

# Safety and Efficacy of IRAK4 Degradator KT-474 (SAR444656) for Hidradenitis Suppurativa and Atopic Dermatitis

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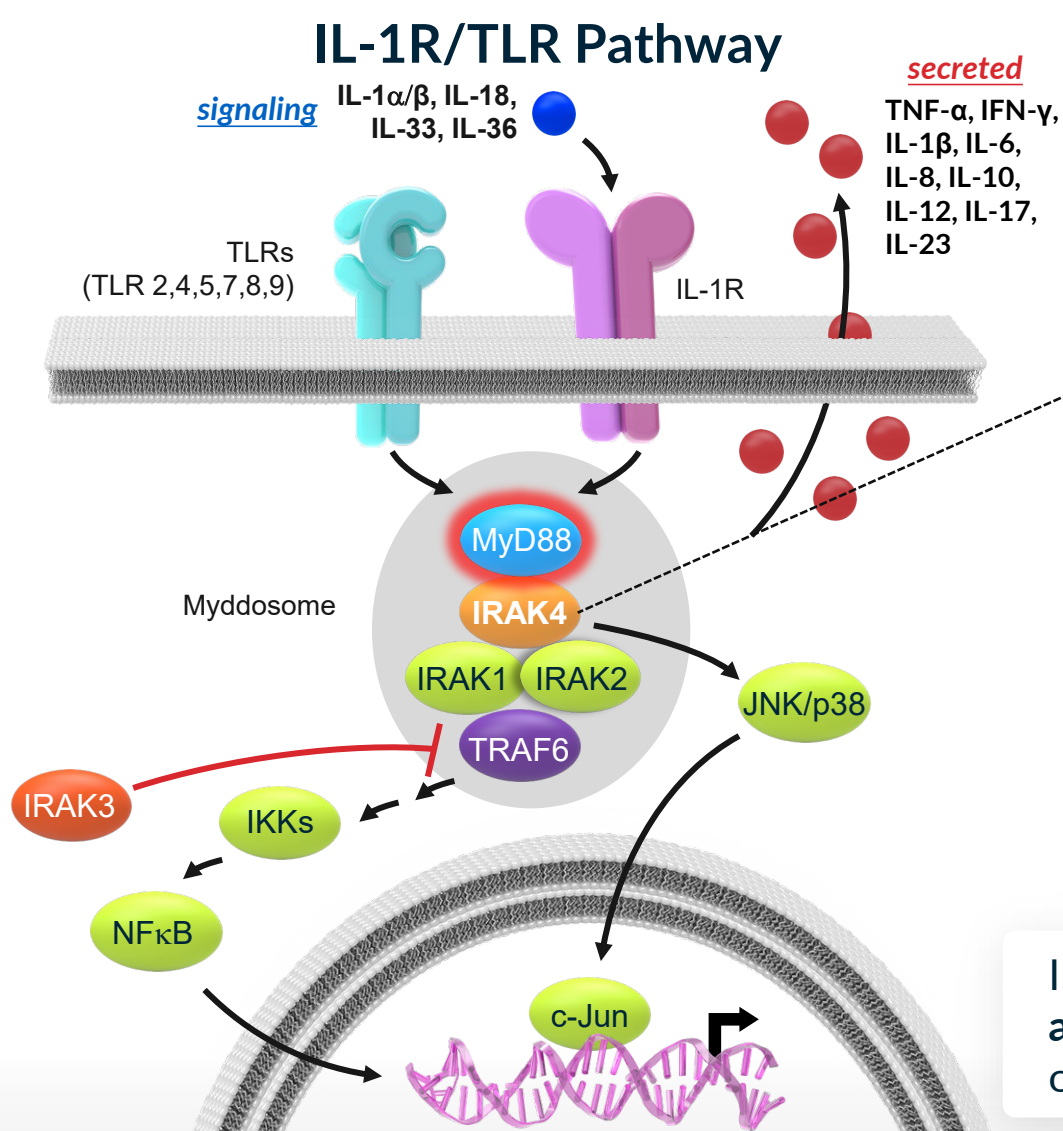
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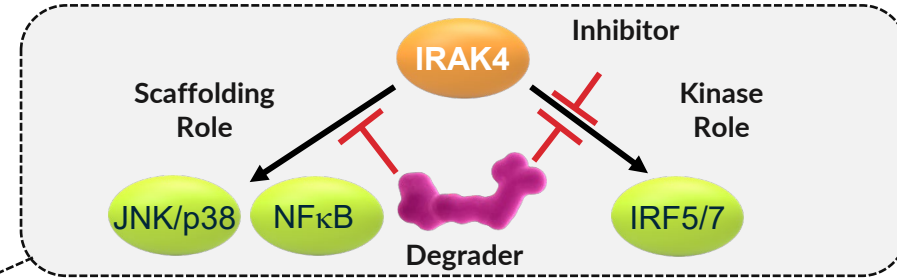
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# Degrading IRAK4: Best Approach to Block IL-1R/TLR driven Inflammation



## Degrader Advantage



## Clinical Pathway Validation

- IL-1α/IL-1β: Rheumatoid Arthritis, CAPS, Hidradenitis Suppurativa
- IL-1α: Atopic Dermatitis
- IL-1β: Gout; CANTOS Outcomes Data in Atherosclerosis and Lung Cancer
- IL-18: Macrophage Activation Syndrome
- IL-36: Generalized Pustular Psoriasis, Atopic Dermatitis
- IRAK4 SMI: Rheumatoid Arthritis

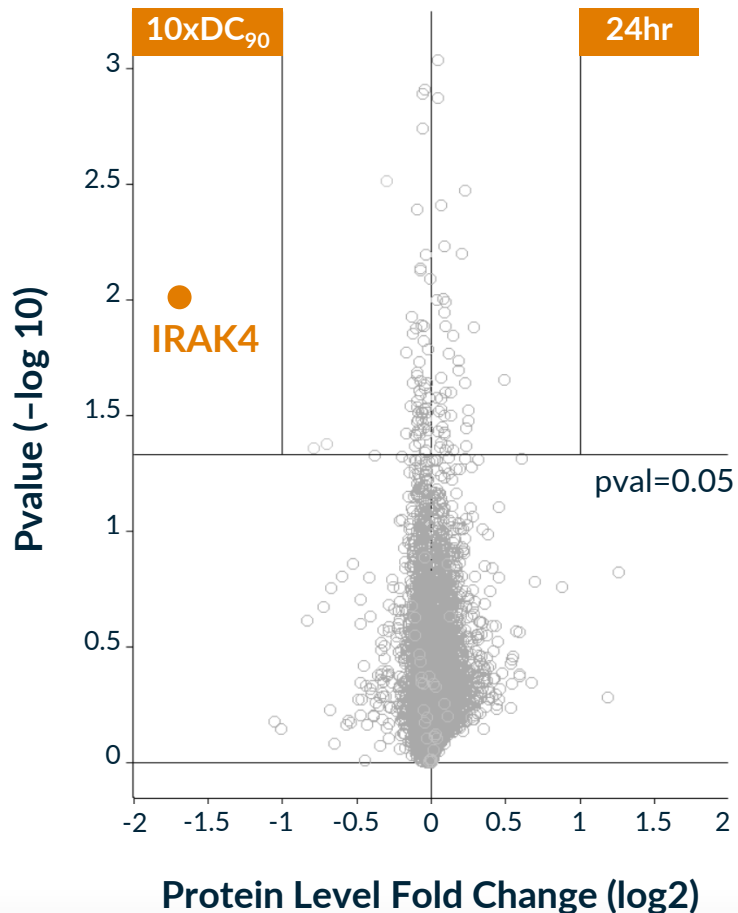
## Human Genetics

Adult humans with **IRAK4 Null Mutation** are healthy

IRAK4 degrader has potential to achieve a **broad, well-tolerated anti-inflammatory effect**, providing multiple development opportunities in autoimmune inflammatory diseases

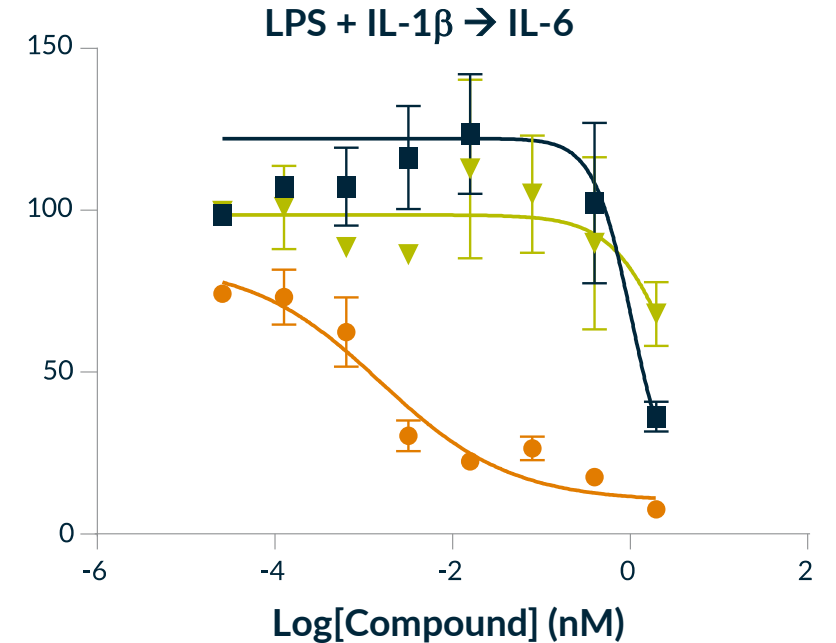
# KT-474: Potent and Specific IRAK4 Degradation with Impact on Cytokines Superior to Kinase Inhibition

