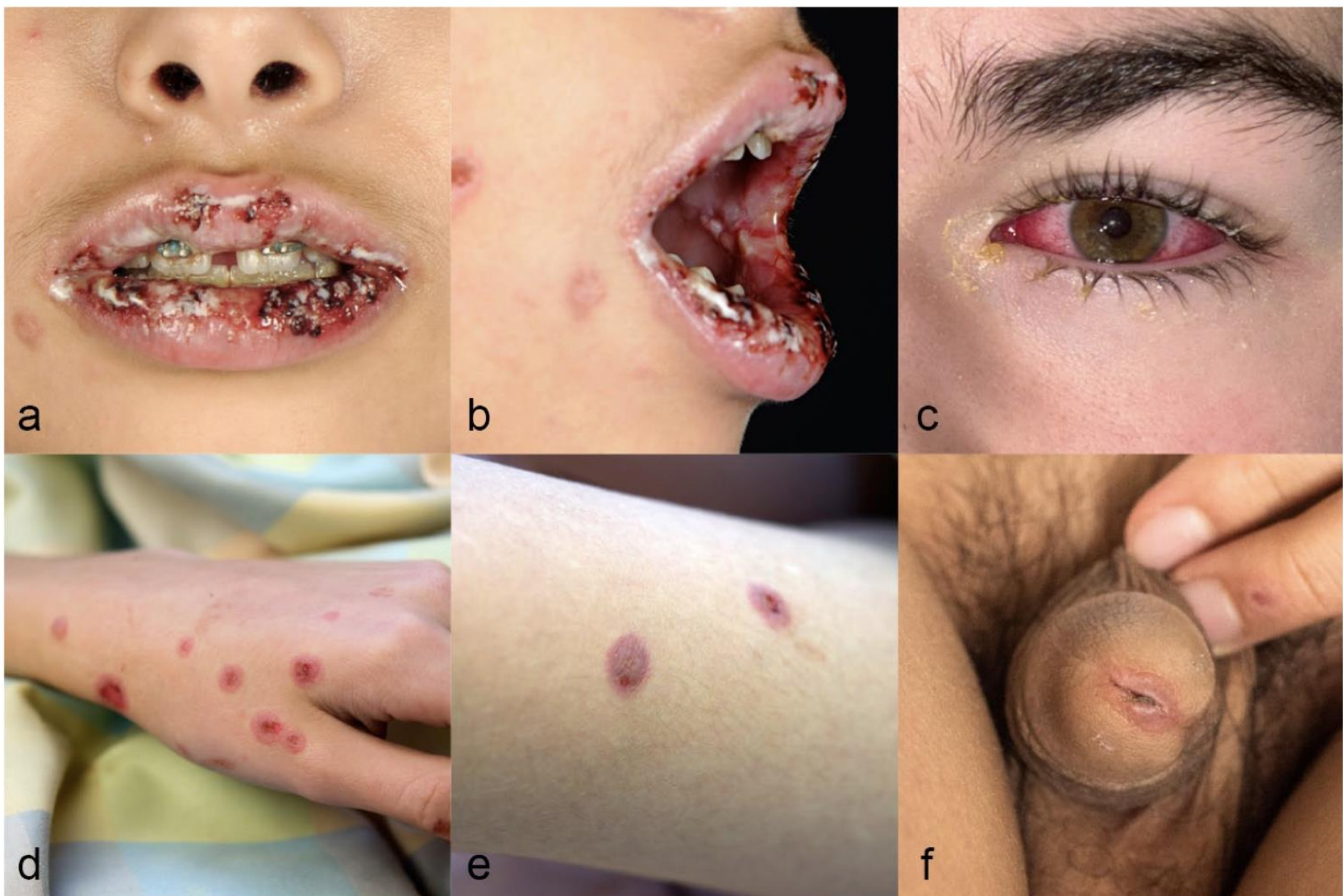





Mycoplasma pneumoniae

Extrapulmonary Manifestations in Children With Focus on Mucocutaneous Disease

Patrick M. Meyer Sauteur^{ID}, MD, PhD,* Michele L. Ramien^{ID}, MD,†‡ and Martin Theiler^{ID}, MD§

