# The Association of Eosinophilia on Atopic Dermatitis Severity and Treatment: Evidence from the UK-Irish Atopic Eczema Systemic Therapy Register (A-STAR)

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**Learning Objective**: Understand how blood eosinophil levels relate to atopic dermatitis severity and treatment response in real-world clinical practice.

**Takeaway Message**: High eosinophil counts identify patients with more severe AD and comorbid asthma, but do not predict treatment response.

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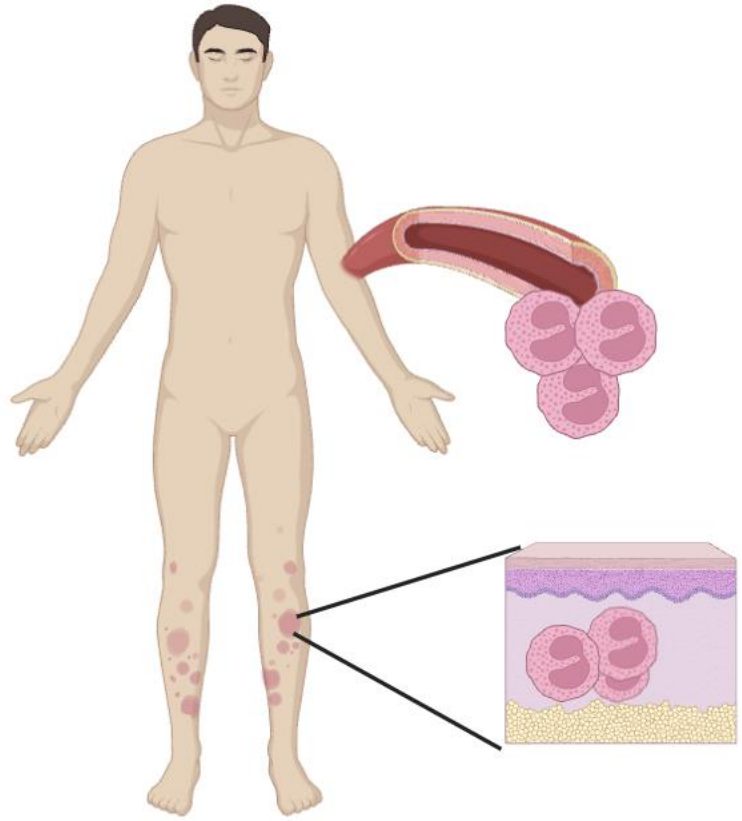
# Background

- Atopic dermatitis (AD) = chronic Th2-driven inflammatory disease
- **Eosinophilia (>500 cells/mm³)** is frequent (≈40% of moderate-to-severe AD
- **Hypereosinophilia** (HEo >1500/mm³) remains poorly characterized
- Key question: **association with AD severity or treatment response**?



# Objective

To study the relationship between baseline blood eosinophil levels and:

1. AD severity
2. Clinical phenotype and comorbidities
3. Treatment response

in the prospective A-STAR real-world cohort.

