

EULAR 2023  
SLE/Sjögren Syndrom

Thomas Daikeler

USB

# Omics in SLE



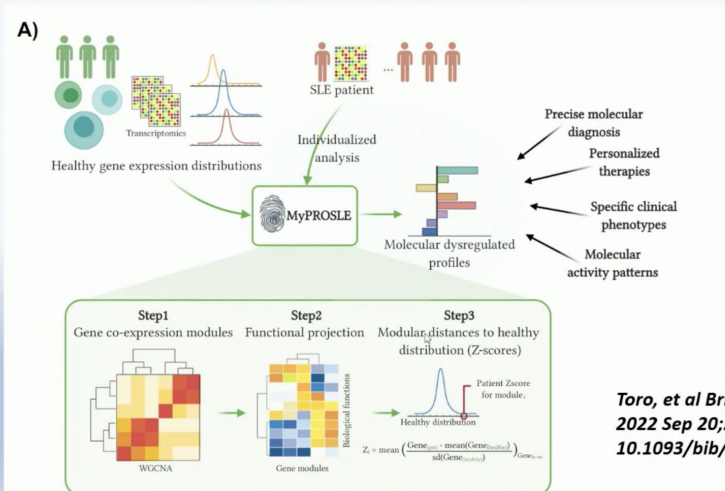
14:15 - 15:30 Precision medicine in SLE: where are we?  
CHAIRS: DIMITRIOS BOUMPAS, JOSE M PEGO-REIGOSA

### Which cells Differentiate Patients that Belong to Different transcriptome groups?

**Marta Alarcon-Riquelme**  
The molecular mechanisms behind lupus: a way to solve the disease heterogeneity?

eular 23  
EUROPEAN SOCIETY OF RHEUMATOLOGY  
11 MAY - 3 JUNE

## Can we use molecular patterns to predict flares or long-term remission?



**Toro, et al Brief Bioinformatics, 2022 Sep 20;23(5):bbac332. doi: 10.1093/bib/bbac332**

## 10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

CHAIRS: NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VollenHOVEN

### Metabolomic Serum Profiling Identifies Metabolites Linked to Kidney Damage Which Are Modulated by Anifrolumab in a Phase 2 Trial in Lupus Nephritis

David Jayne<sup>1</sup>, Patrick G. Gavin<sup>2</sup>, Erik L. Allman<sup>3</sup>, Cristina Di Poto<sup>3</sup>, Xiang Tian<sup>3</sup>, Sonja Hess<sup>3</sup>, Madhu Ramaswamy<sup>2</sup>, Mark Lazarus<sup>4</sup>, Philip Z. Brohawn<sup>2</sup>, Daniel Muthas<sup>5</sup>, Adam Platt<sup>4</sup>, Hussein Al-Mossawi<sup>6</sup>, Catharina Lindholm<sup>7</sup>, Nicola Ferrari<sup>4</sup>

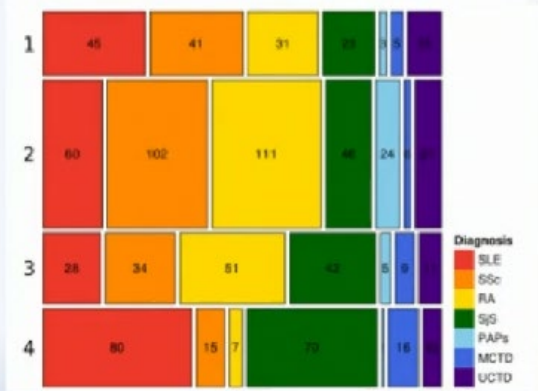
<sup>1</sup>Department of Medicine, University of Cambridge, Cambridge, UK; <sup>2</sup>Translational Science and Experimental Medicine, Early Respiratory and Immunology, BioPharmaceuticals R&D, AstraZeneca, Gaithersburg, MD, USA; <sup>3</sup>Dynamic Omics, Centre for Genomics Research (CGR), Discovery Sciences, BioPharmaceuticals R&D, AstraZeneca, Gaithersburg, MD, USA; <sup>4</sup>Translational Science and Experimental Medicine, Early Respiratory and Immunology, BioPharmaceuticals R&D, AstraZeneca, Gothenburg, Sweden; <sup>5</sup>Clinical Development, Late Respiratory and Immunology, BioPharmaceuticals R&D, AstraZeneca, Cambridge, UK; <sup>6</sup>Clinical Development, Late Respiratory and Immunology, BioPharmaceuticals R&D, AstraZeneca, Gothenburg, Sweden

Red camera icon indicates that screenshots/photographs are not allowed during the presentation (per EULAR guidelines)

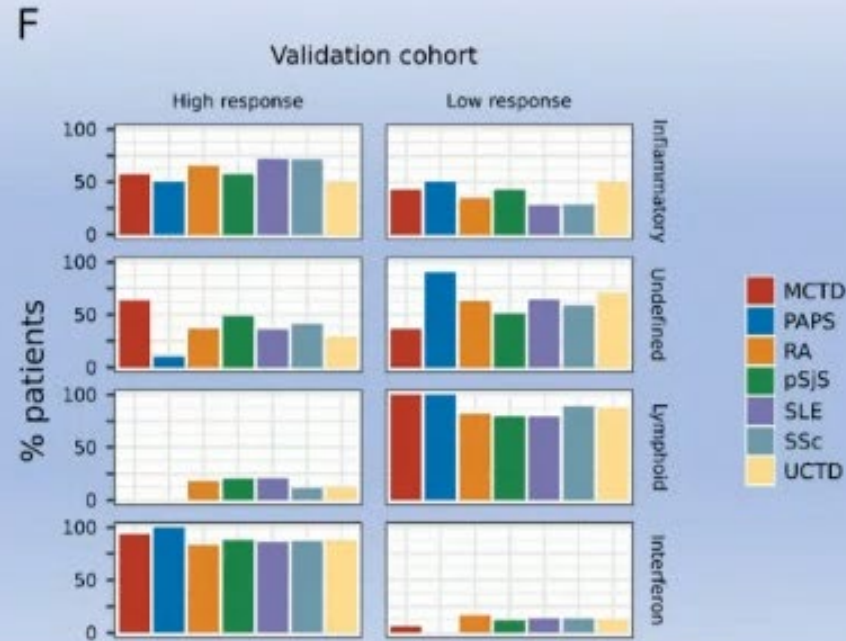


**David Jayne**  
Metabolomic Serum Profiling Identifies Metabolites Linked to Kidney Damage Which Are Modulated by Anifrolumab in a Phase 2 Trial in Lupus Nephritis

# Klassifikation via Dominanz der Immunantwort



1. Inflammatory
2. Undefined
3. Lymphoid
4. Interferon



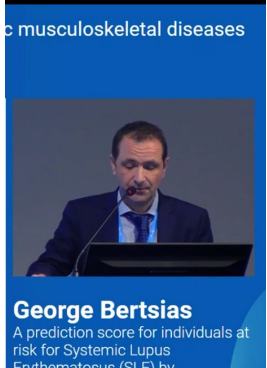
**E,F: Degree of response of Autoimmune diseases of the IFN cluster**

Discovery: 86.2%

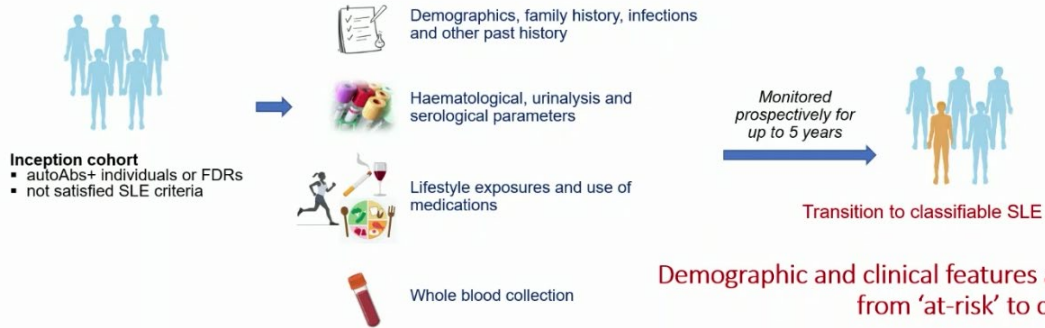
Validation: 86.2%

*In collaboration with X*

# Welche Patienten mit LUPUS Stigmata (aber noch kein SLE) Entwicklen eine LUPUS



**Methodology: evaluation at baseline and every 4 to 12 months depending on the disease status**



## Transition to classifiable SLE (median follow-up 21 months)

SLE classified	No. (%)
by the ACR-97 and/or the EULAR/ACR-19 criteria	52 (22.1%)

## Demographic and clinical features associated with the transition from 'at-risk' to classified SLE

Baseline features	Progression to SLE (ACR 1997 and/or EULAR/ACR 2019 criteria)	
	Hazard ratio (95% CI)	P value
<b>FDR(s) with SLE (yes)</b>	2.21 (1.07–4.54)	0.031
<b>Smoking</b>		
Never smoker	1.00	
Smoker – active	1.23 (0.56–2.72)	0.610
Smoker – past	2.15 (1.17–3.96)	0.014
<b>Mediterranean score (0 to 8)</b>	0.88 (0.76–1.02)	0.090
<b>Malar rash</b>	1.76 (0.92 – 3.36)	0.087
<b>Photosensitivity</b>	2.37 (1.35 – 4.17)	0.003
<b>Mucosal ulcers</b>	1.87 (0.84 – 4.16)	0.125
<b>Serositis</b>	4.87 (1.17 – 20.24)	0.029
<b>Non-scarring alopecia</b>	1.85 (0.92 – 3.71)	0.082
<b>Autoimmune hemolysis</b>	2.56 (0.62 – 10.56)	0.193
<b>Thrombocytopenia</b>	0.22 (0.03 – 1.61)	0.136
<b>Low C3 and low C4</b>	2.13 (0.77 – 5.93)	0.148
<b>Raynaud's</b>	0.52 (0.27 – 1.02)	0.057

## Transition to SLE:

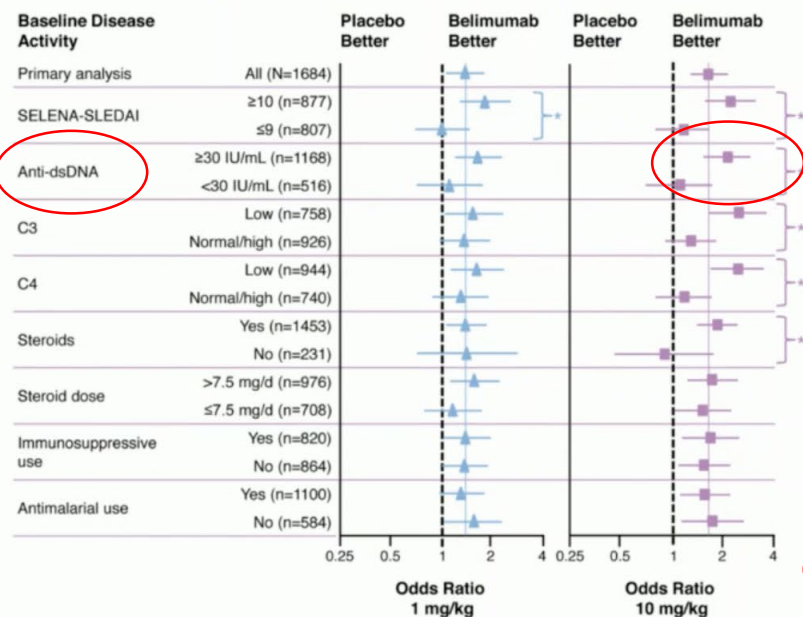
- ✓ Increased *IFI27*, *OTOF*, *IFI44L* expression
- ✓ Deregulation of response to type I IFN