## Degradation and Selectivity



- KT-474  $DC_{50}$  = 2.1 nM in human immune cells
- KT-474 was selective for IRAK4 in human immune cells at concentration 10-fold above the  $DC_{90}$
- KT-474 better able to inhibit IL-6 under both LPS and LPS + IL-1 $\beta$  than clinically active IRAK4 SM kinase inhibitor PF-06550833

## Superiority over SM kinase Inhibitor



Legend	Compound	IL-6 $IC_{50}$ (nM)
●	IRAK4 Degradator	0.8
■	Negative control	450
▼	IRAK4 SMI (PF-06550833)	N/A

# KT-474 Phase 1 Design

Double-blind, Placebo-controlled SAD and MAD in HV; Open Label Patient Cohort in HS & AD Patients

## Parts A & B

Healthy Volunteers  
SAD and MAD

### 7 SAD cohorts

- 8 subjects per cohort (6:2 randomization)
  - 57 adult healthy subjects dosed
- Single dose (25-1600 mg)

### 4 MAD cohorts

- 12 subjects per cohort (9:3 randomization)
  - 48 adult healthy subjects dosed
- 14x daily doses (25-200 mg)

### Primary

- Safety & tolerability

### Secondary/ Exploratory

- Pharmacokinetic measures (half-life, bioavailability)
- IRAK4 knockdown in PBMC and skin (MAD only)
- Ex vivo response of whole blood to TLR agonists (SAD & MAD)

## Part C

HS and AD Patients

### 1 cohort

21 HS and AD patients

### 75 mg (fed state)

(~equivalent exposure to 100 mg fasted MAD cohort dose level)

Open-label

28x daily doses

### Primary

- Safety & tolerability

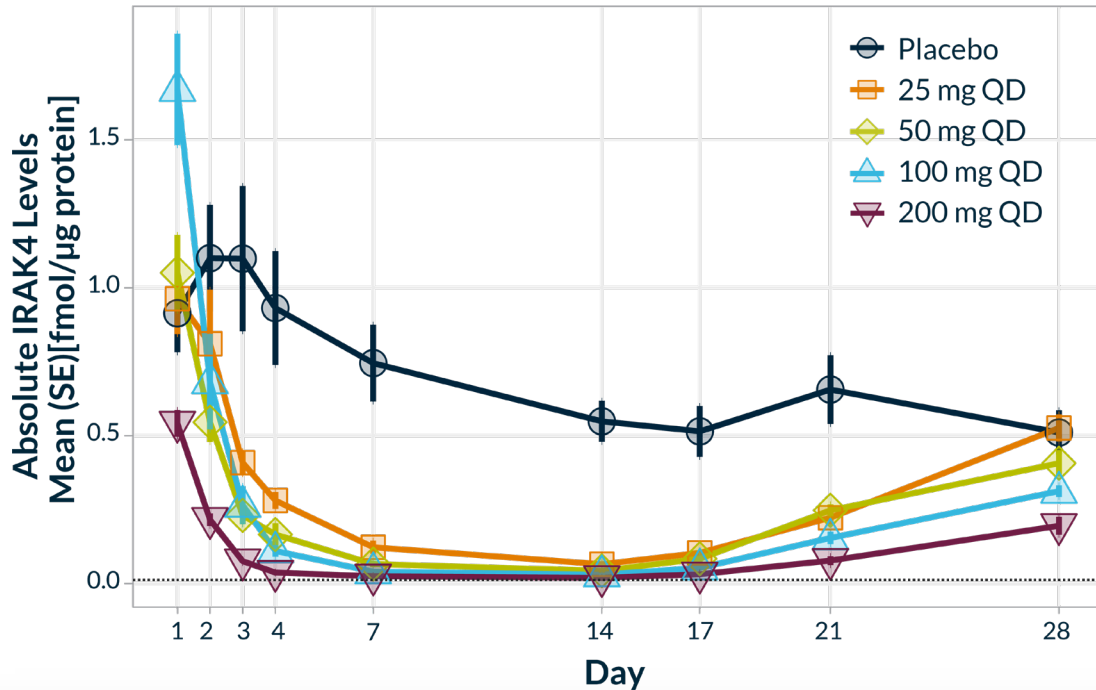
### Secondary/ Exploratory

- Pharmacokinetic measures (half-life, bioavailability)
- IRAK4 knockdown in PBMC and skin
- Change in circulating inflammatory biomarkers and proinflammatory gene transcripts in skin
- Clinical endpoints: EASI (AD), Total AN Count (HS), symptom scores and global assessments

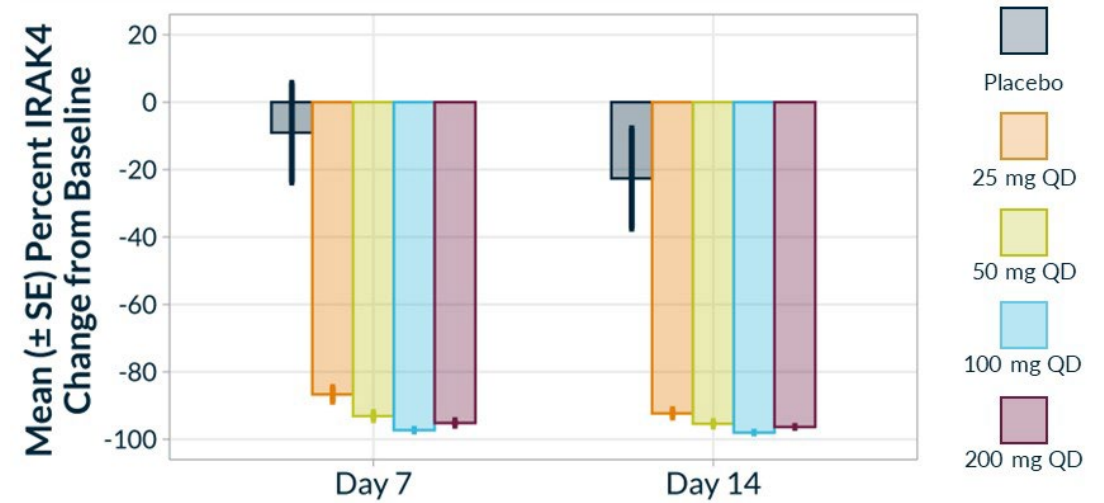


# KT-474 Achieved Robust and Sustained IRAK4 Degradation with Multiple Daily Oral Doses (14 Days)

## Absolute IRAK4 Levels



## Percent IRAK4 Reduction at Steady State



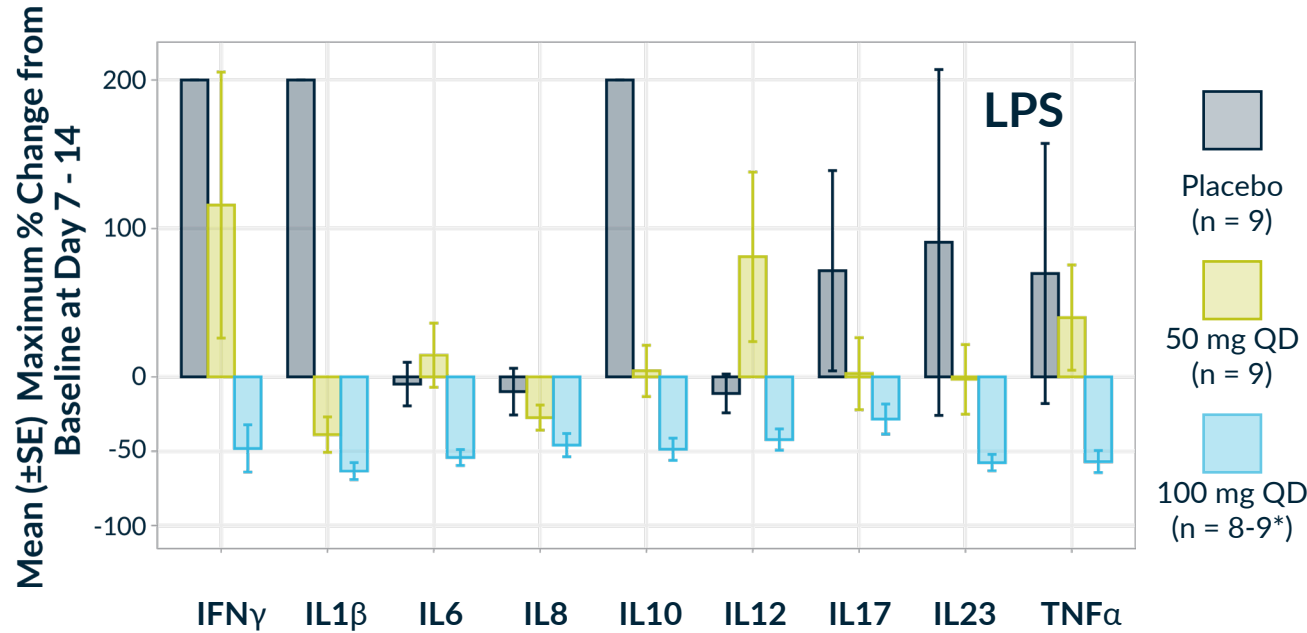
	Placebo (n=12)	25 mg QD (n=9)	50 mg QD (n=9)	100 mg QD (n=9)	200 mg QD (n=9)
Mean Day 7	-9%	-87%	-93%	-97%	-95%
Mean Day 14	-23%	-92%	-95%	-98%	-96%
<i>p value*</i>		<0.0001	<0.0001	<0.0001	<0.0001