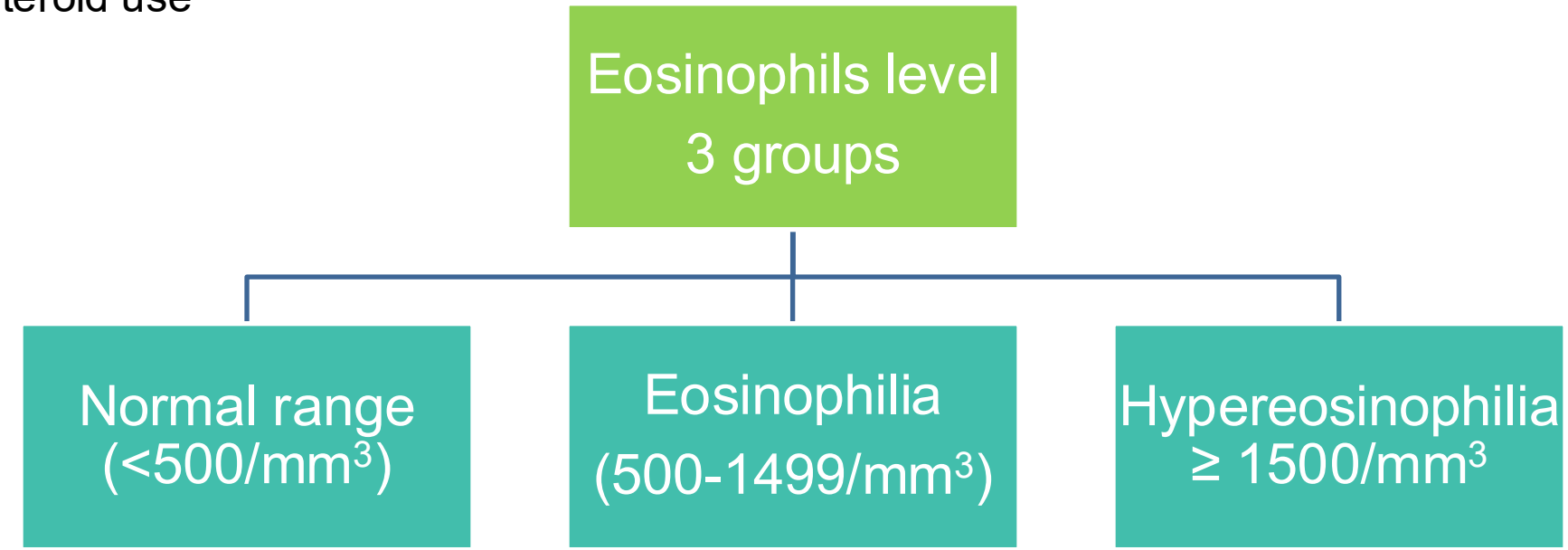
# Methods

- **Prospective multicentric cohort** (**A-STAR**, UK–Ireland)
- **Inclusions criteria**: AD patients (3–82 y) starting systemic therapy (2018–2025)
- **Outcomes**: EASI, DLQI, POEM, PP-NRS, EASI-75/90
- **Analyses**:

Multivariable linear & logistic regression for baseline severity and comorbidities

Cox proportional hazards for treatment response

Adjusted for age, sex, ethnicity, disease onset, Fitzpatrick type, education, prior systemic treatments, baseline EASI, corticosteroid use

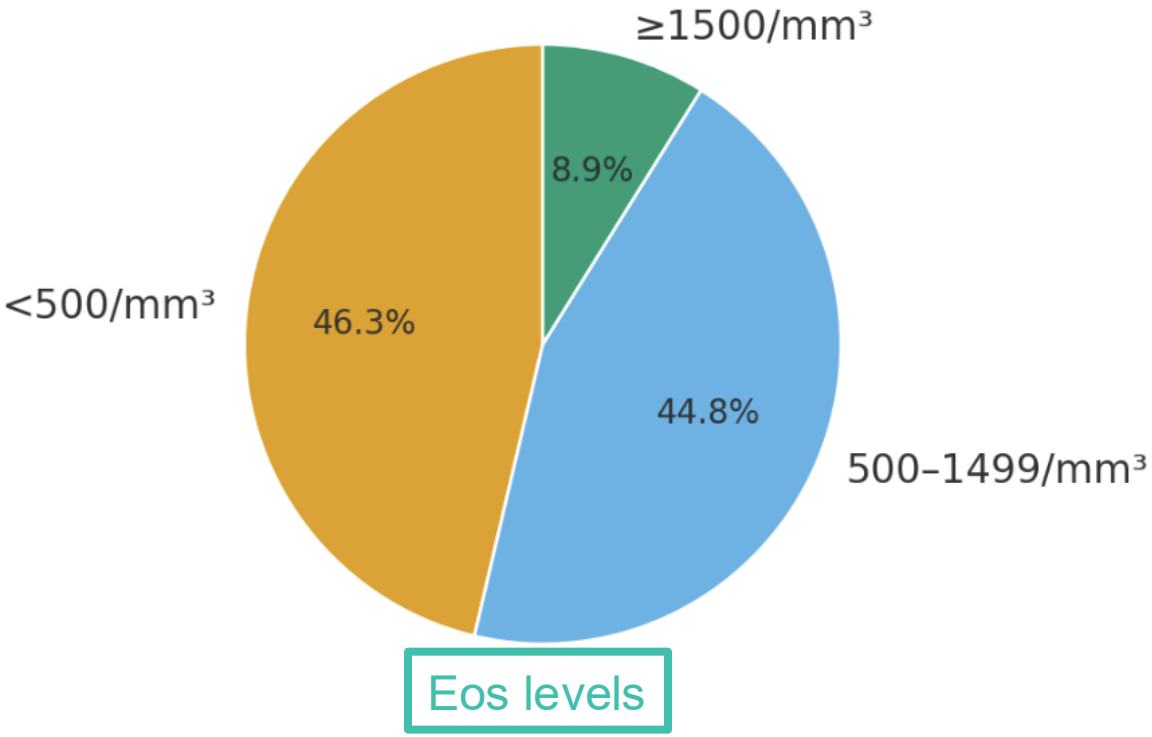


# Population

- **N=719** (**56% male, mean age 27.6±15.5 y**)
- Younger, earlier-onset, more inflamed and erythrodermic AD phenotype in HEo patients.