# How can we choose between belimumab and anifrolumab for non-renal SLE?

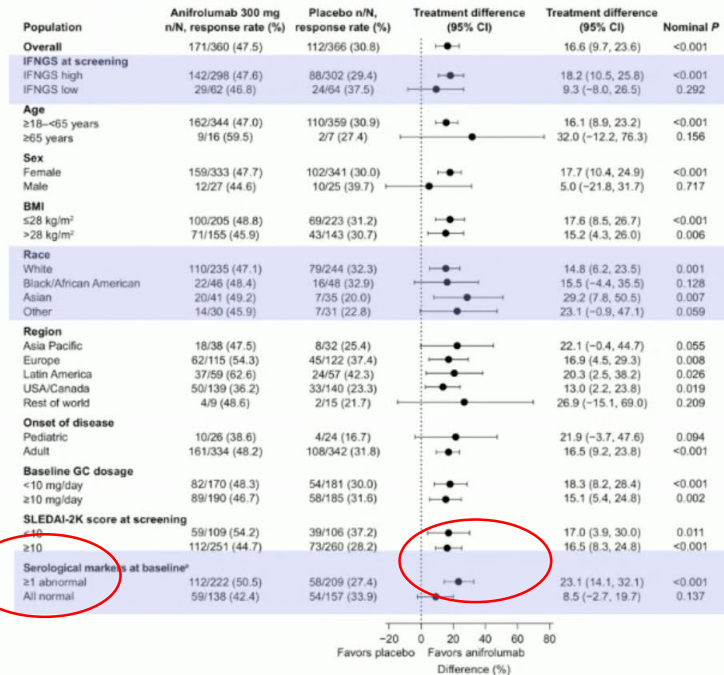


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## Belimumab Vollenhoven et al. ARD 2011



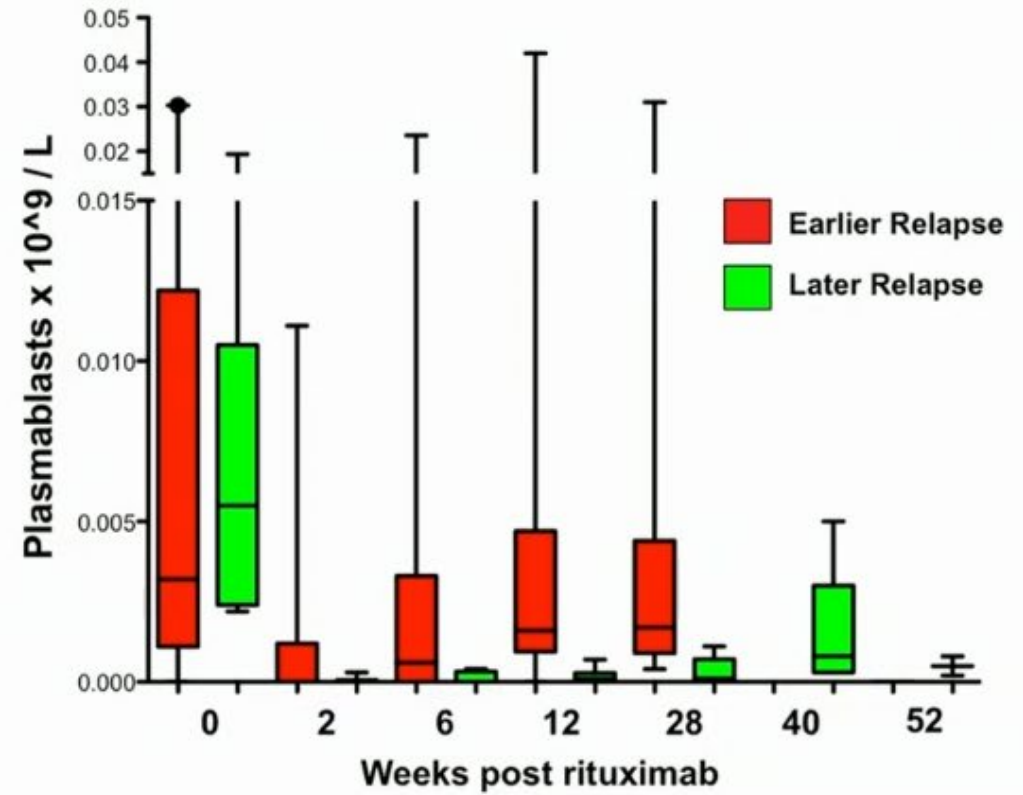
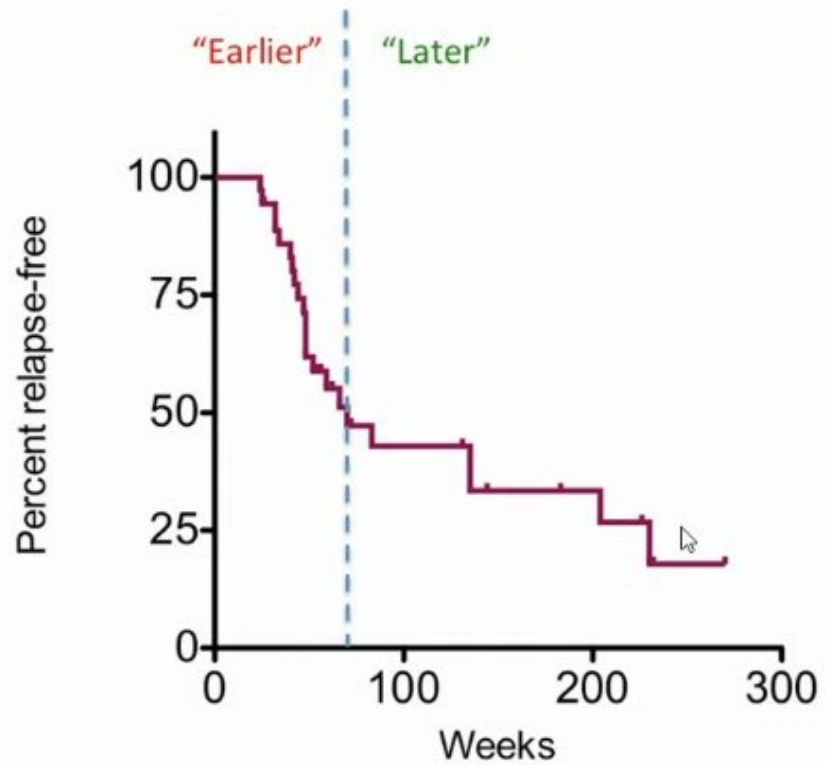
## Anifrolumab Vital et al. ARD 2022



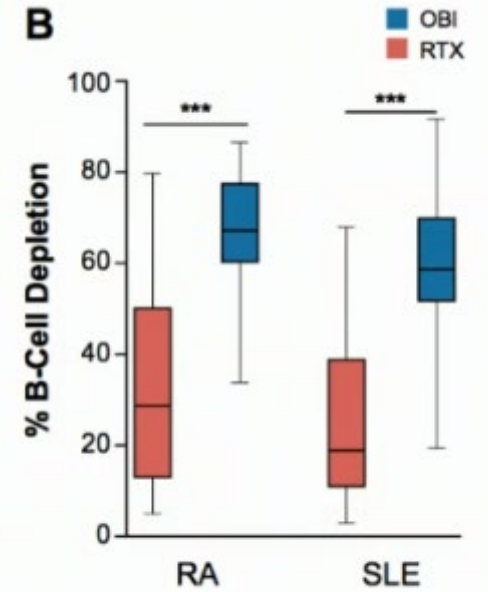
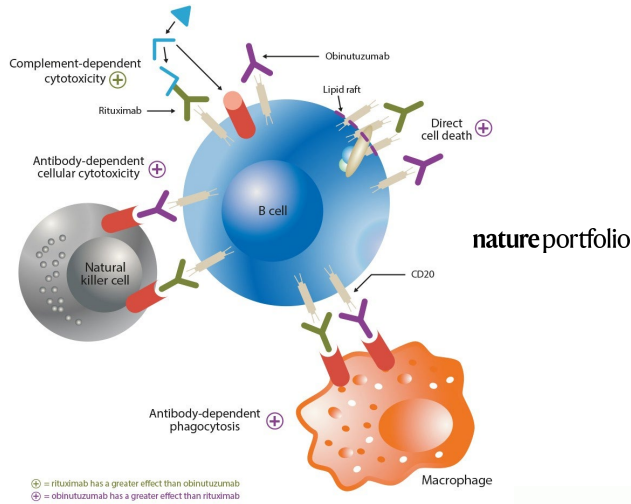
## Edward Vital

Precision medicine in SLE: what is the role of drugs mechanisms of action in the identification of the right therapy?

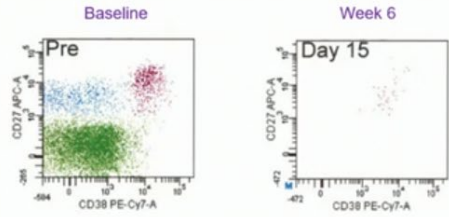
# Focus on B-cell Depleting Therapy



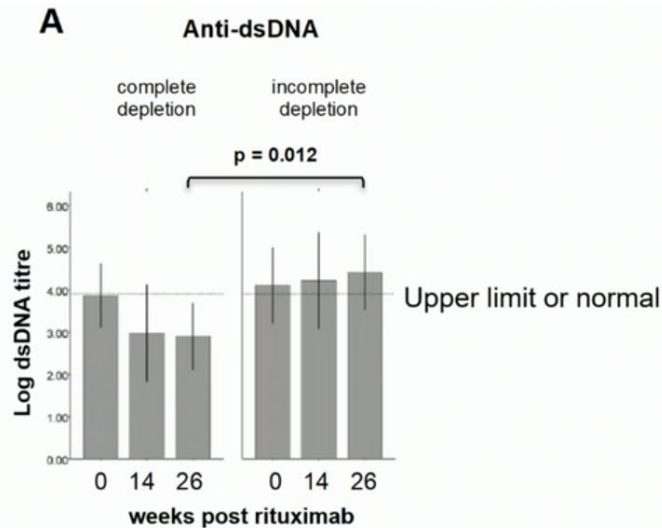
# Die Tiefe der B-Zell Depletion ist Entscheidend



Adapted from Reddy V, et al. *Rheumatology (Oxford)*. 2017;56:1227-1237.

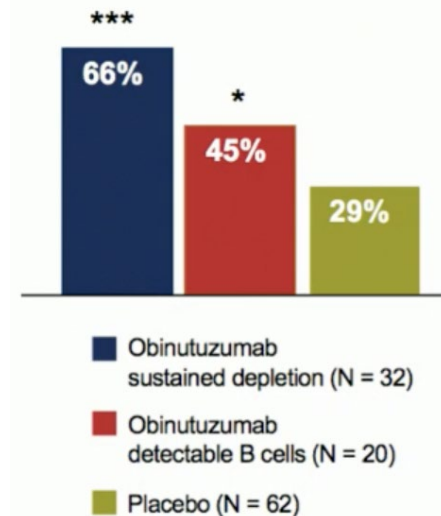


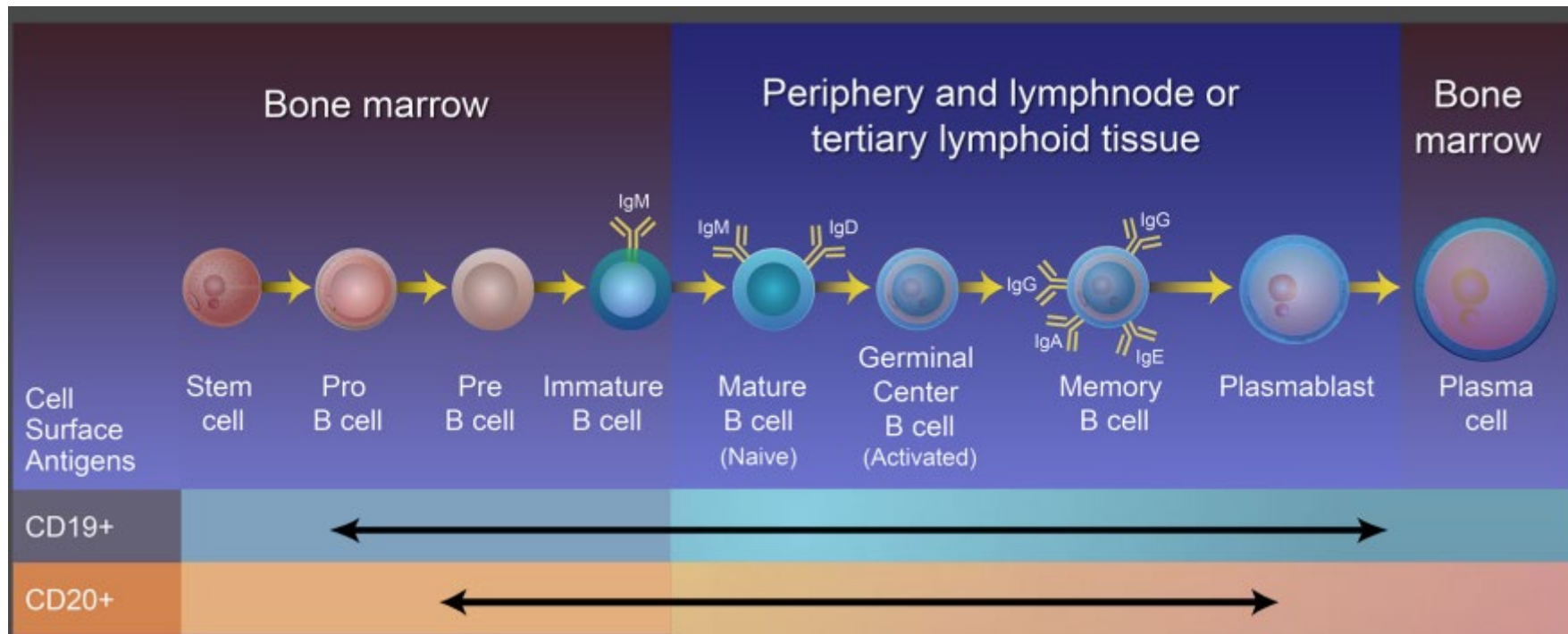
Naïve B cells  
Memory B cells  
Plasmablasts