\* p-values relative to placebo

- Detected by mass spectrometry in circulating PBMC
- Steady state IRAK4 reduction achieved between Days 7 and 14
- Recovery towards baseline by Day 28 (2 weeks after last dose)
- MAD 2 through 4 approached Lower Limit of Quantitation (LLOQ)

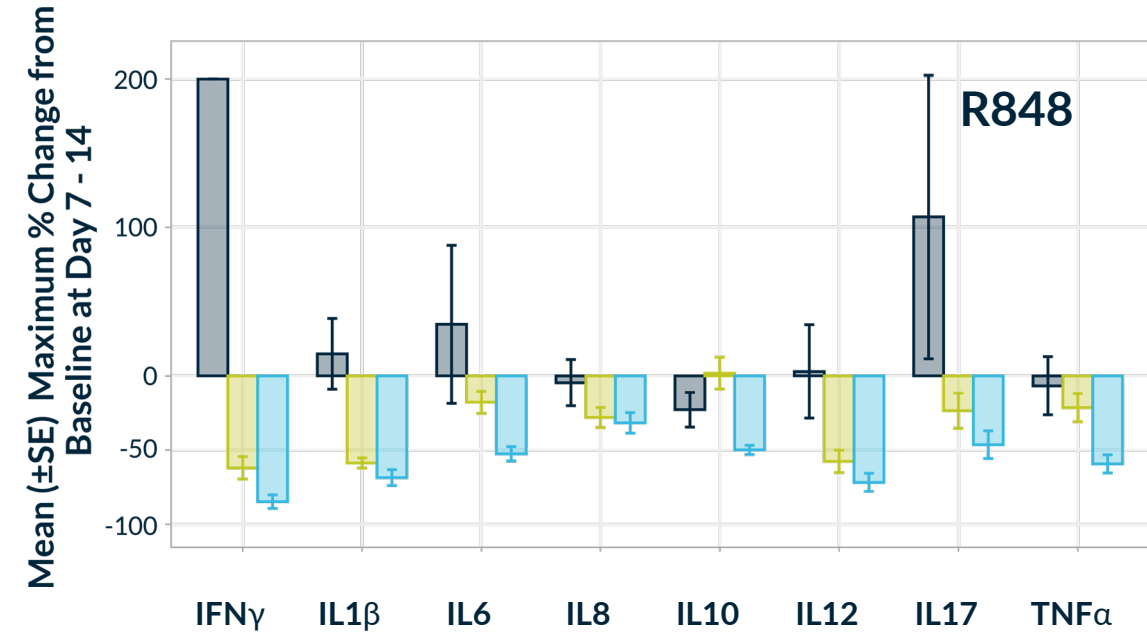
# Ex Vivo Inhibition of 9 Disease-Relevant Cytokines, Day 7-14

Results through MAD3 Showed Dose-Dependent Effect Tracking with Extent of Monocyte IRAK4 Degradation



	IFN $\gamma$	IL1 $\beta$	IL6	IL8	IL10	IL12	IL17	IL23	TNF $\alpha$
<b>Pbo</b>	357%	292%	-5%	-10%	880%	-11%	72%	91%	70%
<b>50 mg QD</b>	116%	-39%	15%	-27%	4%	81%	2%	-2%	40%
<b>100 mg QD</b>	-48%	-63%	-54%	-46%	-49%	-42%	-28%	-58%	-57%

50 mg QD: 93-95% PBMC degradation at Day 7-10; 87-90% Monocyte degradation at Day 7-14  
 100 mg QD: 97-98% PBMC degradation at Day 7-10; 92-93% Monocyte degradation at Day 7-14

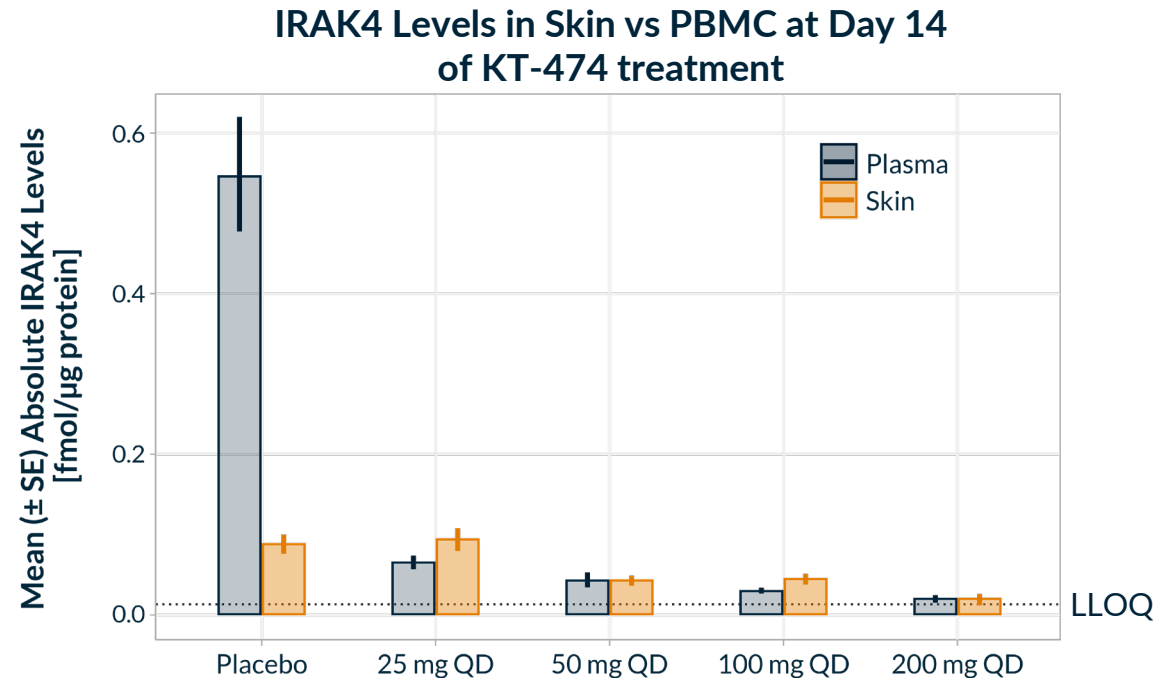


	IFN $\gamma$	IL1 $\beta$	IL6	IL8	IL10	IL12	IL17	TNF $\alpha$
<b>Pbo</b>	>500%	15%	35%	-5%	-23%	3%	107%	-7%
<b>50 mg QD</b>	-62%	-59%	-18%	-28%	2%	-58%	-24%	-21%
<b>100 mg QD</b>	-85%	-68%	-53%	-32%	-50%	-72%	-46%	-59%

\*n=8 for LPS, n=9 for R848

Mean values > 200% have been replaced by 200 for visualization purposes

# KT-474 Reduced IRAK4 to Near LLOQ in the Skin (MS)



- Baseline IRAK4 levels in skin substantially lower compared to PBMC
- Dose-dependent IRAK4 degradation in skin by mass spectrometry
- Mean IRAK4 levels at 200 mg dose nearing LLOQ, with knockdown up to 90% at 200 mg
- Comparable degradation in PBMC shows that effect of KT-474 is independent of baseline expression level



# Patient Cohort: Baseline Disease Characteristics

	<b>HS (n=13)</b>	<b>AD (n=8)</b>
<b>Disease Severity</b>	<b>(HS-PGA)</b>	<b>(vIGA-AD)</b>
Mild	--	1
Moderate	10	5
Severe	1	2
Very Severe	2	--
<b>Extent of Disease</b>	<b>Mean (min, max)</b>	<b>Mean (min, max)</b>
AN Count	8 (5, 18)	--
Fistula Count	4 (0, 15)	--
Pain-NRS*	7 (3, 10)	--
Pruritus-NRS*	5 (0, 10)	8 (4, 10)
EASI Score	--	17.6 (4.4, 52.3)
<b>Patients with any prior Therapy, n (%)</b>	<b>8 (62)</b>	<b>7 (88)</b>
Antibiotics/Antibacterials**	6 (46)	1 (13)
Corticosteroids	0	7 (88)
Adalimumab	3 (23) <sup>§</sup>	0
Other Biologics	1 (8) <sup>¶</sup>	0