➢ **Supports a distinct eosinophilic AD**

➢ **Severity increases progressively with Eos count.**




| Baseline absolute eos count at enrolment | <500/mm³ | 500-1499/mm³ | ≥1500/mm³ |
|---|---|---|---|
| N | 333 | 322 | 64 |
| Age (mean) | 34.1 | 26.1 | 22.7 |
| Male (%) | 54.7% | 57.8% | 54.7% |
| White (%) | 81.1% | 66.5% | 73.4% |
| Age of AD onset (mean) | 6.0 | 4.6 | 2.6 |
| BMI (mean) | 26.8 | 23.9 | 21.2 |
| **Disease phenotype (%)** | | | |
| Flexural dermatitis | 90.7% | 93.2% | 92.2% |
| Non-flexural dermatitis | 92.2% | 92.9% | 95.3% |
| Pompholyx | 13.8% | 13.0% | 23.4% |
| Discoid eczema | 4.8% | 7.1% | 1.6% |
| Nodular prurigo | 11.7% | 10.2% | 10.9% |
| Follicular eczema | 6.0% | 18.0% | 4.7% |
| Ichthyosis | 19.8% | 22.0% | 25.0% |
| Keratosis pilaris | 9.0% | 12.7% | 6.3% |
| Palmar hyperlinearity | 41.4% | 33.5% | 39.1% |
| Erythroderma | 4.2% | 5.3% | 17.2% |
| Skin infection | 6.0% | 10.6% | 18.8% |
| **Disease activities** | | | |
| EASI | 16.1 | 20.1 | 27.9 |
| C/DLQI | 46.3 | 50.0 | 55.2 |
| PP-NRS | 68.2 | 68.4 | 76.2 |
| POEM | 64.3 | 67.7 | 71.4 |

# Medication history

**Overall cohort**

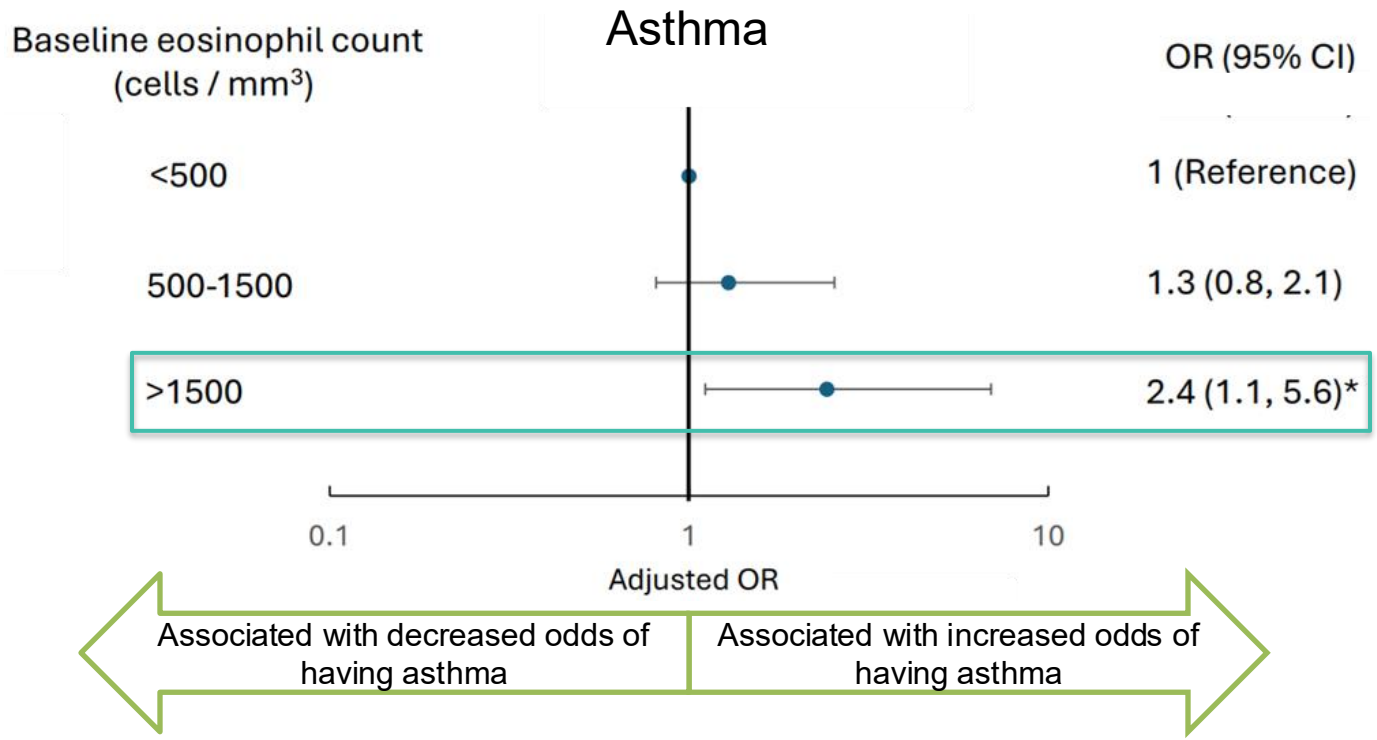
**Biologics** – 49.3%
- Dupilumab: 47.1%
- IL-13 inhibitors (Tralokinumab / Lebrikizumab): 2.9%