Vital EM, et al. *Arthritis Rheum*. 2011;63(10):3038-47.

## Overall renal response (Phase 2 NOBILITY criteria)



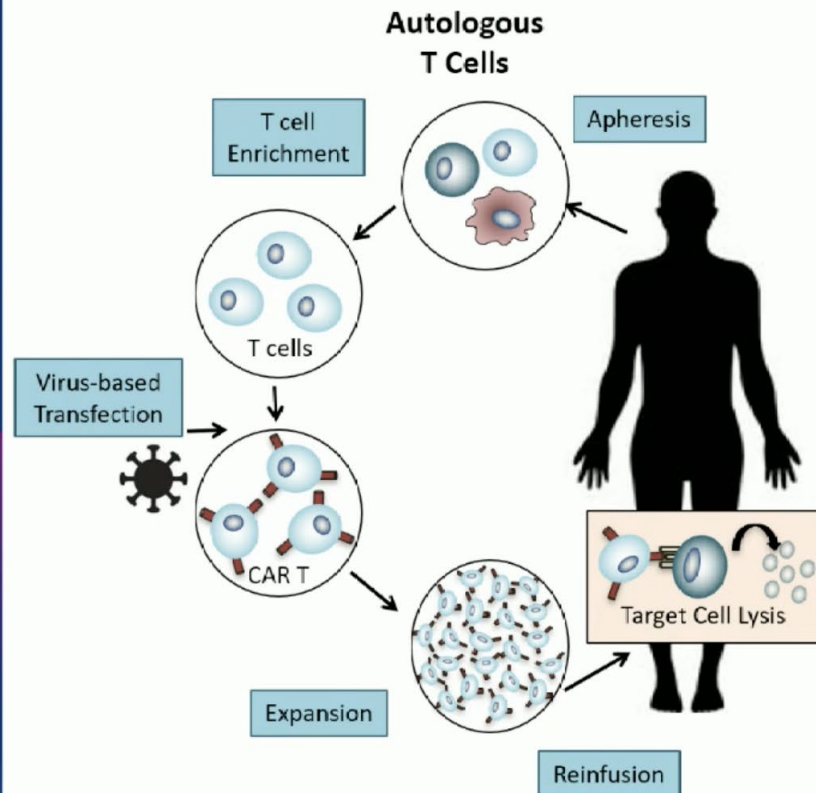




# 10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

CHAIRS : NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VOLLENHOVEN

## Principle of CAR T cell therapy in SLE



### Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS

## 10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

CHAIRS : NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VOLLENHOVEN

### First 7 patients with treatment-refractory SLE

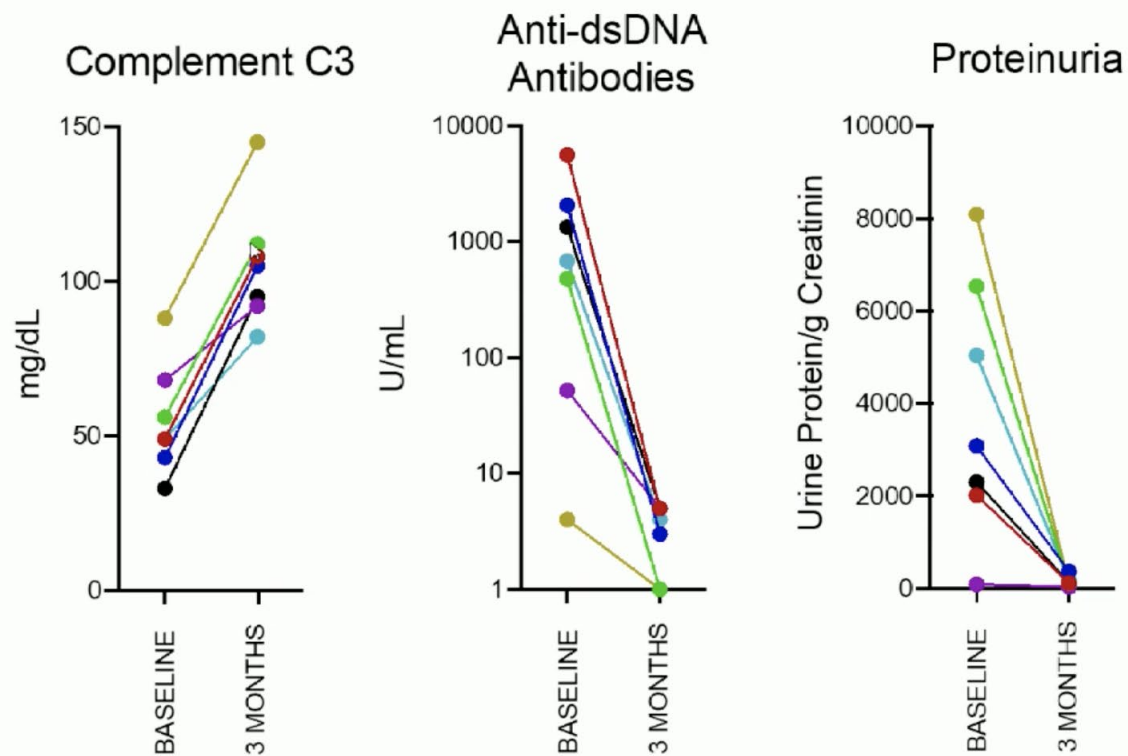
	Pat #1	Pat #2	Pat #3	Pat #4	Pat #5	Pat #6	Pat #7
Age (ys)	22	23	22	24	18	33	33
Sex (F/M)	F	M	F	F	F	F	F
Disease Duration (ys)	4	1	6	9	3	18	1
Baseline SLEDAI (score)	16	16	10	8	9	16	10
Baseline C3 (mg/dL)	49	43	56	88	68	33	49
Baseline anti-dsDNA (U/mL)	5600	2060	479	4	52	1335	680
Kidney Bx Result	III	III	IV	I	V	IV	IV
Proteinuria (/g creatinine)	2015	3080	6539	8096	88	2025	5044
N organs involved	4	3	5	6	4	6	3
N failed treatments	7	5	4	7	5	15	7
Treatments	GLC HCQ MMF BEL TAC CX RTX	GLC HCQ MMF BEL CX	GLC HCQ MMF BEL	GLC HCQ MMF BEL AZA MTX LEF	GLC HCQ MMF BEL AZA	GLC HCQ MMF BEL TAC CX RTX AZA CYA MTX LEF IVIG BORT UPA IA	GLC HCQ MMF BEL TAC CX RTX



### Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS

## Rapid improvement of signs of SLE



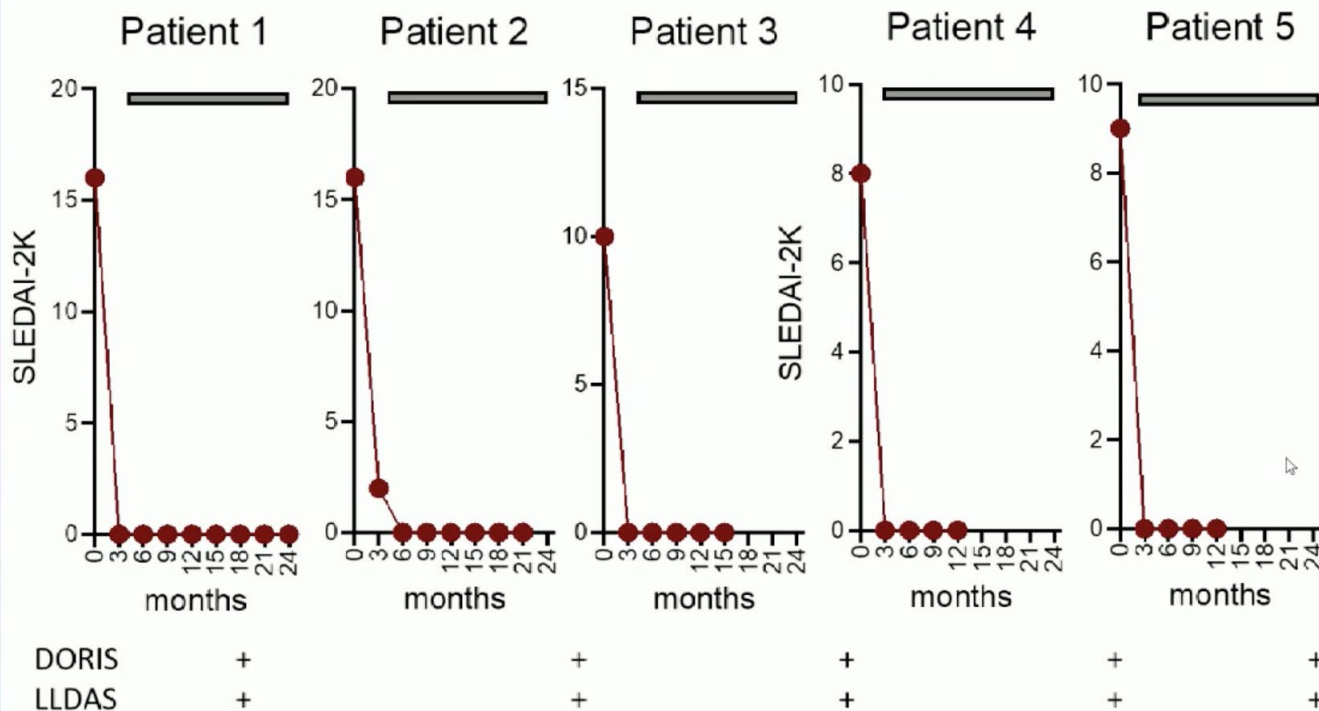
### Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS

# 10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

CHAIRS : NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VOLLENHOVEN

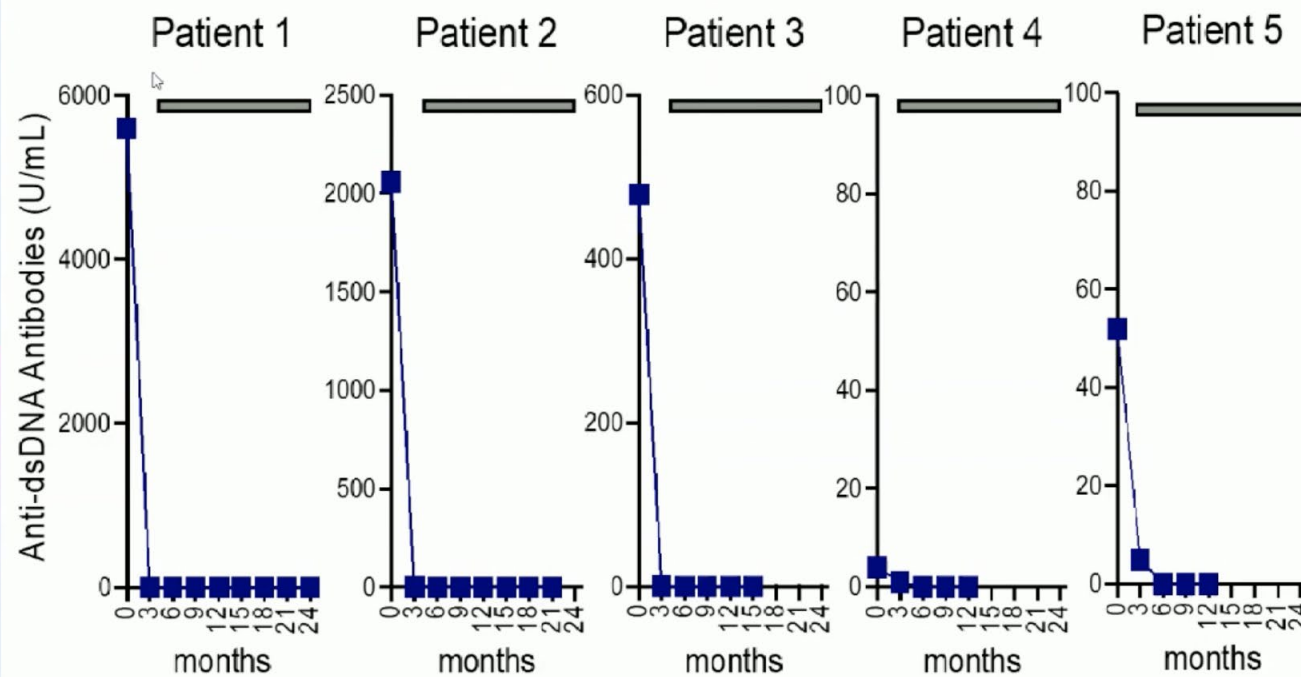
## SLE Disease Activity (long-term follow-up)



### Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS

## Anti-dsDNA Ab (long-term follow-up)



### Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS

## 10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

CHAIRS : NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VOLLENHOVEN

### Infections after CD19 CAR T cell therapy in SLE

	0-3 months	4-6 months	6-12 months	>12 months
Patient 1	Urogenital	0	0	Flu-Like
Patient 2	0	0	COVID19	0
	0	0	Rhinitis	0
Patient 3	COVID19	0	Tonsillitis	COVID19 (P) Herpes Zoster(A)
Patient 4	0	0	0	0
Patient 5	0	COVID19 (P)	0	
Patient 6	0	COVID19 (P)	COVID19 (P)	
	0	RSV	Conjunctivitis*	
Patient 7	0	0		

RSV, respiratory syncytial virus; (P) paxlovid treatment; (A) acylcovir treatment

mild course  moderate course  severe course



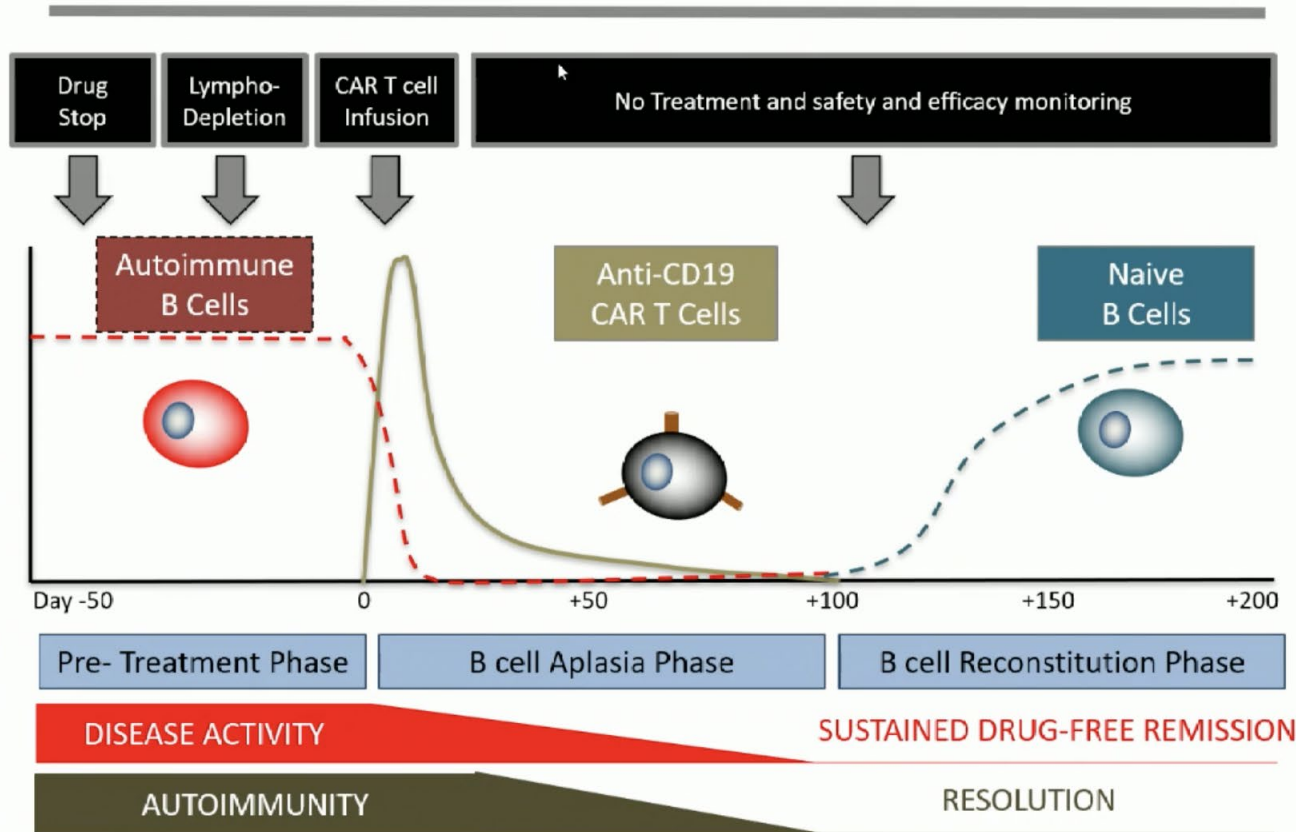
### Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS

# 10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

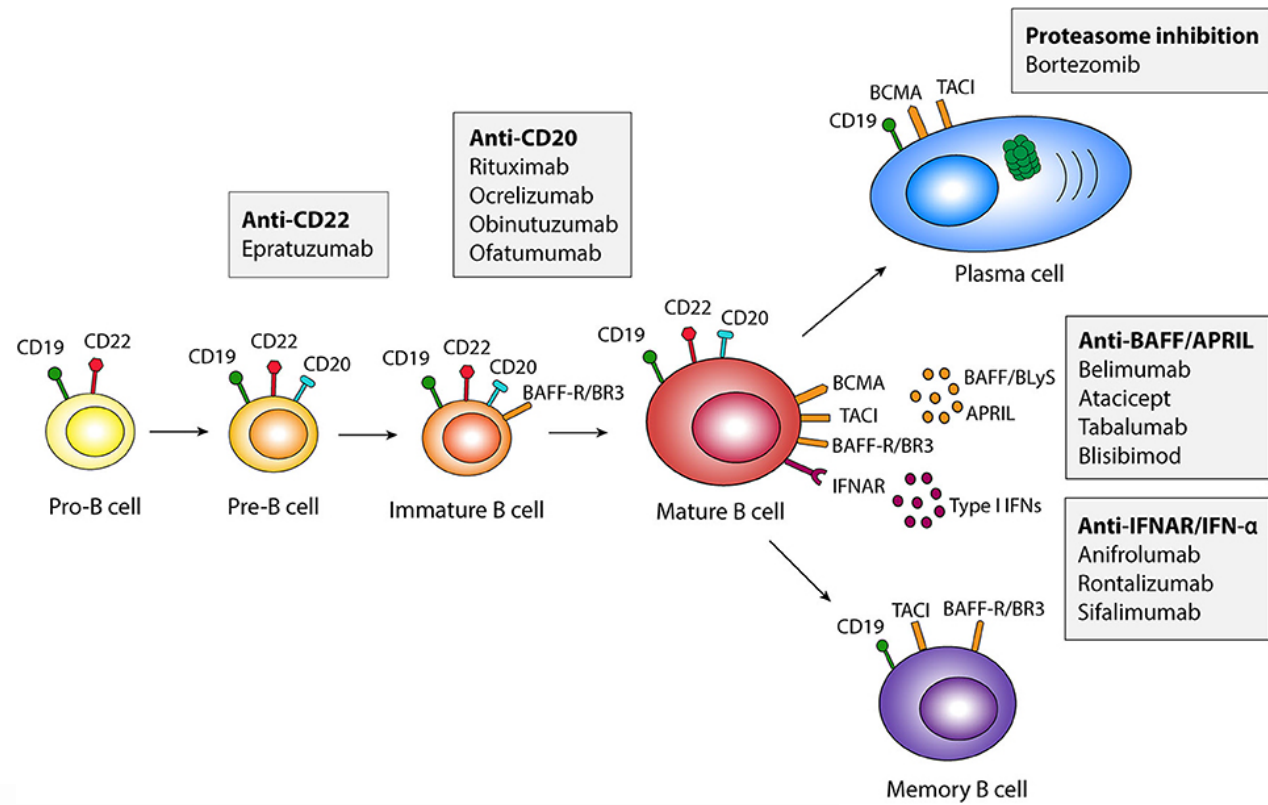
CHAIRS : NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VOLLENHOVEN

## Wrap it up!



## Georg Schett

LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS



Frontiers 2020

### Logical Biologic Sequencing after rituximab

- RTX → OBI for secondary non-response
- RTX → BEL for response with early relapses
- RTX → Bortezomib for plasma cell-mediated disease
- RTX → ANI for primary non-response with skin disease