\*worst score over past week    \*\*includes clindamycin and chlorhexidine

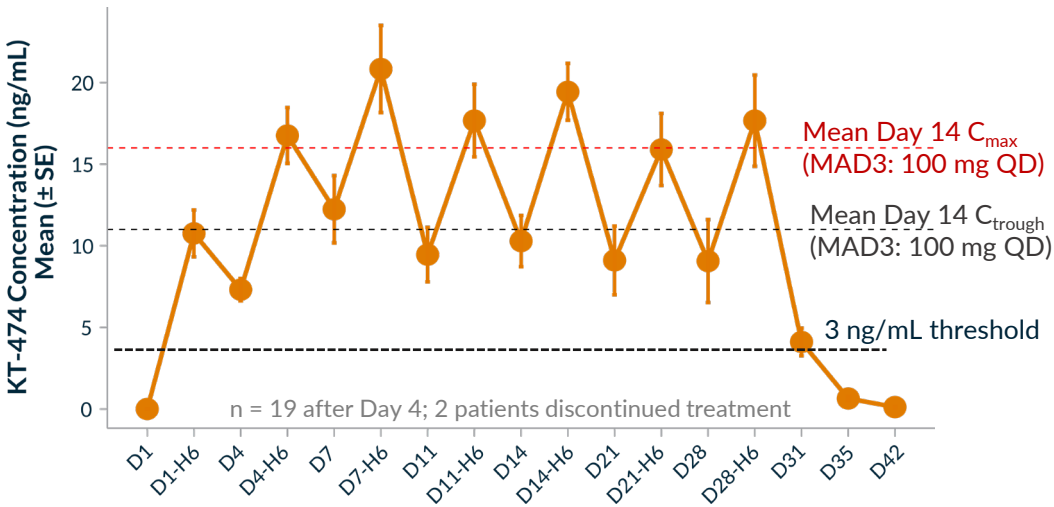
<sup>§</sup>includes 2 pts with very severe disease;

<sup>¶</sup>1 patient with very severe disease received infliximab and bimekizumab (and adalimumab)

AD=Atopic Dermatitis; AN=Abscess and Inflammatory Nodule Count; EASI=Eczema Area and Severity Index; HS=hidradenitis suppurativa; Min=minimum; Max=maximum; Pain-NRS=Skin Pain Numerical Rating Score; Pruritus-NRS=Peak Pruritus Numerical Rating Score; PGA-Physicians Global Assessment; IGA=Investigator Global Assessment

# KT-474 Plasma PK and IRAK4 Degradation in HS and AD Patients Dosed for 28 Days is Comparable to HV

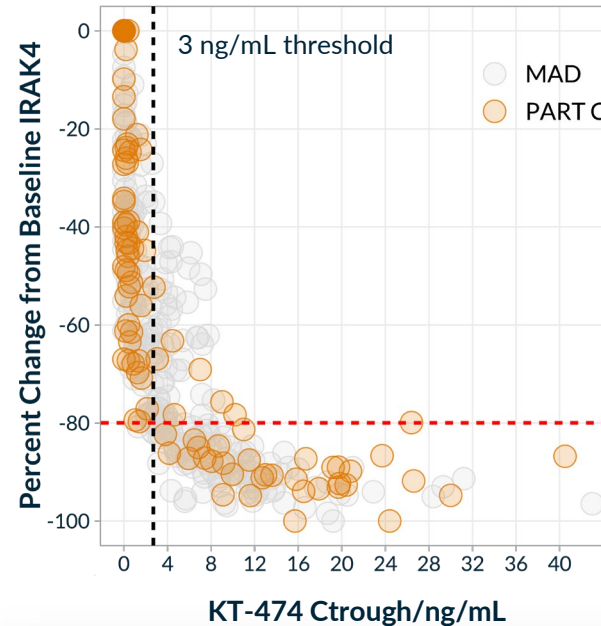
## Part C KT-474 Plasma PK



KT-474 PK at the **75 mg QD dose (fed state)** in patients is comparable to **100 mg QD (fasted state)** in HV

- Mean  $C_{max}$  and  $C_{trough}$  levels at steady state in Part C are in line with MAD3 levels at Day 14
- Mean half-life of 44 hours is within the range observed in MAD (34-59 hours)

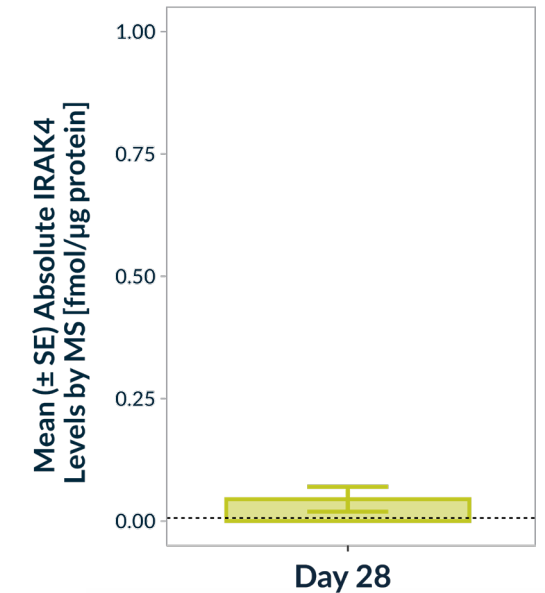
## PK/PD Correlation in Plasma/Monocytes (FLOW)



KT-474 concentrations in plasma lead to **same level of IRAK4 degradation** in HV (n=48) and HS/AD (n=20) patients

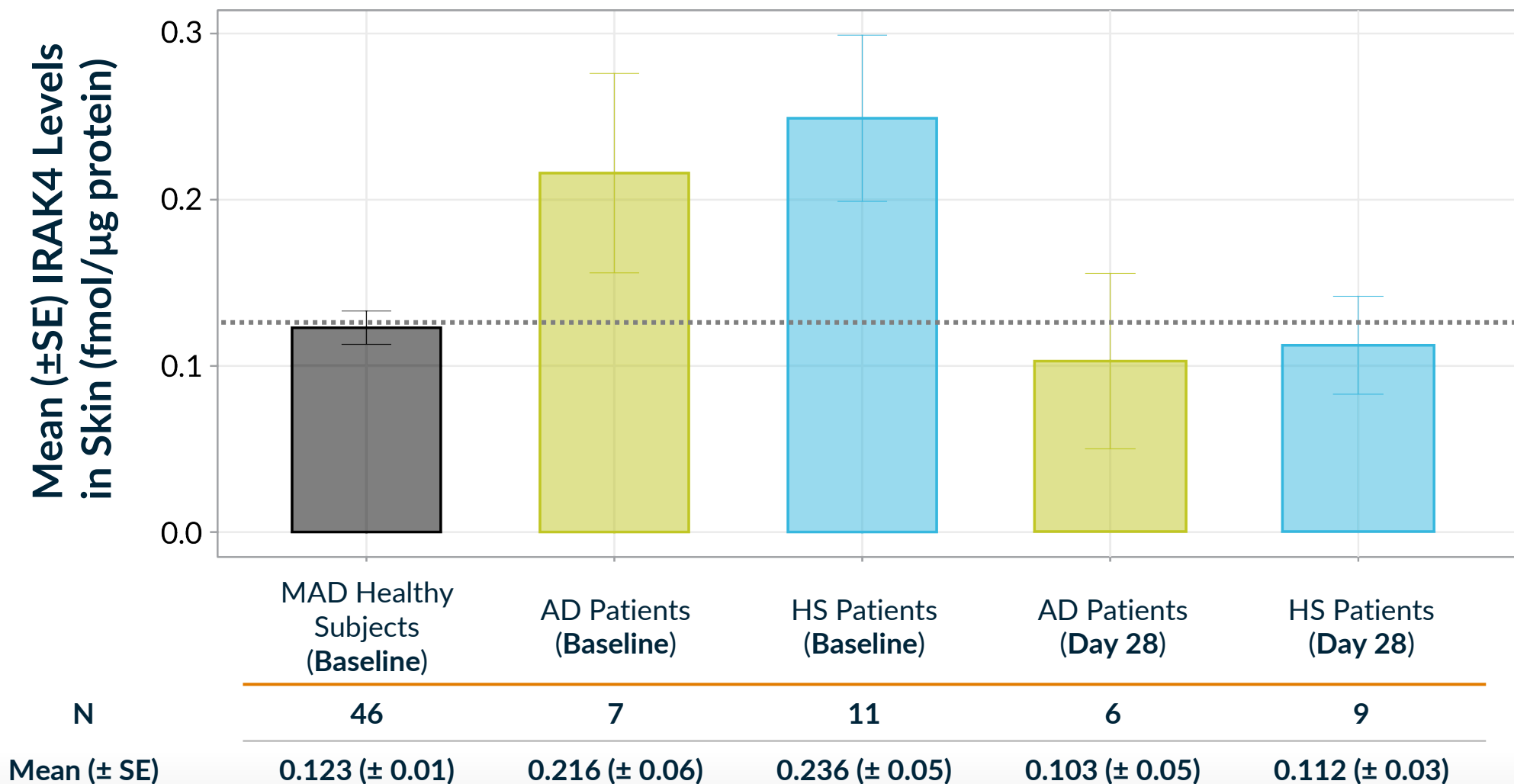
- Concentrations above 3 ng/mL lead to same level of degradation (>80%) in HV and Patients