**JAK inhibitors** – 11.7%

**Conventional systemic therapies** – 36.7%
- Methotrexate: 29.7%
- Cyclosporin: 8.6%

| Medications received at drug episode | Eo<500/mm$^3$ | 500-1499/mm$^3$ | ≥1500/mm$^3$ |
|---|---|---|---|
| JAK inhibitors | 12.7% | 11.3% | 9.4% |
| Biologics | | | |
| **Dupilumab** | **49.3%** | **45.0%** | **47.2%** |
| IL-13 inhibitors | 3.2% | 3.4% | 0% |
| Conventional systemics | | | |
| Methotrexate | 29.0% | 30.7% | 28.3% |
| Cyclosporin | 5.9% | 9.7% | 15.1% |
| **Concomitant medications** | | | |
| Oral prednisolone | 6.8% | 7.6% | 5.7% |
| Topical corticosteroids | 60.6% | 63.0% | 69.8% |
| Topical calcineurin inhibitors | 24% | 21.8% | 30.2%) |
| **Medication history** | | | |
| No. of prior systemic AD treatments (mean) | 1.73 | 1.37 | 1.19 |
| Conventional systemic exposure ever (%) | 75.1% | 71.8% | 71.7% |
| **Prior exposure to dupilumab (%)** | **14.0%** | **9.0%** | **6.0%** |

# Comorbidities




## Asthma

- Strongest and only independent association with eosinophil level
- Association remains significant in dupilumab-naïve patients: OR 2.6 (1.3–5.5) p<0.05

➢ **Confirms biological link between systemic eosinophilia and airway Th2 inflammation**