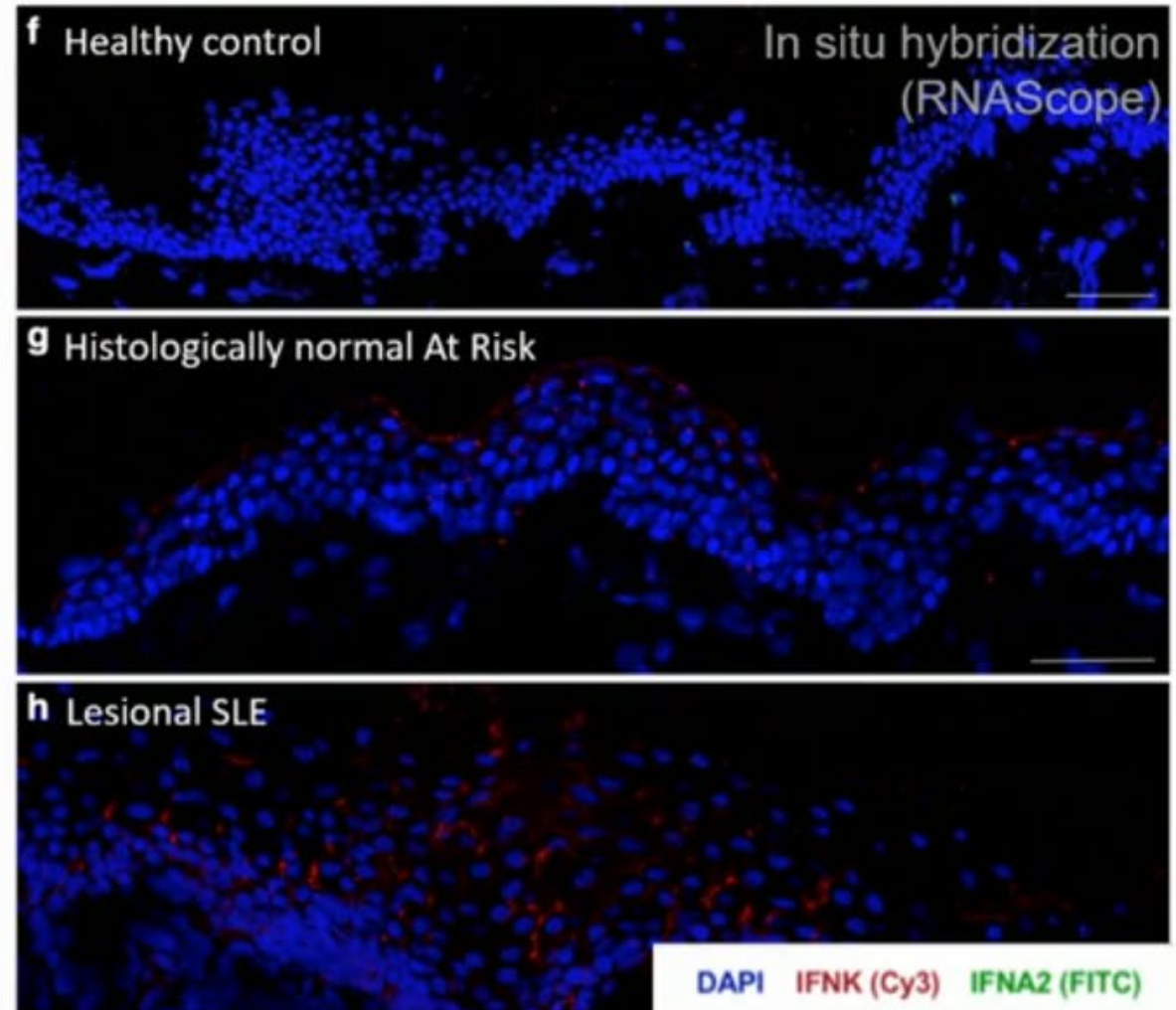
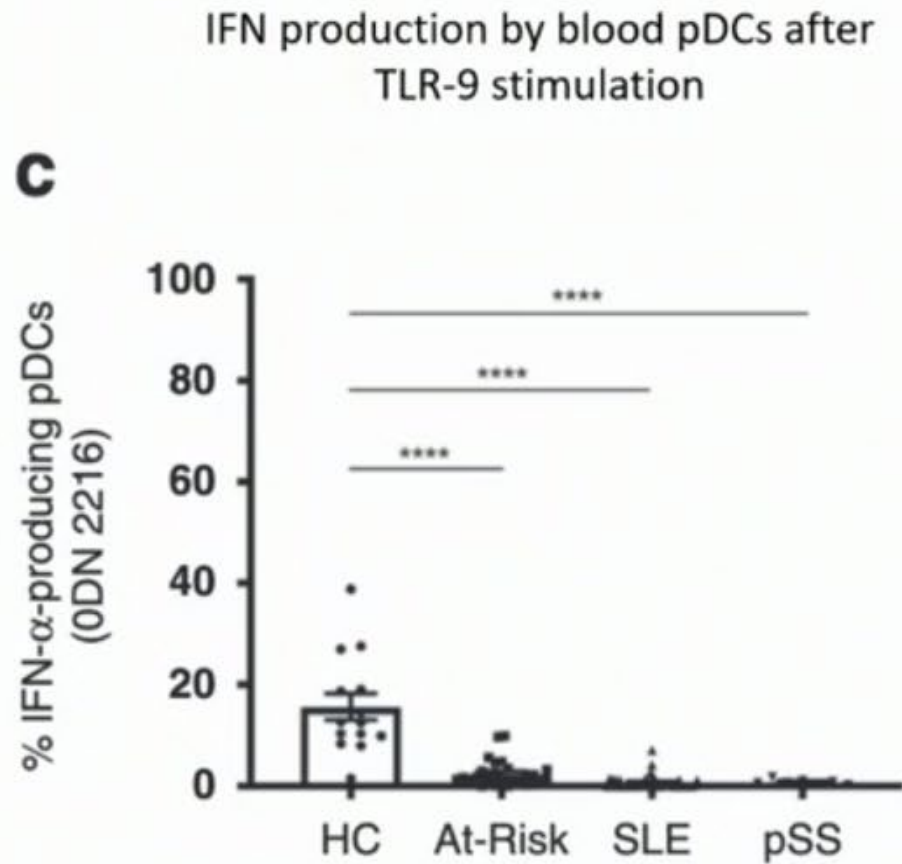
Oder CD 38 abs

Car T-cells/Autologe HSCT

Ed vital Precision medicine SLE/SS

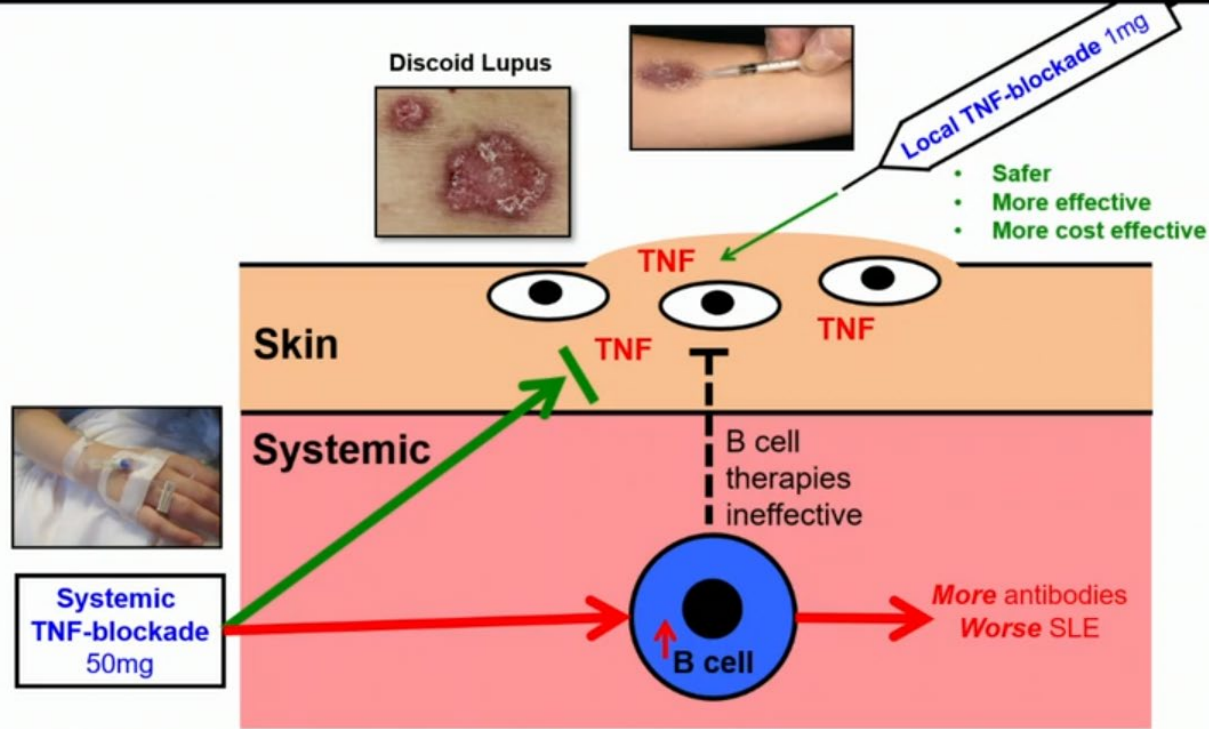


# IFN production shifts from circulating immune cells to target organs prior to onset of SLE



# Anti-TNF in SLE

UNIVERSITY



**Primary Endpoint =  $\geq 6$  patients achieving a decrease of 20% from baseline at Week 12 (ML-SADDLE 20)**

**TARGET-DLE (Full-set Analysis) ML-SADDLE 20 Response rate: 14/25 (56%)**

Secondary Endpoints	Pre-ETN	Post-ETN	p-value
Physician VAS, mean (SD) mm	53.1 (16)	23.2 (20)	<0.001
Patient VAS, mean (SD) mm	56.9 (28)	29.7 (28)	0.001
DLQI, mean (SD)	11.4 (7)	6.5 (6)	<0.001
Laser Doppler Imaging, mean (SD), PU	495.1 (224)	376.2 (223)	0.018
Infrared thermography, mean (SD), °C	1.92 (1.17)	1.08 (1.05)	0.005



Biopsy micro-array: CXCL13 signature predicts response

Yusof et al. Under review

## Haematopoietic immunity

- Autoreactive B cells and autoantibodies



## Tissue immunity

- Antigen generation, danger signals and innate immune functions of target organs themselves

## Non-haematopoietic immunity may explain:

- Differing organ manifestations
- Resistance to therapy
- Relapse after B cell therapies

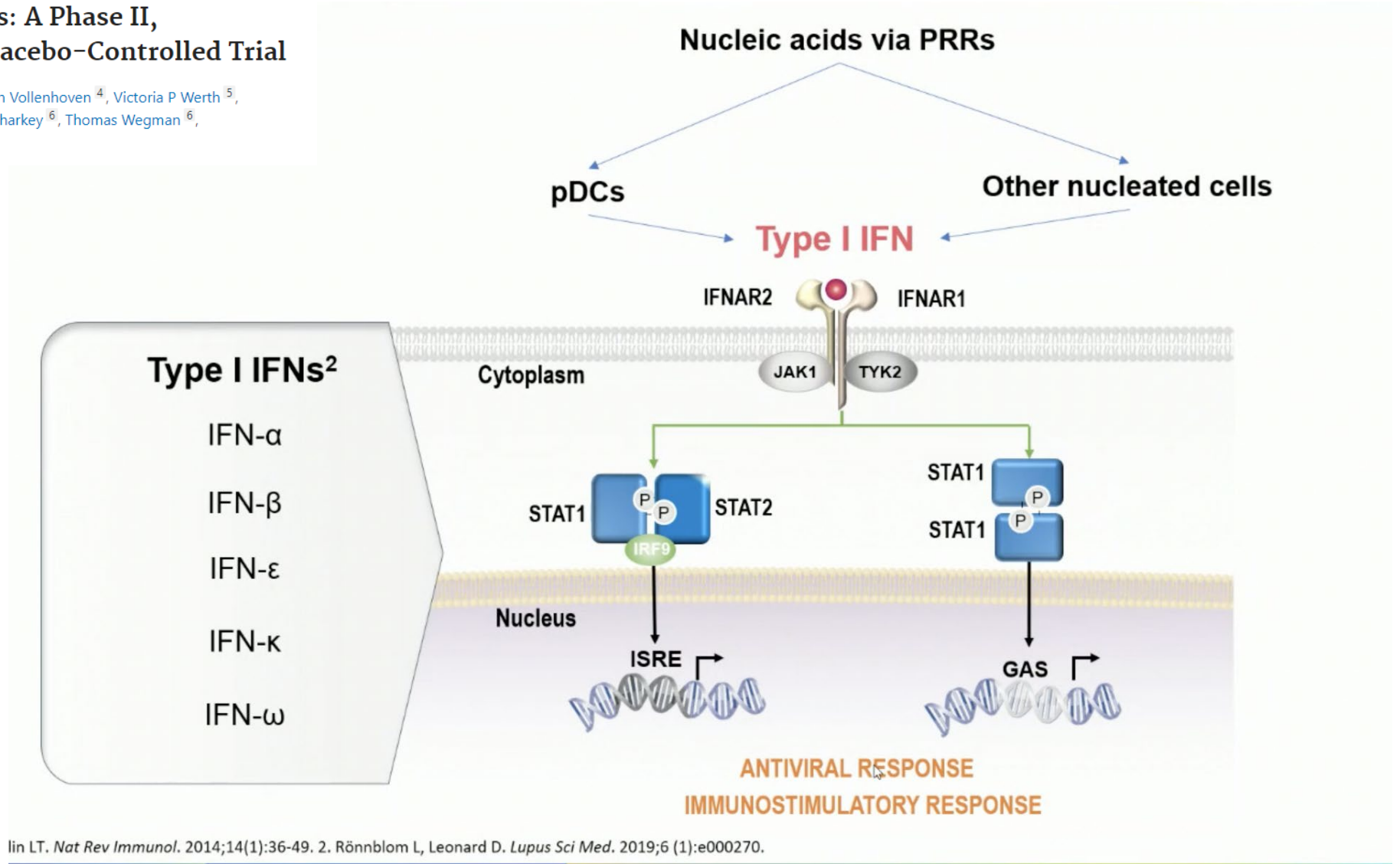
# **Efficacy and Safety of ABBV-599 High Dose (Elsubrutinib 60 mg and Upadacitinib 30 mg) and Upadacitinib Monotherapy for the Treatment of Systemic Lupus Erythematosus: A Phase 2, Double-blind, Placebo-Controlled Trial**