## IRAK4 Levels in PBMC in Patients at Day 28 (MS)



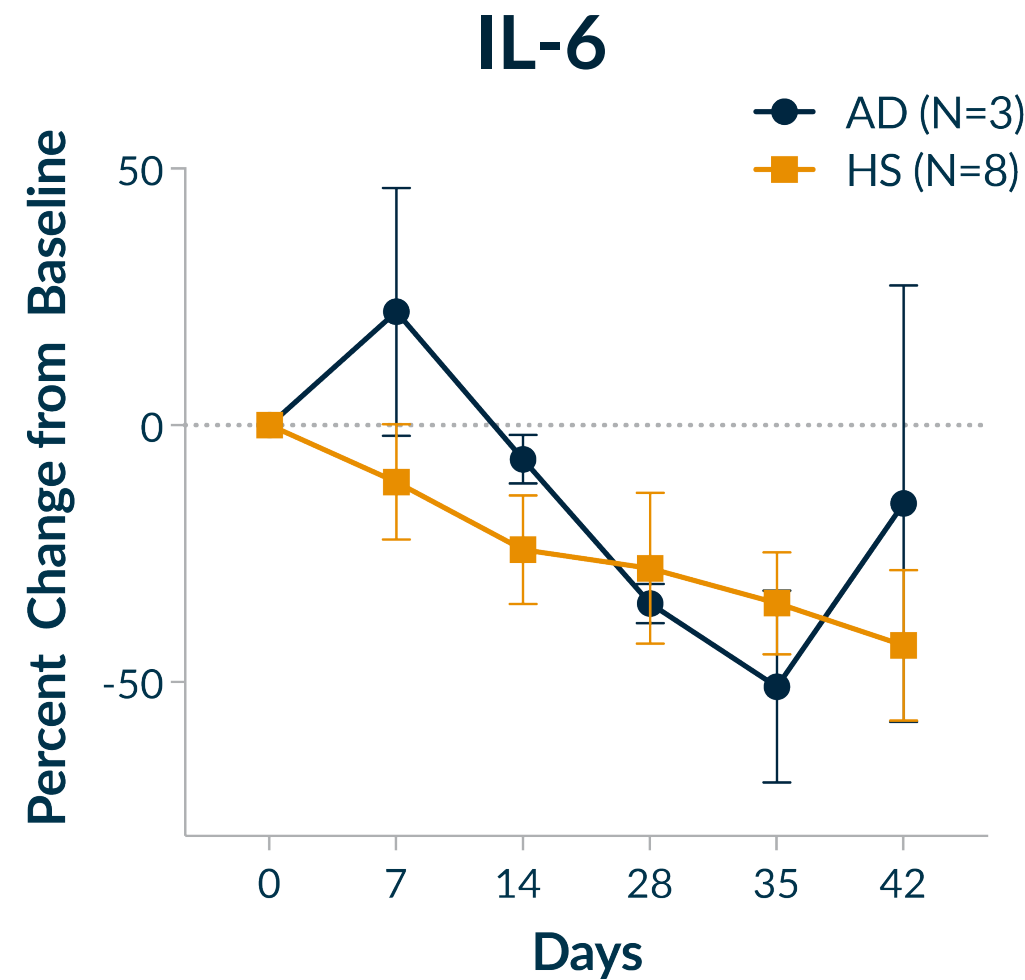
HS and AD Patients **IRAK4 Levels at Day 28 (n=4) near LLOQ**

# KT-474 Reduced IRAK4 in Skin Lesions of AD and HS Patients on Day 28 to at Least Same Level as Healthy Subjects



# In Vivo Inhibition of Disease-Relevant Plasma Cytokines and Acute Phase Reactants by KT-474 in HS/AD Patients

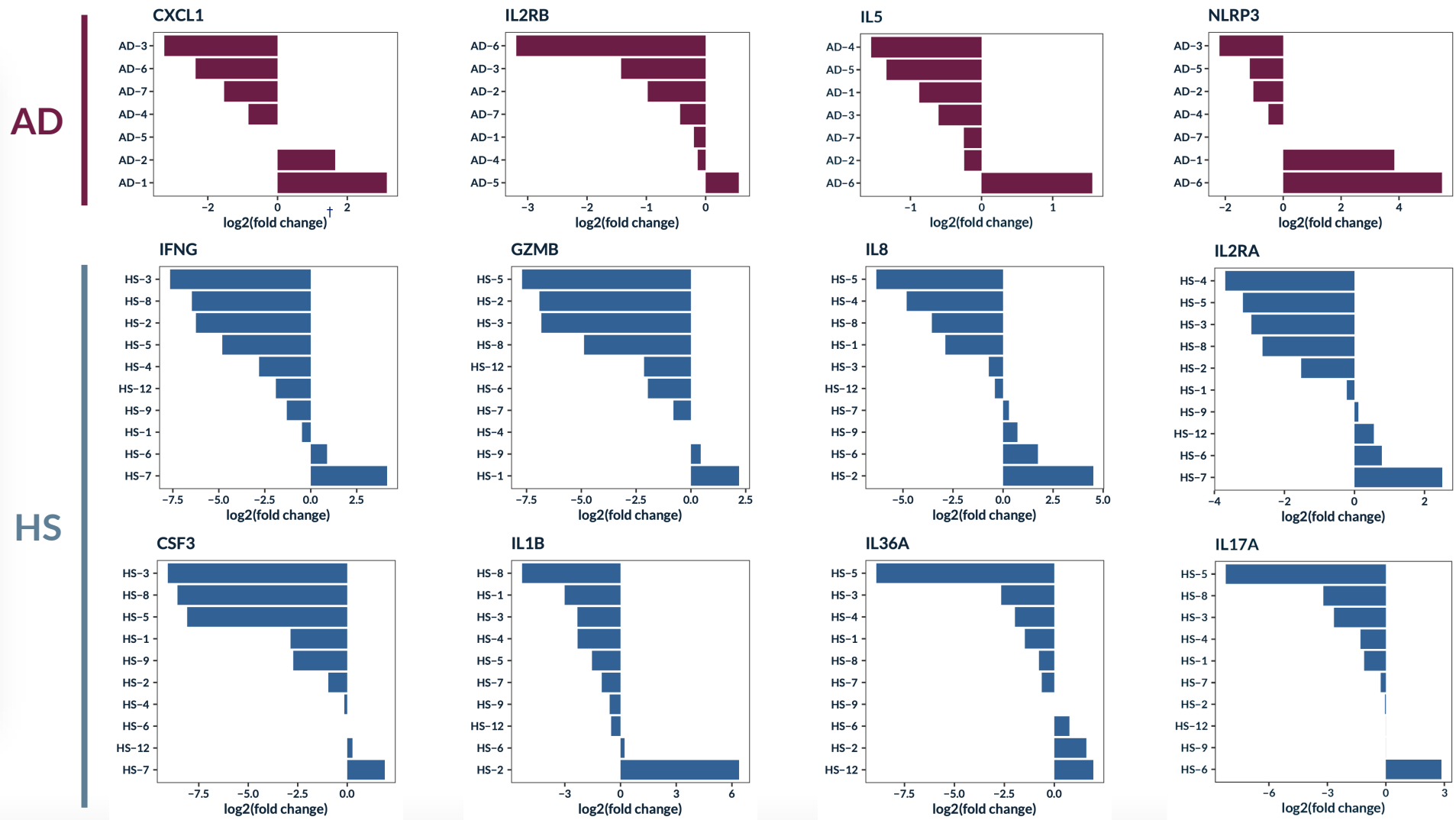
Analyte	Mean Max* AD (n)	Mean Max* HS (n)
IL-6 <sup>†</sup>	-56% (3)	-63% (8)
CRP <sup>†</sup>	NA	-58% (5)
IL-1 $\beta$	-36% (7)	-48% (8)
SAA <sup>†</sup>	-51% (4)	-41% (10)



\*Max % reduction through Day 42  
<sup>†</sup>Analysis performed only on patients with values >ULN at baseline  
 IL-6, IL-1 $\beta$  and CRP are high sensitivity assays  
 NA: not applicable

# Disease-Relevant Genes Downregulated in Skin Lesions in $\geq 50\%$ of Evaluable\* AD (N=7) and HS (N=10) Patients at Day 28 (RNAseq)

