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Hyperglycemia Requiring Insulin Among Pediatric Patients Diagnosed With Hemophagocytic Lymphohistiocytosis

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Background

- Hemophagocytic lymphohistiocytosis (HLH) is a rare, life-threatening disorder marked by massive cytokine release due to macrophage and T-cell activation
- Hallmarks include fever, splenomegaly, cytopenias, hypertriglyceridemia, hypofibrinogemia, and elevations in ferritin and soluble IL-2 receptor
- Detailed descriptions of the development of hyperglycemia and insulin management among HLH patients are lacking
- We describe 10 years' experience at a single tertiary pediatric health center with HLH patients who developed insulin-dependent hyperglycemia

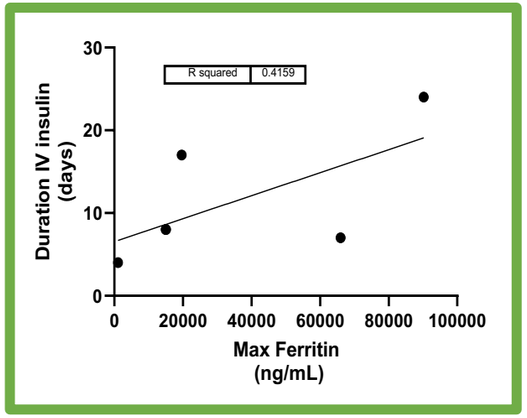
Methods

- Chart review from 2010 to 2019 of patients < 21 years old who required insulin during/shortly after a hospitalization where they were diagnosed with HLH using established criteria
- Descriptive statistics of demographics, clinical and lab findings, treatment regimens, and outcomes

Modified HLH 2009 Criteria			
At least 3 of 4 required			
fever	splenomegaly	cytopenias	hepatitis
and at least 1 of 4 required			
↑ferritin	hemoph-agocytosis	↑ soluble IL2-R	↓NK cell function

Results

- Of 30 patients with HLH, 33% (n=10) required insulin
- All HLH cases were secondary with 90 % having infection and 40 % having an underlying malignancy
- All were treated with high dose dexamethasone (dex), with 50% of patients being treated for over 30 days
- 70% needed insulin within 5 days of starting steroids
- Most patients (90%) received parenteral nutrition with mean max GIR of 8 mg/kg/min (SD=2.7)
- Mean duration of IV regular insulin therapy was 9.5 days; however, 2 patients died while being treated
- Only 1 patient was discharged home on SQ insulin therapy
- Mortality of HLH patients requiring insulin was 50%



	Age (years)	Sex	BMI (percentile)	Hospitalized (days)	Mortality	Max Ferritin (ng/mL)	Max CRP (mg/dL)	Max Glucose (mg/dL)	Dex (days)	Max Dex (mg/m²/day)	Insulin Type	IV regular insulin (days)
case 1	7.9	M	86.8	27	deceased	15,106	7.4	660	12	10.0	IV regular → SQ lispro and glargine	8
case 2	2.4	M	4.7	110	deceased	90,219	13.9	471	53	10.2	IV regular	24
case 3	10.7	M	57.9	202	alive	19,640	44.9	438	17	9.9	IV regular	17
case 4	1.7	F	N/A	17	deceased	>10,000	7.7	284	2	10.2	IV regular	2
case 5	2	M	86.4	39	alive	1,091	40.5	281	42	10.4	IV regular	4
case 6	8.8	F	10.7	15	deceased	58,342	8.3	267	70	11.5	SQ glargine	N/A
case 7	0.7	F	N/A	139	alive	14,970	19.6	399	49	11.6	IV regular	8
case 8	16	F	74.4	27	alive	>10,000	3.2	725	35	10.1	IV regular	6
case 9	16	F	23.4	10	deceased	2,386	2.6	318	4	9.5	SQ lispro and glargine	N/A
case 10	17	M	81.8	16	alive	65,962	8.6	371	8	5.2	IV regular → SQ lispro and detemir	7
mean (SD)	8.3 (6.5)		53.3 (35.0)	60.2 (66.5)		33,465(33,338)	15.7 (15.1)	421.1 (159.2)	29.2	9.9 (1.8)		9.5 (7.3)

Conclusions

- One-third of pediatric patients hospitalized with a new HLH diagnosis, required insulin for hyperglycemia
- Age, sex and BMI percentile were variable
- Insulin is typically started for hyperglycemia within 5 days of initiating steroid therapy, suggesting hyperglycemia is primarily glucocorticoid-related
- Treatment was limited to IV regular insulin infusions, and often not needed by the time of discharge
- Risk of mortality is very high

No disclosures.