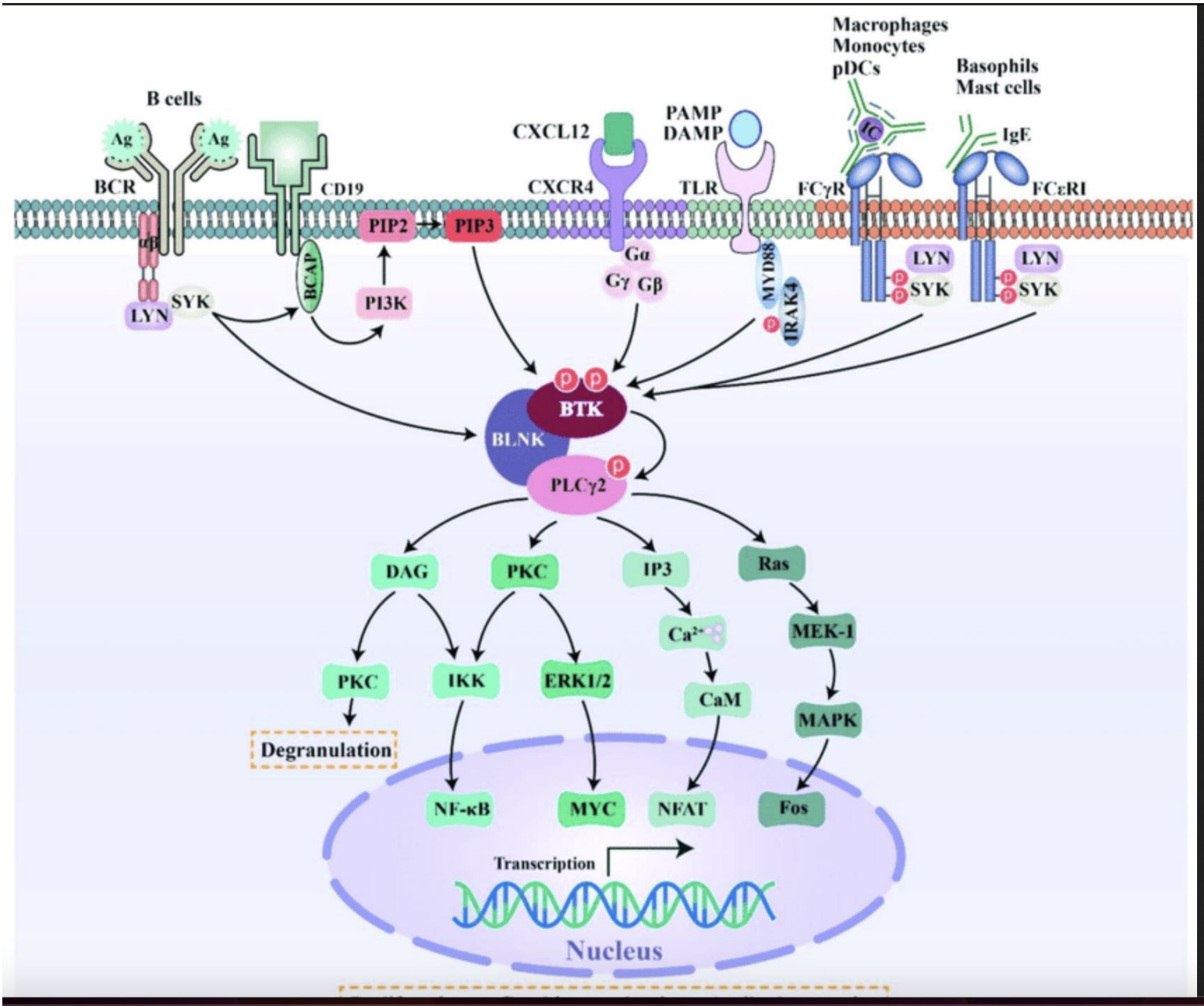
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Joan T. Merrill,<sup>1</sup> Yoshiya Tanaka,<sup>2</sup> David D'Cruz,<sup>3</sup> Karina Vila-Rivera,<sup>4</sup> Daniel Siri,<sup>5</sup>  
Xiaofeng Zeng,<sup>6</sup> Kristin M. D'Silva,<sup>7</sup> Ling Cheng,<sup>7</sup> Thierry Sornasse,<sup>7</sup>  
Thao T. Doan,<sup>7</sup> Denise Kruzikas,<sup>7</sup> Alan Friedman<sup>7</sup>

## Deucravacitinib, a Tyrosine Kinase 2 Inhibitor, in Systemic Lupus Erythematosus: A Phase II, Randomized, Double-Blind, Placebo-Controlled Trial

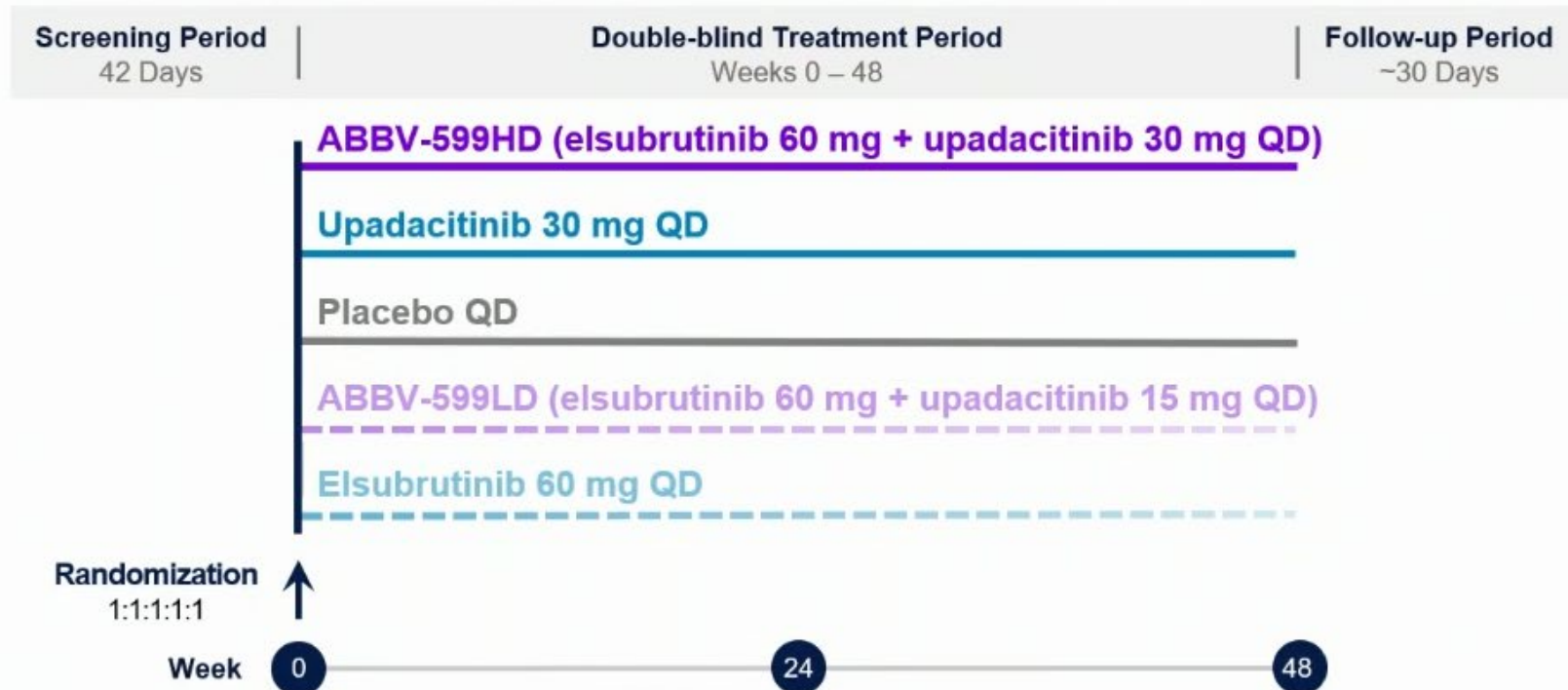
Eric Morand<sup>1</sup>, Marilyn Pike<sup>2</sup>, Joan T Merrill<sup>3</sup>, Ronald van Vollenhoven<sup>4</sup>, Victoria P Werth<sup>5</sup>, Coburn Hobar<sup>6</sup>, Nikolay Delev<sup>6</sup>, Vaishali Shah<sup>6</sup>, Brian Sharkey<sup>6</sup>, Thomas Wegman<sup>6</sup>, Ian Catlett<sup>6</sup>, Subhashis Banerjee<sup>6</sup>, Shalabh Singhal<sup>6</sup>





# Study Design and Treatment

- In the phase 2 SLEek study (NCT03978520), patients were initially randomized 1:1:1:1:1 to receive once-daily ABBV-599 high dose, ABBV-599 low dose, elsubrutinib 60-mg monotherapy, upadacitinib 30-mg monotherapy, or placebo
- After a planned interim analysis when 50% of the patients reached week 24 or withdrew from the study, the ABBV-599 low dose and elsubrutinib 60-mg treatment groups were discontinued due to lack of efficacy (no safety concerns)



**Primary endpoint**  
at week 24:

- SLE Responder Index-4 (SRI-4) **and** steroid dose  $\leq$  10 mg QD

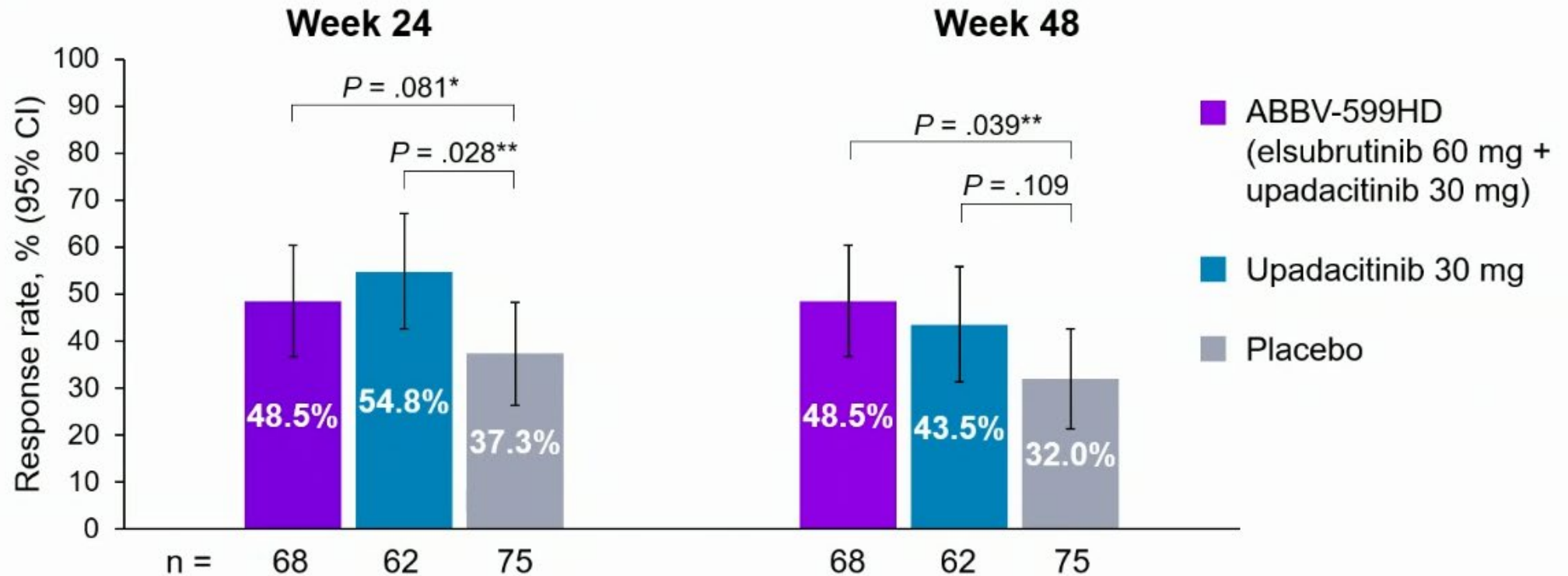
At week 48:

- SRI-4 **and** steroid dose  $\leq$  10 mg QD
- SRI-4
- British Isles Lupus Assessment Group-based Combined Lupus Assessment (BICLA)
- Lupus Low Disease Activity State (LLDAS)



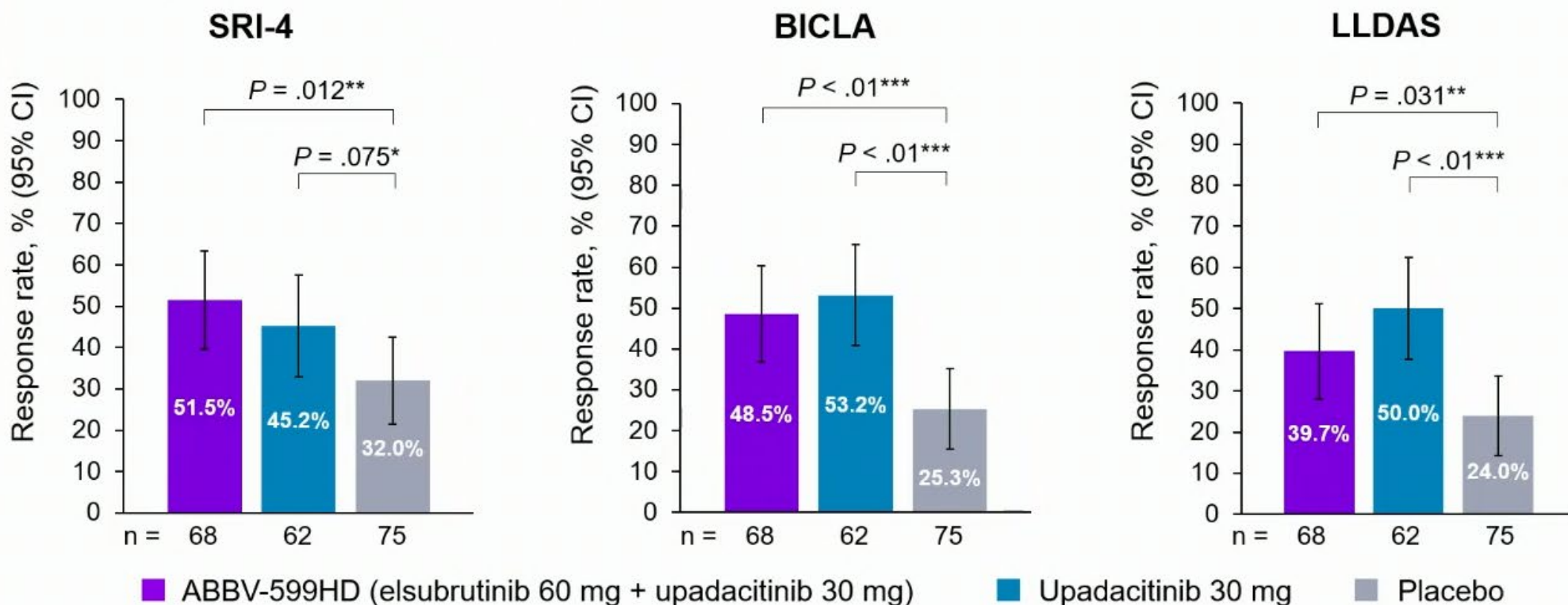
## Achievement of SRI-4 and Steroid Dose $\leq 10$ mg QD at Weeks 24 and 48

- The primary endpoint (proportion of patients achieving both SRI-4 and steroid dose  $\leq 10$  mg QD at week 24) was met for the ABBV-599 high dose (elsubrutinib 60 mg + upadacitinib 30 mg) and upadacitinib 30-mg groups vs placebo



## Achievement of Key Efficacy Endpoints at Week 48

- Key efficacy endpoints were achieved at greater rates at week 48 in both the ABBV-599 high dose (elsubrutinib 60 mg + upadacitinib 30 mg) and the upadacitinib 30-mg treatment groups vs the placebo treatment group



ABBV-599HD, elsubrutinib 60 mg QD + upadacitinib 30 mg QD; BICLA, British Isles Lupus Assessment Group-Based Combined Lupus Assessment; LLDAS, Lupus Low Disease Activity State; QD, once daily; SRI-4, Systemic Lupus Erythematosus Responder Index-4.

\* $P < .1$ ; \*\* $P < .05$ ; \*\*\* $P < .01$  vs PBO.

Parameter, n (%)	ABBV-599HD (elsubrutinib 60 mg + upadacitinib 30 mg) (n = 68)	Upadacitinib 30 mg (n = 62)	Placebo (n = 75)
Any TEAE	59 (86.8)	51 (82.3)	59 (78.7)
COVID-19–related TEAE	6 (8.8)	8 (12.9)	9 (12.0)
Serious TEAE	7 (10.3)	13 (21.0)	13 (17.3)
TEAE leading to discontinuation of study drug	9 (13.2)	6 (9.7)	5 (6.7)
TEAE resulting in death	1 (1.5) <sup>a</sup>	0	0

ABBV-599HD, elsubrutinib 60 mg QD + upadacitinib 30 mg QD; ELS, elsubrutinib; PBO, placebo; QD, once daily; TEAE, treatment-emergent adverse event; UPA, upadacitinib.  
<sup>a</sup>Death from acute respiratory failure due to COVID-19.

## Safety: Adverse Events of Special Interest

- There were no cases of malignancy or venous thromboembolism
- There were 3 non-fatal cardiovascular events (1 myocardial infarction [placebo]; 2 non-fatal strokes due to ruptured cerebral aneurysms [1 with ABBV-599 high dose, 1 with upadacitinib 30 mg])

AESI, n (%)	ABBV-599HD (elsubrutinib 60 mg + upadacitinib 30 mg) (n = 68)	Upadacitinib 30 mg (n = 62)	Placebo (n = 75)
Serious infection	5 (7.4)	7 (11.3)	3 (4.0)
Opportunistic infection excluding TB and herpes zoster <sup>a</sup>	0	1 (1.6)	1 (1.3)
Herpes zoster	8 (11.8)	4 (6.5)	3 (4.0)
Active TB	0	0	1 (1.3)
Possible malignancy	0	0	0
Malignancy	0	0	0
Anemia	3 (4.4)	2 (3.2)	3 (4.0)
Neutropenia	1 (1.5)	2 (3.2)	1 (1.3)
Lymphopenia	0	2 (3.2)	0
Renal dysfunction	1 (1.5)	1 (1.6)	0
Hepatic disorder	3 (4.4)	1 (1.6)	1 (1.3)
Adjudicated VTE	0	0	0
Any adjudicated MACE	1 (1.5)	1 (1.6)	1 (1.3)
Non-fatal myocardial infarction <sup>b</sup>	0	0	1 (1.3)
Non-fatal stroke <sup>c</sup>	1 (1.5)	1 (1.6)	0

ABBV-599HD, elsubrutinib 60 mg QD + upadacitinib 30 mg QD; AESI, adverse event of special interest; MACE, major adverse cardiovascular event; QD, once daily; TB, tuberculosis; VTE, venous thromboembolism.

<sup>a</sup>Opportunistic infections were oesophageal candidiasis (placebo) and *Pneumocystis jirovecii* pneumonia (upadacitinib 30 mg).

<sup>b</sup>Occurred in a 61-year-old woman with a family history of cardiovascular disease.

<sup>c</sup>Non-fatal strokes were both due to ruptured cerebral aneurysms:

- 47-year-old woman receiving ABBV-599HD had a ruptured cerebral aneurysm on day 231 of study drug. She underwent craniotomy and surgical trapping of the cerebral aneurysm.
- 53-year-old woman receiving UPA 30 mg had a ruptured cerebral aneurysm and subarachnoid hemorrhage on day 199 of study drug. She underwent a craniotomy for clipping of a right middle cerebral artery bifurcation aneurysm.

10:30 - 12:00 The future perspectives in the treatment of SLE & Sjögren's

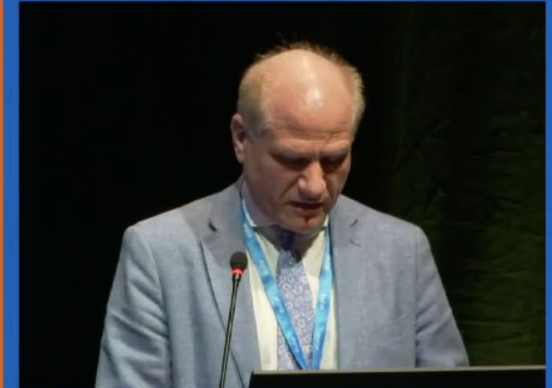
CHAIRS : NATHALIE COSTEDOAT-CHALUMEAU, RONALD VAN VOLLENHOVEN

June 1, 2023  
EULAR 2023 Meeting  
Abstract # OP0142

## Efficacy And Safety Of Telitacicept, A Novel BLYS/APRIL Dual Inhibitor, In Patients With Primary Sjögren'S Syndrome: A Phase 2, Randomized, Placebo-Controlled 24-Week Study

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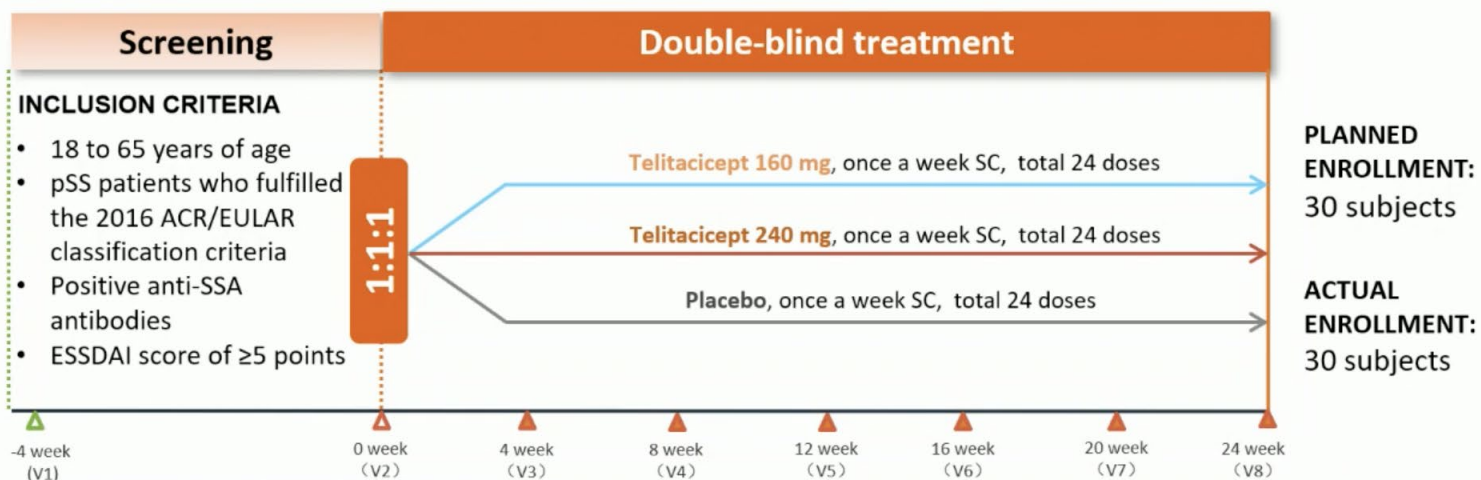
Efficacy and Safety of telitacicept, a novel BLYS/APRIL dual inhibitor, in patients with primary Sjögren's syndrome: a phase 2, randomized, placebo-controlled 24-week study



## Study Design

### Primary Endpoint:

- Change from baseline in the ESSDAI score at Week 24



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ESSDAI, EULAR Sjögren's syndrome disease activity index; ESSPRI, EULAR Sjögren's Syndrome Patient Reported Index; MFI, multidimensional fatigue inventory; pSS, primary Sjögren's syndrome; ACR/EULAR, American College of Rheumatology/European League Against Rheumatism.