## Aeroallergen Sensitisation
## Allergic rhinoconjunctivitis
## Food allergy
## Atopic eye disease
## Contact allergy

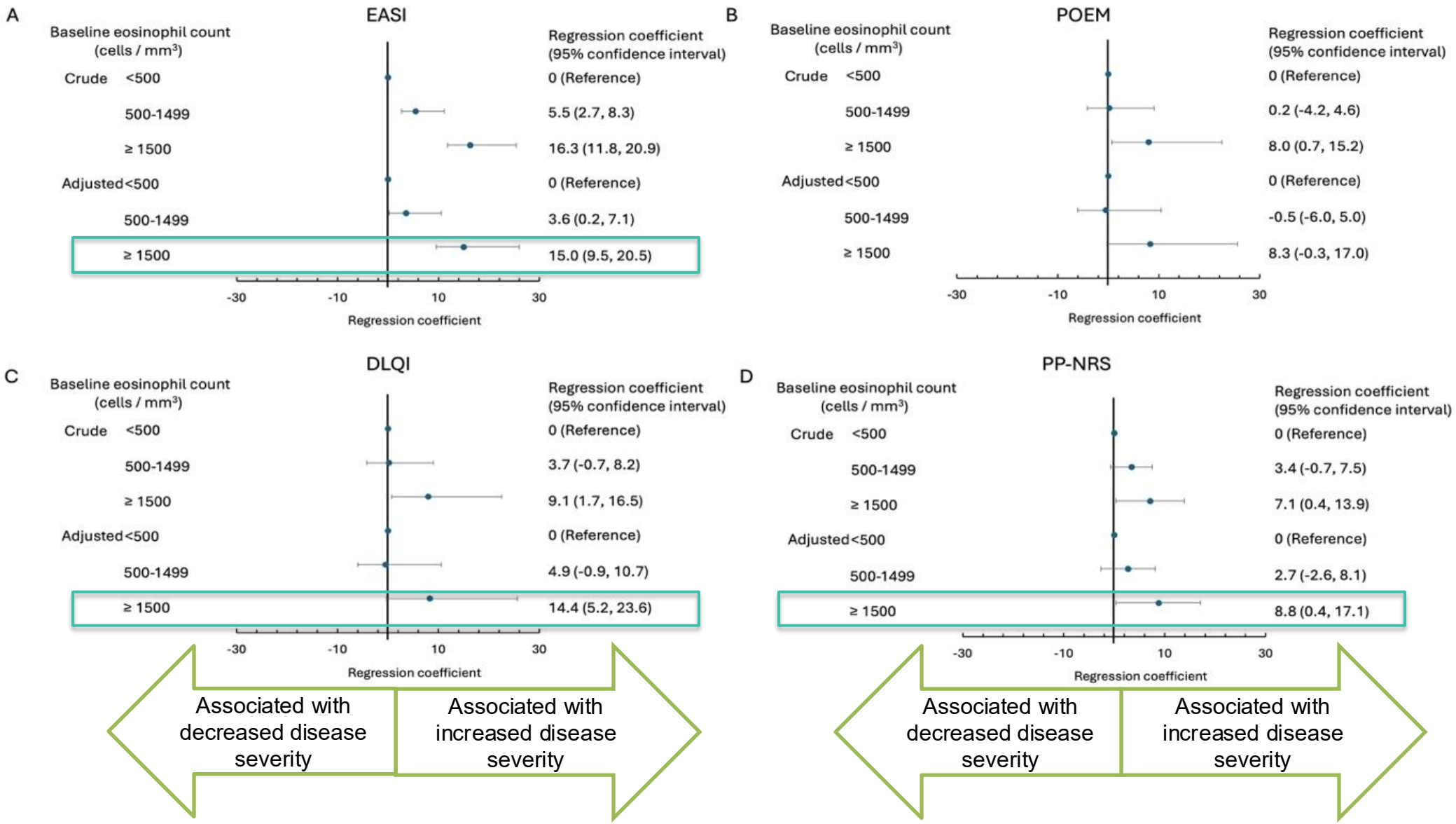
➢ **No independent associations after adjustment → trends reflect general atopic background, not eos-driven pathology**

**Association between baseline blood eos count and atopic comorbidities in patients with moderate-to-severe AD at enrolment.** *p<0.05.

# AD severity

- **HEo** associated with **severity** :

– EASI
– DLQI
– PP-NRS
+/- POEMS




**Association between baseline AEC and disease activity or patient-reported outcomes at enrolment (0-100 transformed scale).**

# Treatment Response

- **No evidence of association** between baseline Eos count and EASI-75/90 response

