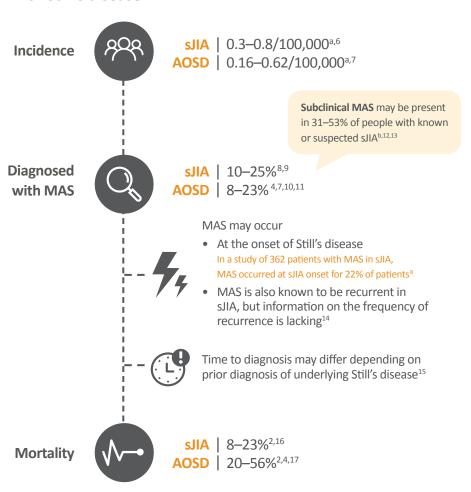
# MAS is a life-threatening complication of Still's disease

MAS is a subtype of secondary HLH that occurs in the setting of rheumatic disease. <sup>1,2</sup> MAS is a life-threatening condition that significantly increases the risk of death for patients with Still's disease<sup>3–5</sup>



MAS in Still's disease is a severe burden on patients and healthcare resources



#### Intensive care

In a study of 362 patients with MAS in sJIA:8

35%

were admitted to the ICU

In a multi-institutional retrospective study of 71 confirmed adult patients with HLH/MAS who required ICU admission: <sup>C,18</sup>



72% required mechanical ventilation



71% required norepinephrine

In a study of 8 patients with MAS in AOSD:19

Long hospital stay



Median 45 days (range 20–180 days)

**Further relapses** 



~25% of patients have multiple relapses

<sup>a</sup>Estimation based on limited available published literature. <sup>b</sup>Patients with subclinical MAS have mild MAS disease activity, with presence of activated macrophages or hemophagocytosis, but do not meet the criteria for a full clinical diagnosis. <sup>12</sup> <sup>4</sup>All-cause HLH/MAS. <sup>18</sup>

AOSD, adult-onset Still's disease; HLH, hemophagocytic lymphohisticcytosis; ICU, intensive care unit; MAS, macrophage activation syndrome; sJIA, systemic juvenile idiopathic arthritis.

1. De Benedetti F, et al. Nat Rev Rheumatol 2021;17:678–691; 2. Lerkvaleekul B, Vilaiyuk S. Open Access Rheumatol 2018;10:117–128; 3. Shakoory B, et al. Arthritis Rheumatol 2023;75:1714–1732; 4. Gao Q, et al. Clin Exp Rheumatol 2021;39(Suppl 132):59–66; 5. Ruscitti P, et al. Clin Rheumatol 2017;36:2839–2845; 6. De Benedetti F, Schneider R. 2016; Chapter 16: Systemic Juvenile Idiopathic Arthritis. In: Petty RE, et al (Eds).

4. Gao Q, et al. Clin Exp Rheumatol 2021;39(Suppl 132):59–6; S. Ruscitt P, et al. Clin Rheumatol 2017;35:2839–2845; 6. De Benedetti F, Schneider R. 2016; Chapter 16: Systemic Juvenile Idiopathic Arthritis. In: Petty Rt., et al. (Eds). Textbook of Pediatric Rheumatol 2014;66:3160–3169; 9. Høeg PE, et al. Int J Rheumatol 2022;2022:1784529; 10. Ruscitti P, et al. J Rheumatol 2018;45:864–872; 11. Wang R, et al. Clin Rheumatol 2023;32379–2386; 12. Behrens EM, et al. J Rheumatol 2007;34:1133–1138; 13. Bleesing J, et al. Arthritis Rheum 2007;56:965–971; 14. Bracaglia C, et al. Pediatr Rheumatol Online J 2017;15:5; 15. Sobi. Data on file. Sobi US market research 2021; 16. Aytaç S, et al. Rheumatol Int 2016;36:1421–1429; 17. Di Benedetto P, et al. PLoS One 2020;15:e0235326; 18. Barba T, et al. Medicine (Boltimore) 2015;94:e2318; 19. Hot A, et al. Medicine 2010;89:37–46.



# Clinical diagnosis of MAS in Still's disease

## Clinical and laboratory features of MAS include: 1,2





Hepatosplenomegaly



Hyperferritinema



Lymphadenopathy



Hypertriglyceridemia



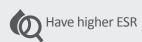
Cytopenias

### MAS can occur at the onset of Still's disease or later in disease course<sup>3</sup>

Compared with late-onset MAS, patients with MAS at the onset of Still's disease:3



Are younger Have less CNS involvement Have higher ESR



Other than ESR, laboratory parameters are comparable in patients with early or late onset of MAS3



## Diagnosing MAS is challenging because of the clinical overlap with other conditions<sup>1,2,4</sup>

▶ Infectiona,5-7

► Malignancy<sup>2,6,7</sup>

► Sepsis<sup>2,6</sup>

- ▶ Liver failure<sup>1,6</sup>
- ▶ Rheumatoid disorders<sup>2,7</sup>
- ▶ Immune disorders<sup>1,6</sup>

The MAS/sJIA (MS) score and EULAR/ACR/PRINTO classification criteria have been developed specifically for patients with sJIA<sup>8,9</sup>

### MAS in sJIA (2016 EULAR/ACR/PRINTO) classification criteria9



**Fever** 

Ferritin ≥684 ng/mL



Any 2 of:



Platelet count ≤181 × 10<sup>9</sup>/L







Laboratory and biomarker patterns may help differentiate MAS from other conditions<sup>4</sup>



- - Triglycerides
- CXCL9 • IL-18
- D-dimer
- Ferritin
- PT/INR/PTT
- sCD25
- CRP
- ALT
- LDH
- AST
- CSF studies
- Bilirubin



- Fibrinogen
- Neutrophils
- Lymphocytes
- Hemoglobin
- Platelets
- Albumin



- ESR may increase or decrease
- Brain imaging may be abnormal

alnfection is estimated to trigger MAS in one-third of patients with sJIA.3

ACR, American College of Rheumatology; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CNS, central nervous system; CSF, cerebrospinal fluid; CRP, C-reactive protein; CXCL9, chemokine C-X-C motif ligand 9; ESR, erythrocyte sedimentation rate; EULAR, European Alliance of Associations for Rheumatology; IL, interleukin; LDH, lactate dehydrogenase; MAS, macrophage activation syndrome; PRINTO, Paediatric Rheumatology International Trials Organisation; PT/INR/PTT, prothrombin time/international normalized ratio/partial thromboplastin time; sCD25, soluble CD25 (also known as soluble interleukin-2 receptor α [sIL-2Rα]); sJIA, systemic juvenile idiopathic arthritis.