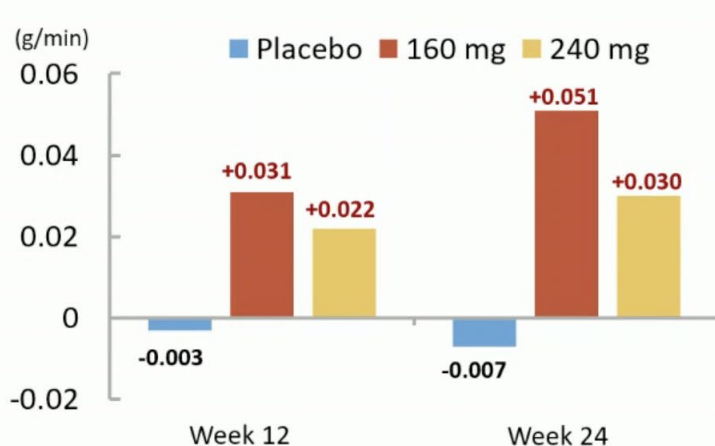


Secondary Endpoints

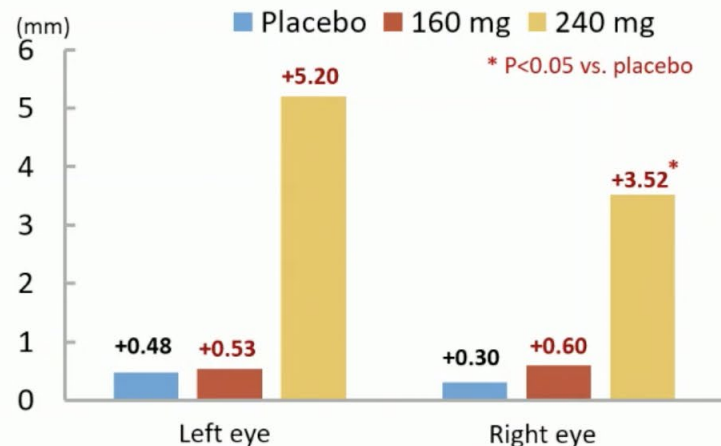
### Efficacy: Unstimulated Whole Saliva Flow and Schirmer's Test

**Unstimulated whole saliva flow rate** is an assessment of salivary gland function. The subject will be asked to collect the saliva in his/her mouth into a test tube for 15 minutes.

**Schirmer's test** is an assessment of lacrimal gland function in which a strip of filter paper is applied under the eyelid to measure the quantity of tear production by the length in millimeters that the strip wets during the 5-minute test period.



Change from baseline in the unstimulated whole saliva flow (g/min) at Week 12 and 24 (FAS, mean)



Change from baseline in the length of the wet strip (Schirmer's test, mm) at Week 24 (FAS, mean)

FAS, full analysis set.



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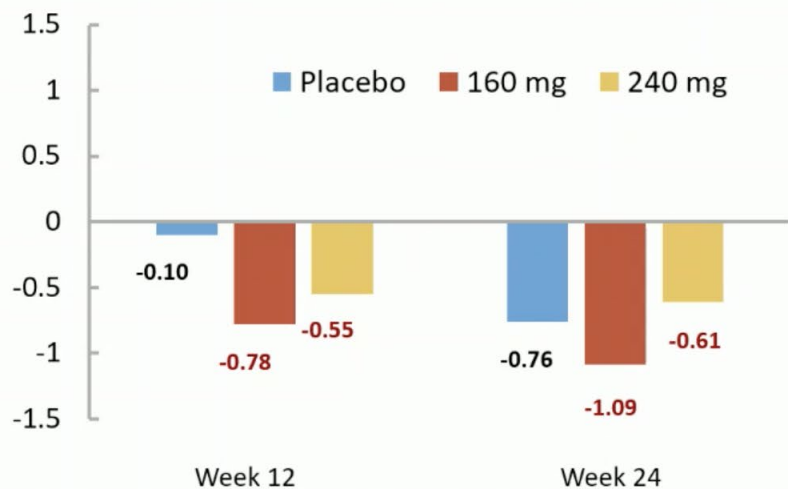
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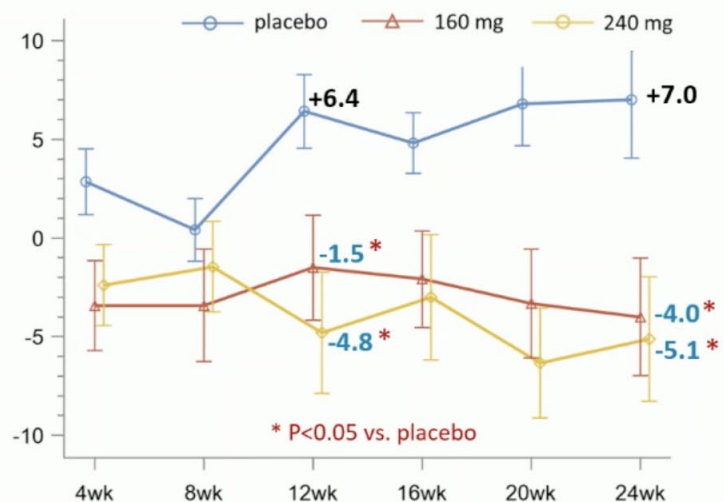
Secondary Endpoints

### Efficacy: ESSPRI and MFI-20

ESSPRI change from baseline at Week 12 and 24 (FAS, mean)



MFI-20 change from baseline (FAS, mean±SE)



MFI-20 is a 20-item self-report instrument designed to measure fatigue. Higher total scores correspond with more acute levels of fatigue.

ESSPRI, EULAR Sjögren's Syndrome Patient Reported Index; MFI, multidimensional fatigue inventory; FAS, full analysis set; SE, standard error.



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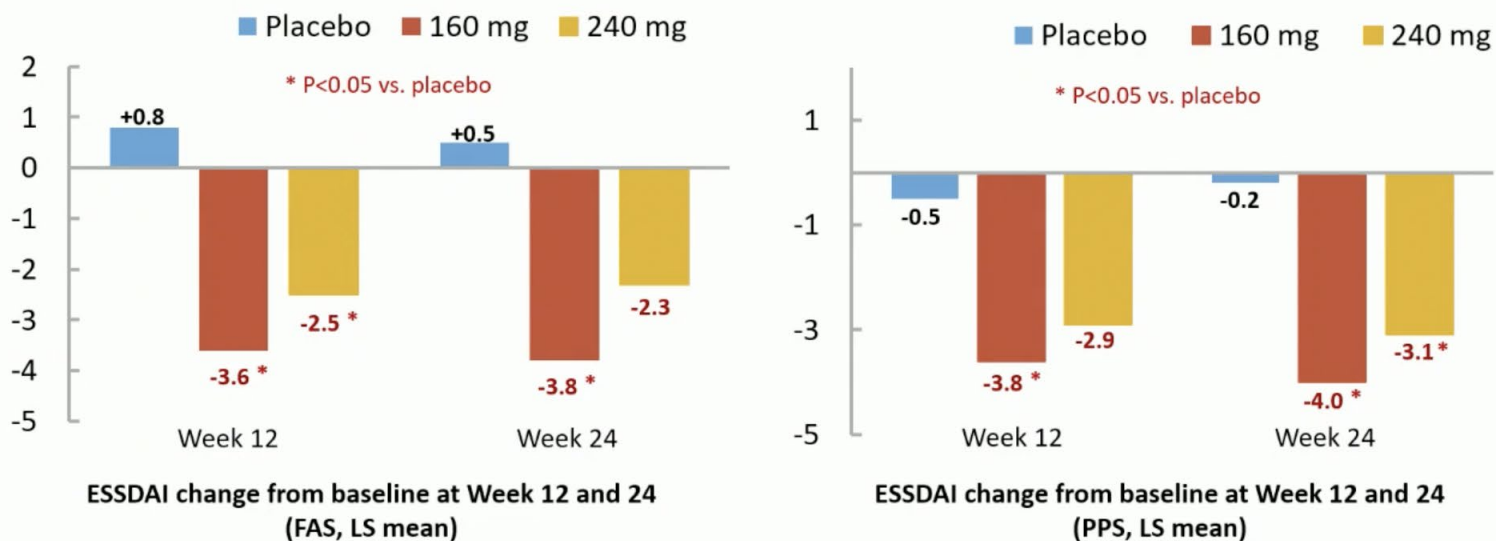




Primary Endpoint

## Efficacy: ESSDAI Change from Baseline

Efficacy analyses of the ESSDAI change from baseline were based on the FAS and PPS



ESSDAI, EULAR Sjögren's syndrome disease activity index; FAS, full analysis set; PPS, per-protocol set; LS mean, least square mean.



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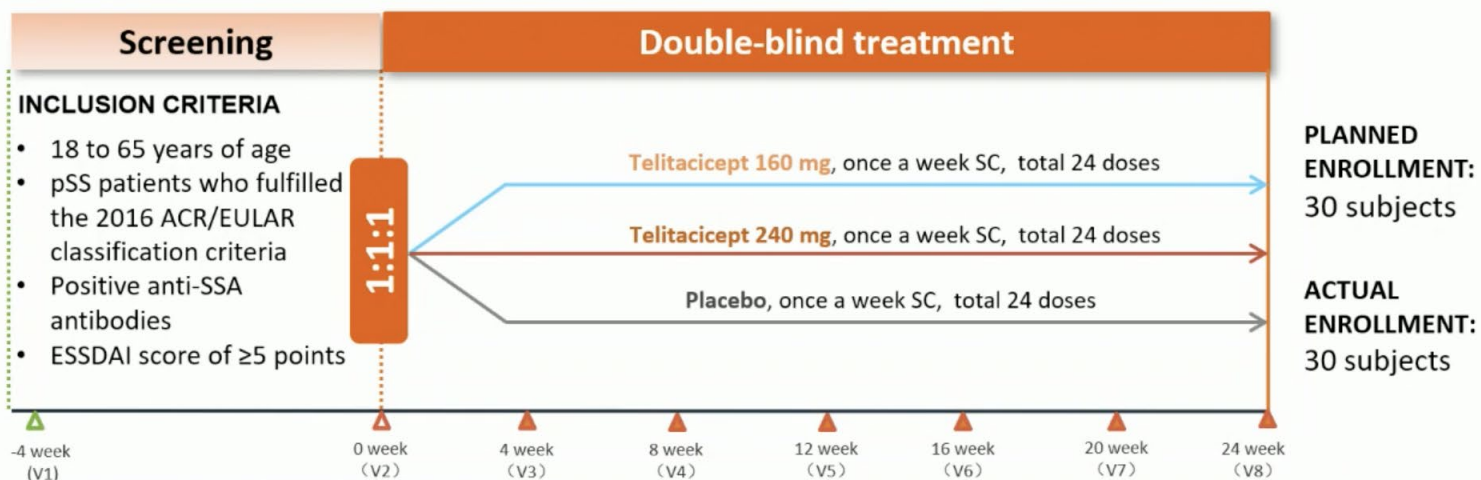
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<https://ondemandcongress.eular.org/course/view.php?id=1182>

- Teliteccept
- [Efficacy and Safety of Dazodalibep \(VIB4920/HZN4920\) in Subjects with Sjögren's Syndrome: A Phase 2, Randomized, Double-Blind, Placebo-Controlled, Proof of Concept Study](#)
- [Dazodalibep \(VIB4920/HZN4920\) in Sjögren's Subjects with an Unacceptable Symptom Burden: Safety and Efficacy from a Phase 2, Randomized, Double-Blind Study](#) (late braking abstract)
- [LONG TERM SAFETY AND EFFICACY OF CAR-T CELL TREATMENT IN REFRACTORY SYSTEMIC LUPUS ERYTHEMATOSUS - DATA FROM THE FIRST SEVEN PATIENTS](#)
- Georg Schett