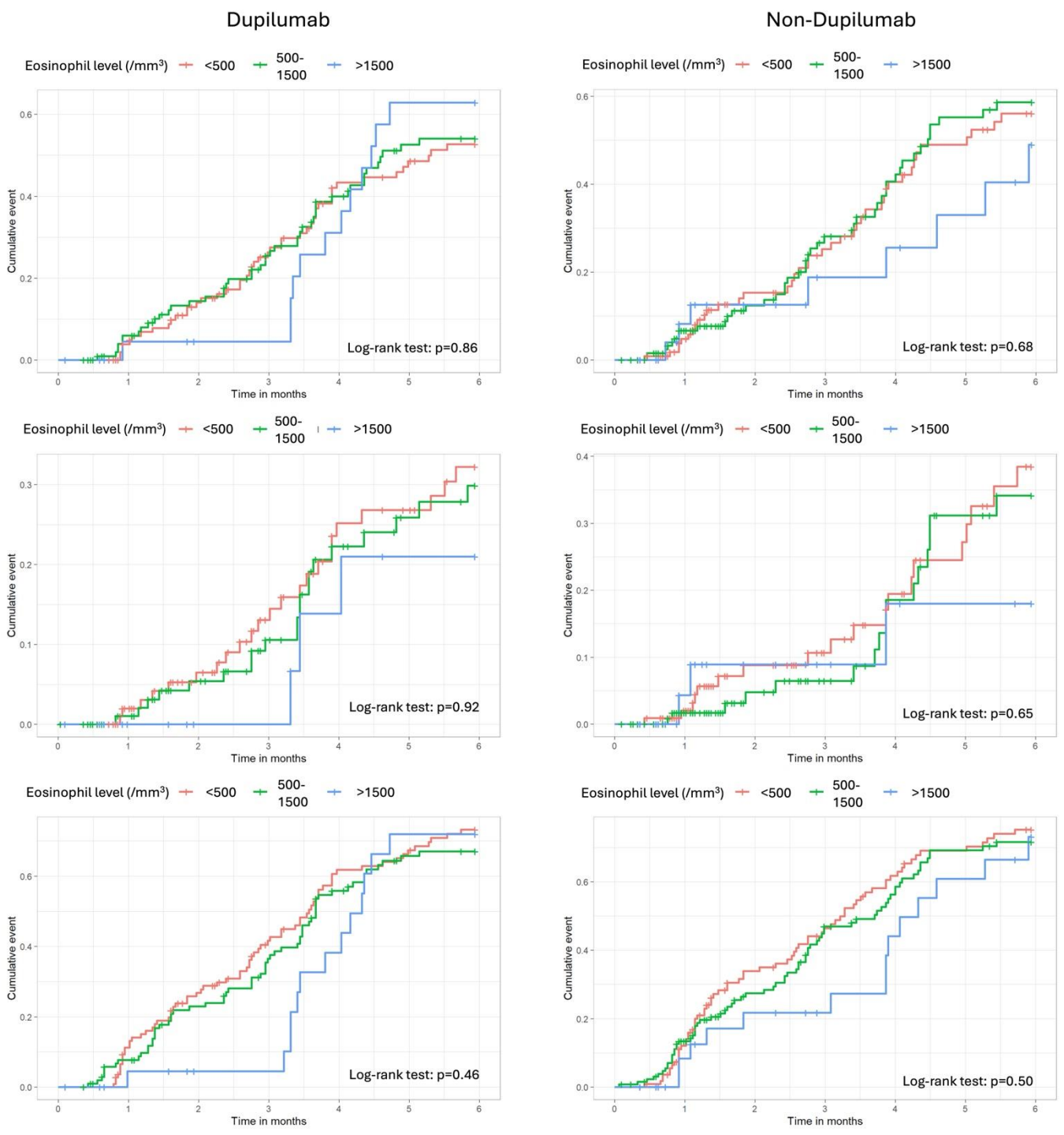
-> similar for Dupilumab yes/no

| Absolute eos count at drug initiation | <500/mm³ N=191 | 500-1499/mm³ N=216 | ≥1500/mm³ N=50 |
|---|---|---|---|
| **Censored at 1 year** | | | |
| EASI 75 | | | |
| Crude | (Reference) | 1.2 (0.9, 1.5) | 1.0 (0.7, 1.5) |
| Adjusted | (Reference) | 0.9 (0.6, 1.3) | 0.6 (0.3, 1.0) |
| EASI 90 | | | |
| Crude | (Reference) | 1.0 (0.7, 1.4) | 1.0 (0.6, 1.8) |
| Adjusted | (Reference) | 0.8 (0.5, 1.4) | 0.6 (0.3, 1.2) |
| EASI ≤7 | | | |
| Crude | (Reference) | 1.0 (0.8, 1.3) | 0.8 (0.5, 1.2) |
| Adjusted | (Reference) | 1.0 (0.7, 1.3) | 0.8 (0.5, 1.4) |

- Eosinophils = baseline disease severity marker, not predictive (more patients needed ?)

≥1500/mm³ (hyperEo)
500-1499/mm³
<500/mm³

Cox proportional hazards



# Conclusion & Perspectives

- High Eos count / ELR = **marker of greater AD severity + asthma**
- **No evidence of association with treatment response**
- High Eos may identify a **more systemic, multi-organ inflammatory phenotype of AD** with a higher burden of symptoms and quality-of-life impact.
- This eosinophilic subgroup is likely regulated by more type 2–driven inflammation which might suggest **greater potential benefit from biologics that target IL-5, or other eosinophil pathways**
- More patients for assessing specific treatment response (i.e., Dupilumab, JAKi, conventional IS)
- Need for **multi-omic integration** to define eosinophilic endotypes further