Organ system affected, ranked by frequency (from top to bottom):	Strength of association* (from left to right):	
	Definite, confirmed, or probable	Possible
Dermatological (1-5)	<ul style="list-style-type: none">• Maculopapular skin eruptions• Urticaria• <i>M. pneumoniae</i>-induced rash and mucositis (MIRM or <i>M. pneumoniae</i>-triggered reactive infectious mucocutaneous eruption [RIME]**)• Erythema multiforme (EM)• Stevens-Johnson syndrome (SJS)***• Toxic epidermal necrolysis (TEN)***• Erythema nodosum• Non-sexually acquired genital ulceration (Lipschütz ulcers) (6)• Angioedema (7, 8)• Flagellate erythema (9)• Red fingers (10)	<ul style="list-style-type: none">• Raynaud's syndrome (cryoglobulinemia)• Subcorneal pustular dermatosis (Sneddon-Wilkinson)• Sweet's syndrome• Reactive arthritis (formerly Reiter's syndrome)• Papular acrodermatitis (Gianotti-Crosti)• Pityriasis rosea Gibert• Pityriasis lichenoides et varioliformis acuta (Mucha-Habermann)



<i>New classification</i>	EM Erythema multiforme		RIME Reactive infectious mucocutaneous eruption		DEN Drug-induced epidermal necrolysis	
<i>Main trigger</i>	Herpes simplex virus		<i>M. pneumoniae</i> (MIRM)		Drugs	
<i>Clinical picture</i>						
<i>Traditional classification</i>	EM minor		EM major	SJS	SJS-TEN overlap	TEN
<i>Mucosal involvement</i>	(+)		≥2 mucosal surfaces		≥2 mucosal surfaces	
<i>BSA involvement</i>	<<10% (acral distribution)		<10%		10–30%	>30%
<i>Target lesion morphology</i>	Typical or atypical papular targets		Vesiculobullous or atypical papular targets		Flat atypical targets	

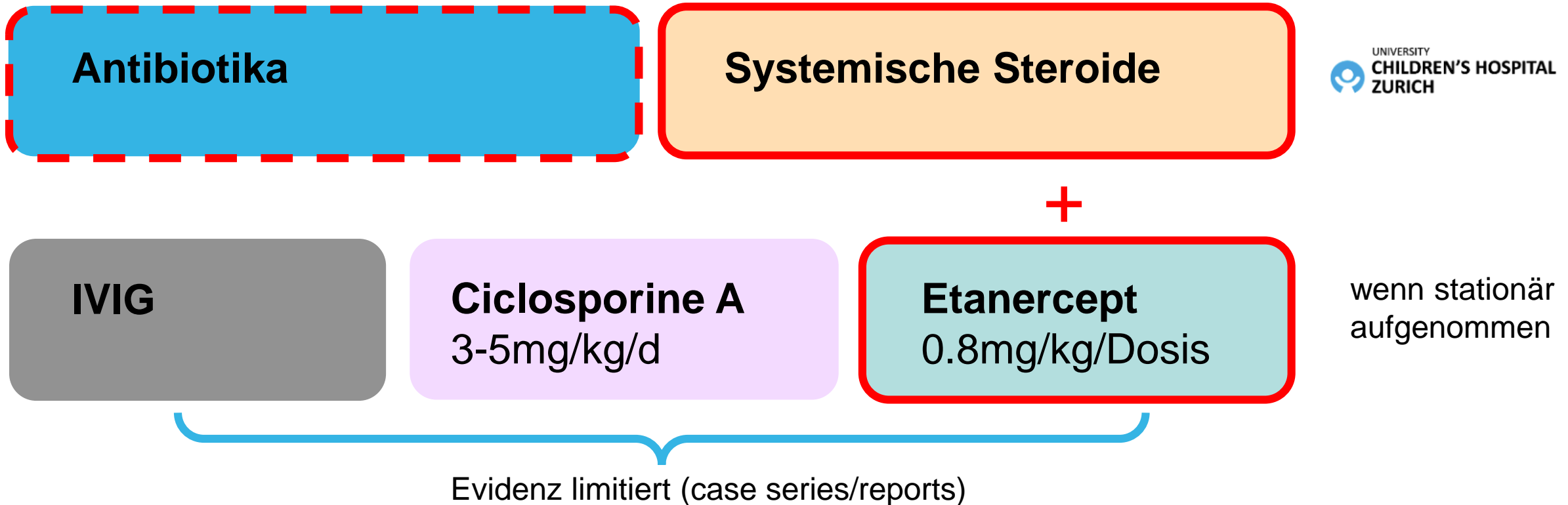
RIME – Systematischer Review (Lara-Corales and Ramien; unpubliziert)

Patients (n)	261
Age (mean years, SD)	10.07 (4.11)
Sex (n, %)	
Male	165 (28%)
Female	74 (63%)
Unreported	22 (8%)
Race (n, %)	
Indigenous	1 (0.4%)
Asian	26 (10%)
Black	6 (2%)
Hispanic	5 (2%)
White	22 (8%)
Unreported	193 (74%)