- Substantial **downregulation of many disease relevant genes** in both HS and AD patients
- Downregulation exceeded 90%** for many genes
- Broad **anti-inflammatory signature** with downregulation of genes responsible for:
  - ✓ IL1 family cytokines
  - ✓ Th1
  - ✓ Th17
  - ✓ Th2
  - ✓ Innate immunity

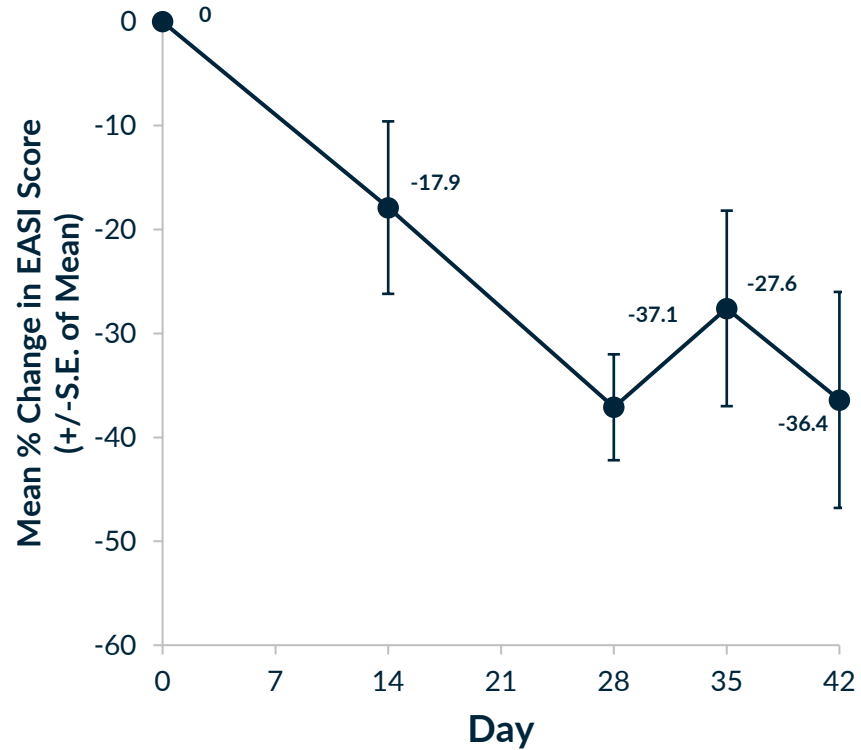


†log<sub>2</sub>(fold change relative to baseline): -1 = 50% decrease, -2 = 75% decrease, -3 = 87.5% decrease

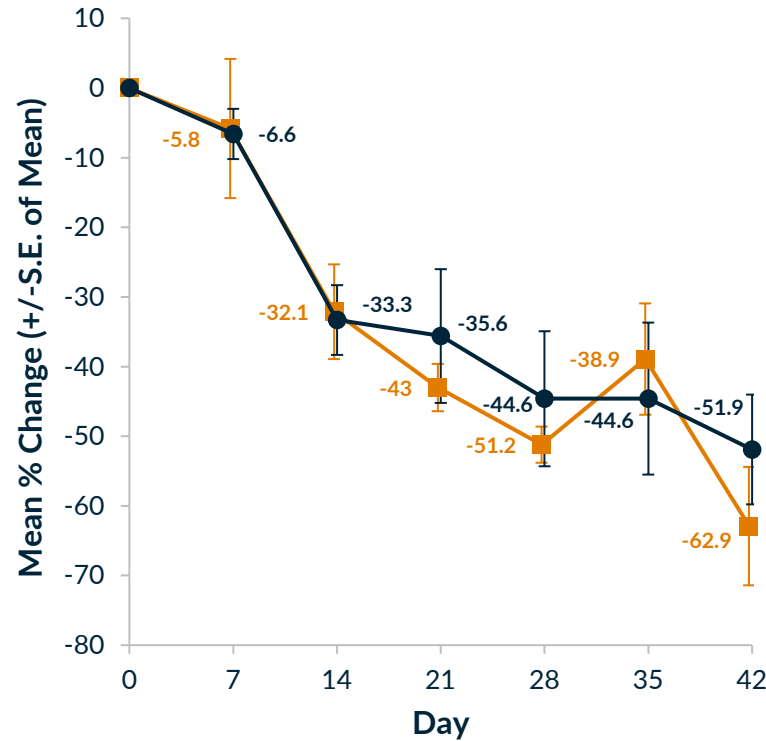
\*Evaluable patients for whom the samples were of sufficient quality for analysis.

# AD: Significant Reduction in EASI Score and Pruritus

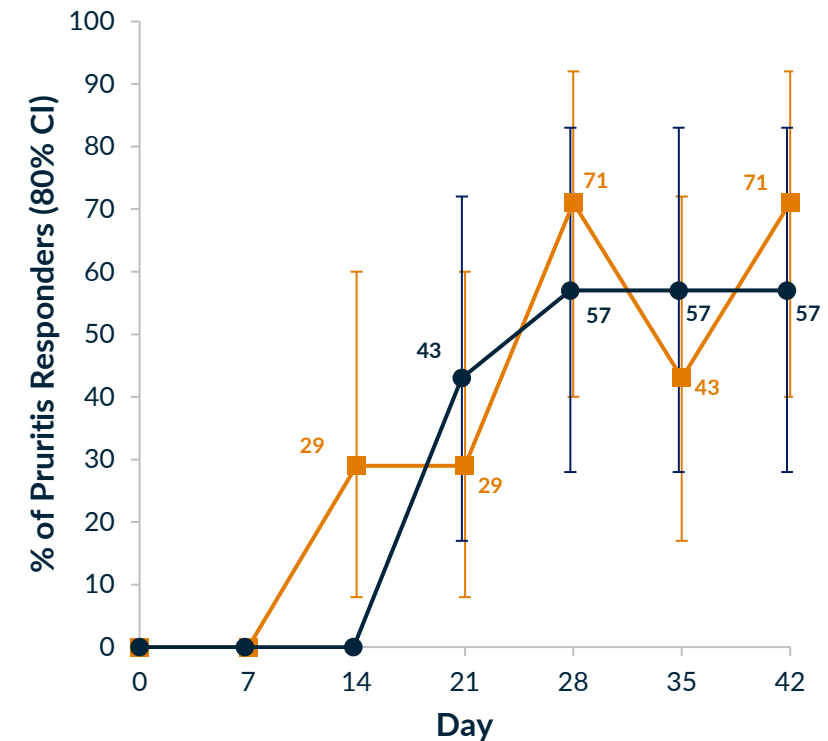
Mean % Change in EASI Score Over Time (N=7)



Mean % Change of Worst Pruritus Over Time (N=7)



Patients with  $\geq 4$  Unit Reduction from Baseline in Worst Pruritus (N=7)



● Past Week  
■ Past 24 Hours

● Past Week  
■ Past 24 Hours



# AD Case Study: Patient AD-3

## Improvement in Disease Severity from Severe to Mild

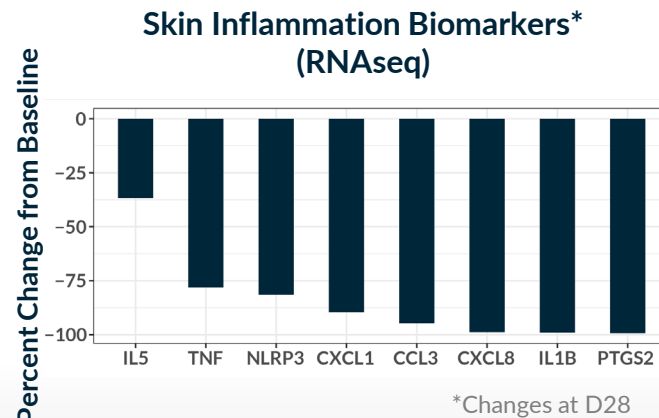
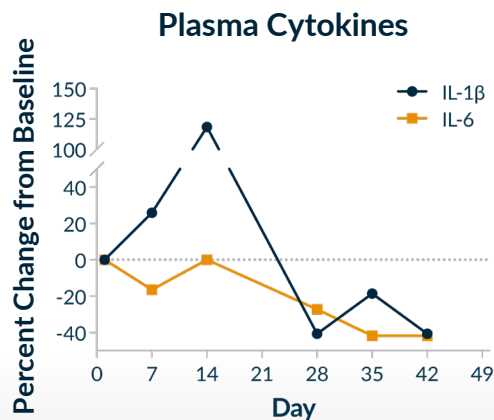
- 51-year-old Hispanic/Latino male with severe AD (vIGA-AD) and EASI score of 28.2 at baseline
- Previously treated with topical betamethasone 2018-2020

Efficacy Endpoints	BL	Day 28	Day 35	Day 42
IGA-AD Score	Severe	Moderate	Moderate	Mild
EASI Score (% Change)	28.2	14 (-50)	16.45 (-42)	9.2 (-67)
Peak Pruritus NRS - past week (% Change)	4	1 (-75)	1 (-75)	1 (-75)

Day 1 - BL

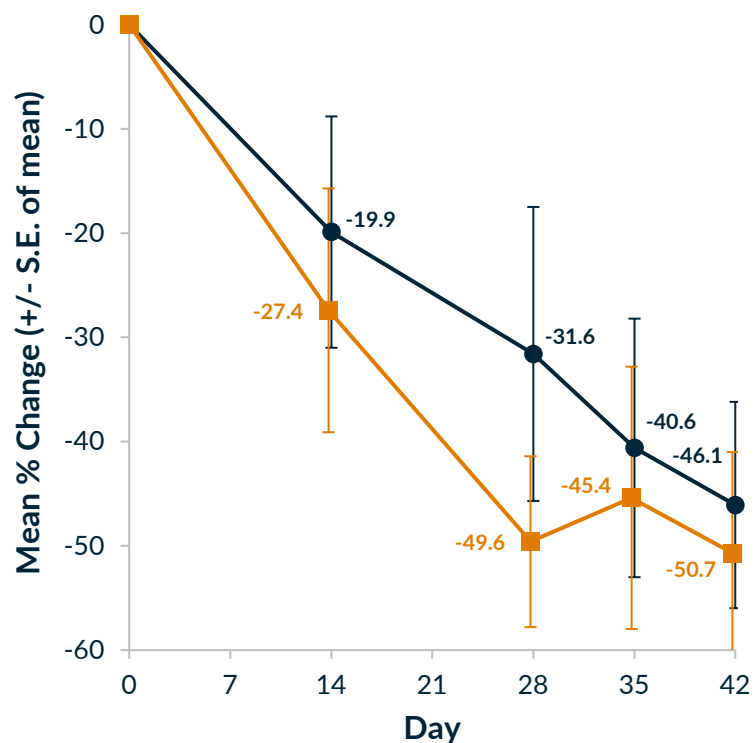


Day 42



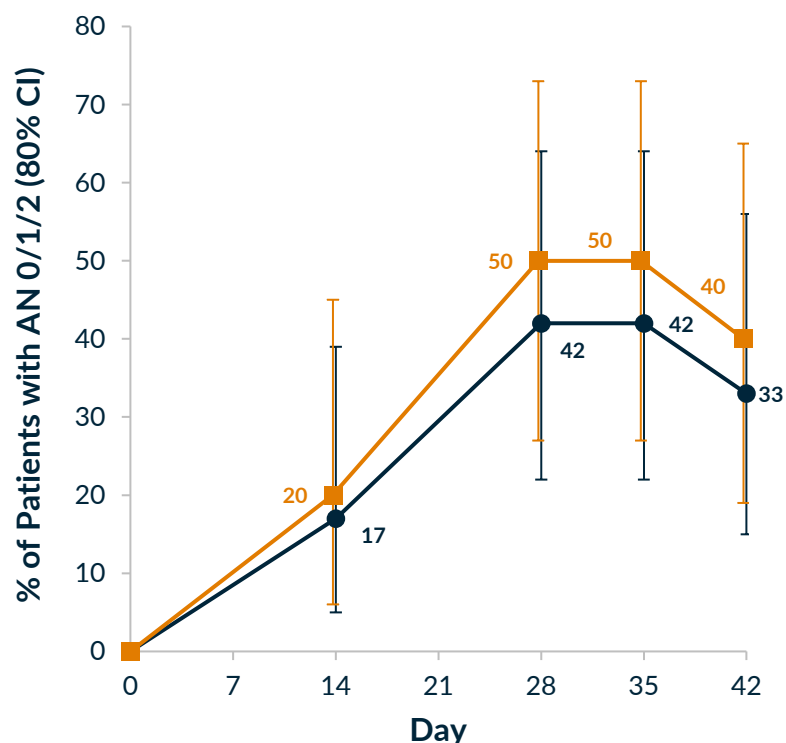
# HS: Significant Reduction in AN Count Leading to HiSCR Responses

## Mean % Change in Total AN Counts Over time



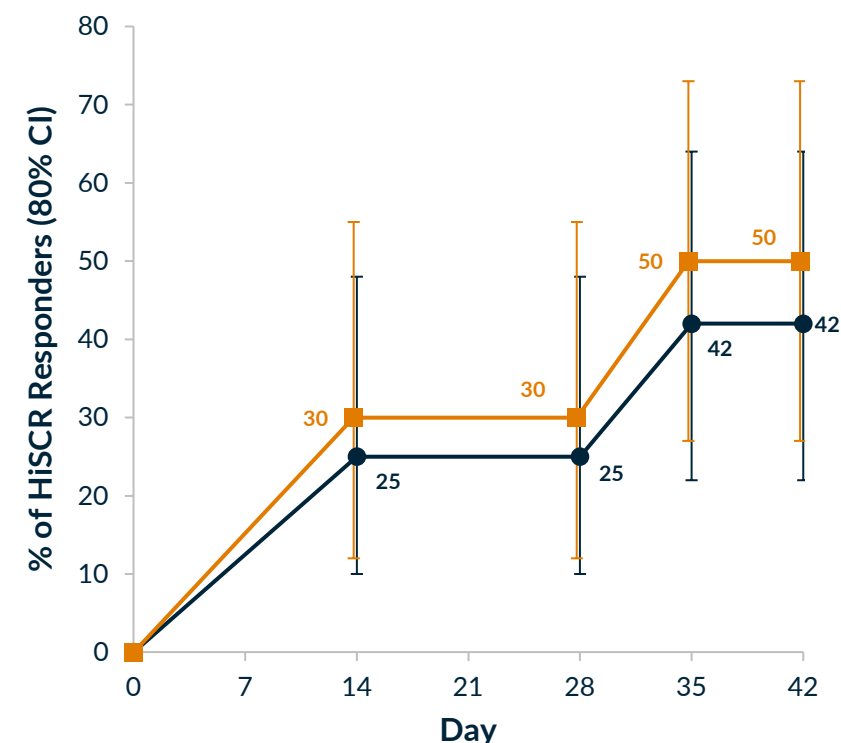
● All HS Patients (N=12)\*  
 ■ Moderate to Severe (N=10)

## % of Patients with AN Count 0/1/2



● All HS Patients (N=12)  
 ■ Moderate to Severe (N=10)

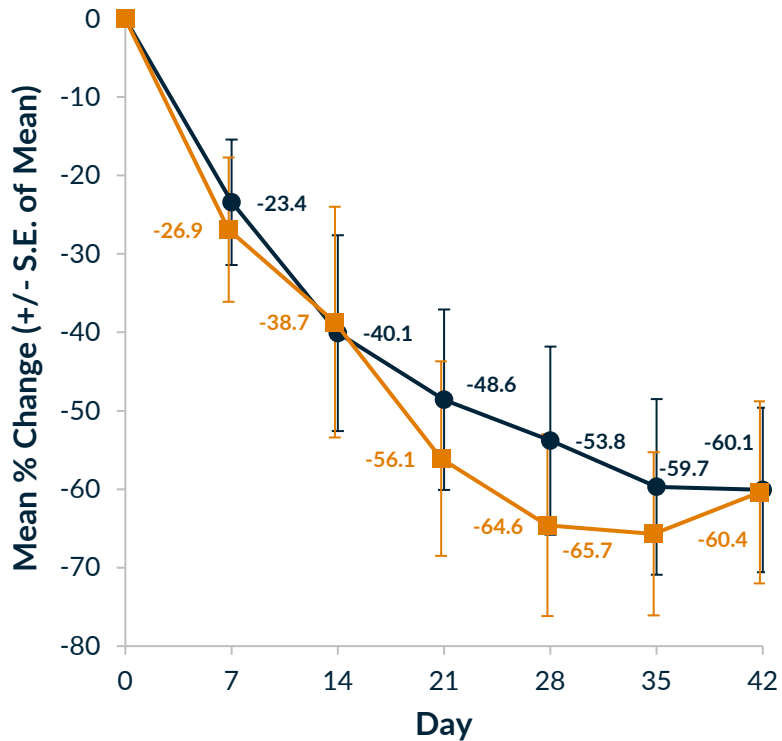
## HiSCR50 Responders



● All HS Patients (N=12)  
 ■ Moderate to Severe (N=10)