Trigger identified	234 (90%)
<i>M. pneumoniae</i>	198 (76%)
<i>C. pneumoniae</i>	11 (4%)
HSV	9 (3%)
Influenza	6 (2%)
Adenovirus	5 (2%)

Erythema multiforme (EM)	Reactive Infectious Mucocutaneous Eruption (RIME)	Drug-induced epidermal necrolysis (DEN)
Patient must have fixed typical or atypical papular targets	Patient must have at least two of the following:	Patient must have rapidly progressing erythema and epidermal detachment and relevant medication history and, if needed, histology that excludes alternative diagnoses
Pathogenese – basiert		
	b) Erosive mucositis, with at least 2 mucosal surfaces involved c) Non-contributory medication history	
Patient must have at least two of the following:	Patient must have evidence of infection with at least one of the following:	Patient must have at least two of the following:
a) Acral distribution b) ... c) ... <div> – HSV – topische/systemische Steroide – Virostatika </div>	a) Clinical symptoms (ie. <u>cough</u> , sore throat, fever) b) ... c) ... <div> – Respiratorische Erreger – Antibiotika (sofern indiziert) – Systemische Steroide, TNF-Blocker, Ciclosporin </div>	a) ≥10% detached or detachable skin b) ... c) ... <div> – auslösendes Medikament stoppen – intensivmedizinische Betreuung – TNF-Blocker, IVIG, Ciclosporin </div>

Management RIME – immunmodulierende Therapie



Augenbehandlung

9% der RIME Patienten haben Folgeprobleme an den Augen!

(trockene Augen, Bindehautvernarbungen/Synechien, Hornhautulzerationen, Blindheit)

→ Ophthalmologie involvieren



keine oder sehr milde Augenbeteiligung: **häufige Befeuchtung**



mittelgradige Augenbeteiligung: zusätzlich **antibiotische und steroidhaltige Augentropfen**
(Tobramycin 0.3% und Dexamethasone 0.1%)

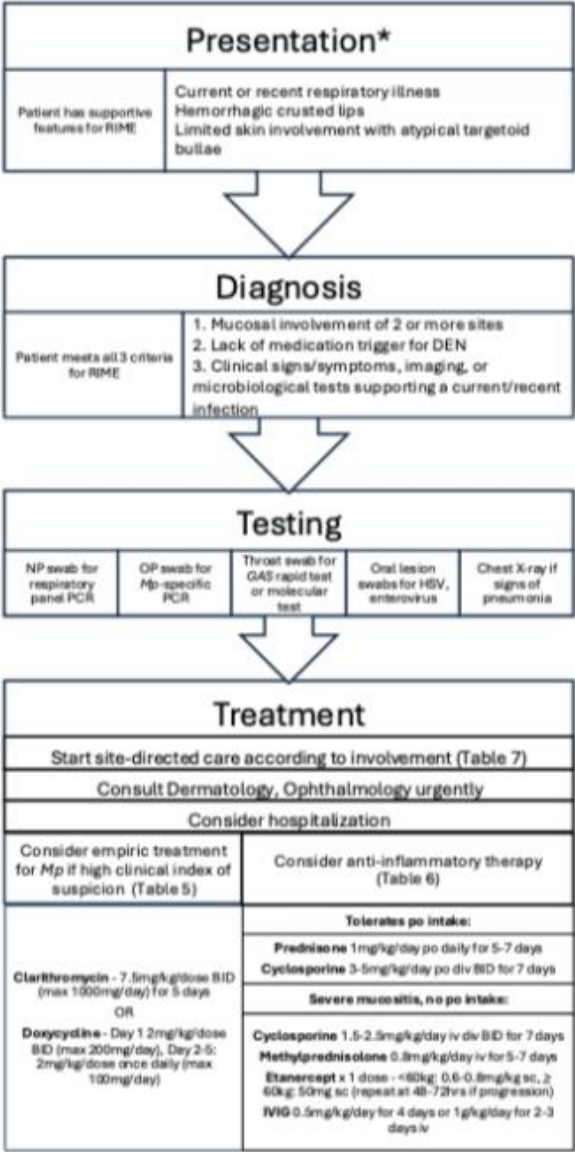


schwere Augenbeteiligung: zusätzlich **Amnionmembrantransplantation** evaluieren

COMING SOON

RIME Update 2025 (submitted)

RIME expert consensus guidelines (in prep)



Vielen Dank für die Aufmerksamkeit!

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