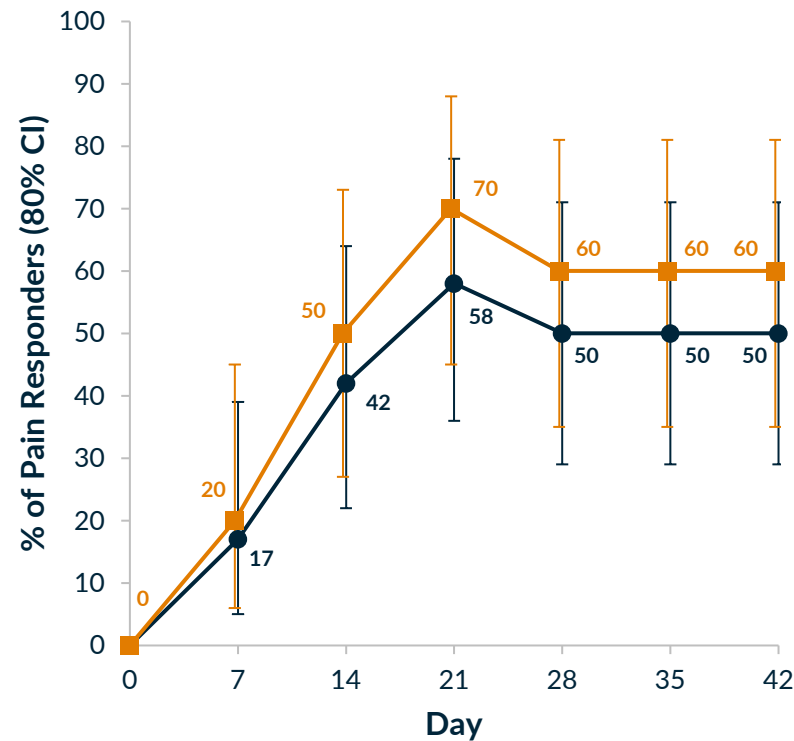
# HS: Significant Reduction in Pain/Pruritus

Mean % Change in Average Pain Over Past Week



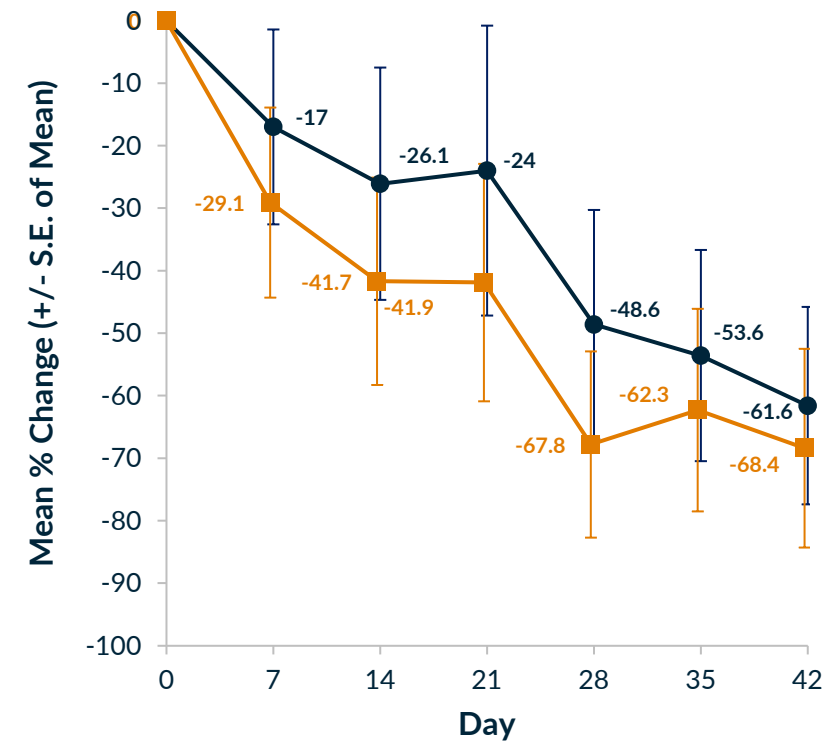
● All HS Patients (N=12)\*  
 ■ Moderate to Severe (N=10)

% of Patients with  $\geq 30\%$  and  $\geq 1$  Unit Reduction in Worst Pain Over the Past Week



● All HS Patients (N=12)  
 ■ Moderate to Severe (N=10)

Mean % Change in Worst Pruritus Over Past Week



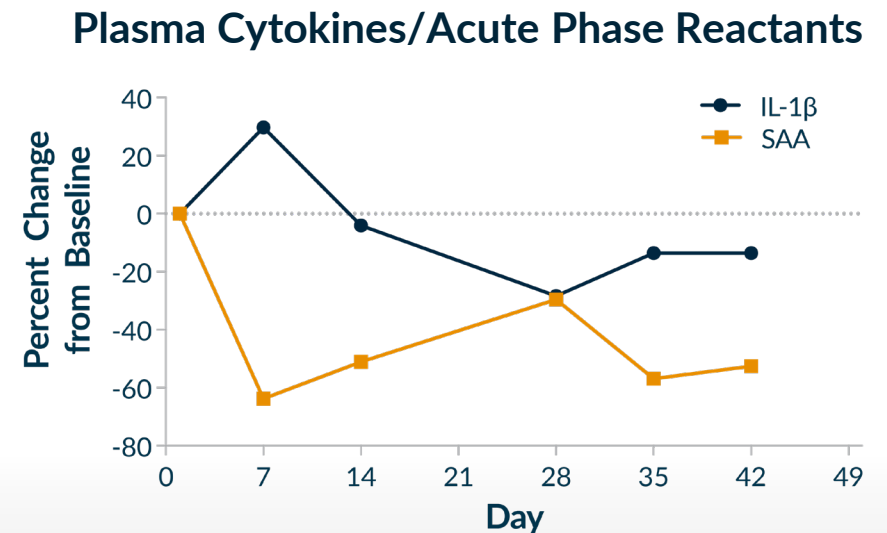
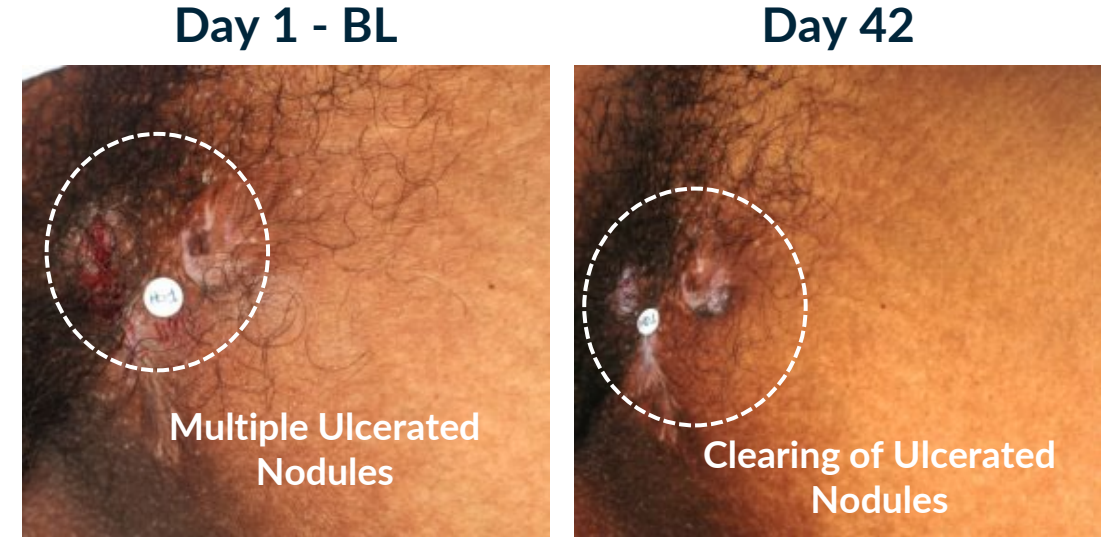
● All HS Patients (N=12)\*  
 ■ Moderate to Severe (N=10)

# HS Case Study: Patient HS-10

## Improvement in Disease Severity from Moderate to Mild

- 39 year old Black Female with Moderate HS (HS-PGA); Baseline AN count = 5
- Prior treatments: benzocaine ointment

Efficacy Endpoints	BL	Day 28	Day 35	Day 42
HS-PGA Score	Moderate	Mild	Mild	Mild
AN Count (% Reduction)	5	2 (-60)	2 (-60)	1 (-80)
Skin Pain NRS - Worst, past week (% Change)	8	3 (-63)	3 (-63)	1 (-88)
Peak Pruritis NRS - past week (% Change)	10	2 (-80)	0 (-100)	0 (-100)



# Adverse Events Related to Study Drug (Occurring in > 1 Patient)

Adverse Event (Preferred Term)	# of Patients	Severity (# of Pts)	Outcome (# of Pts)
Headache	6	Mild (5) Severe (1)	Recovered (6)
Fatigue	4	Mild (4)	Recovered (4)
Diarrhea	2	Mild (2)	Recovered (2)

- No SAEs, no drug-related infections, and no AEs observed leading to dose interruption or discontinuation



# Summary

- Single and multiple doses of KT-474 were well-tolerated in healthy volunteers and resulted in **strong degradation of IRAK4 in blood and skin associated with inhibition of ex vivo whole blood cytokine induction**
- KT-474 administered to HS and AD patients at 75 mg QD for 28 days shown to have safety, PK and PD **comparable to healthy volunteers**
- Robust degradation of IRAK4 in blood and skin was associated with **systemic anti-inflammatory effect in HS and AD patients**
- Promising clinical activity observed in HS and AD **exceeding benchmark placebo rates and comparing favorably to SOC biologics**
- Data presented here **support IRAK4 degradation as a potential best in class mechanism in inflammatory diseases and its superior clinical potential over SMI**
- Results support **advancing KT-474 into Phase 2 placebo-controlled trials, Sanofi plans to start Ph2 clinical trials in HS and AD**



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