The actual incidence of Small for Gestational Age (SGA) newborns and their catch-up growth is dramatically lower than previously considered.

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Introduction

The incidence of small for gestational age (SGA) births (weight < 2SD from the mean) varies among populations with an estimate of 10% of term infants in developed countries compared with 10-30% of term infants in developing countries (Figures 1,2). Infants born SGA are at increased risk of perinatal morbidity and mortality, developmental disabilities metabolic alterations (diabetes mellitus type 2, hypertension and hyperlipidemia) in later life and tendency for persistent short stature.

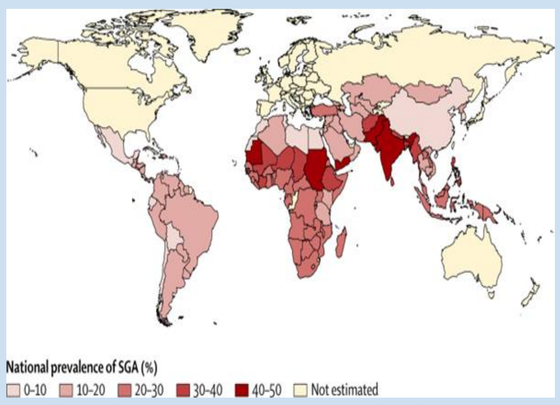

Fig 1. Estimated prevalence of SGA births in 138 low-income and middle-income countries (Lee, Anne CC, et al.)

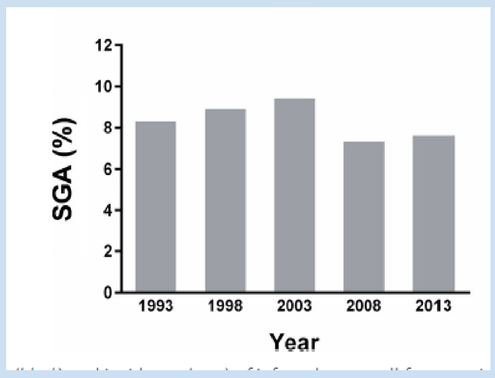

Fig 2. Incidence of infants born SGA Hospital in Chieti (Valentina Chiavaroli et al)

Catch up growth (CUG) is the accelerated growth during the first years of life achieving a height of more than 2 or 2.5 SD below the mean for age and sex. The incidence of CUG among SGA infants varies significantly in different populations but 85-90% of SGA infants experience CUG (Fig 3). These children are eligible for growth hormone (GH) therapy to increase their final height (Fig 4).

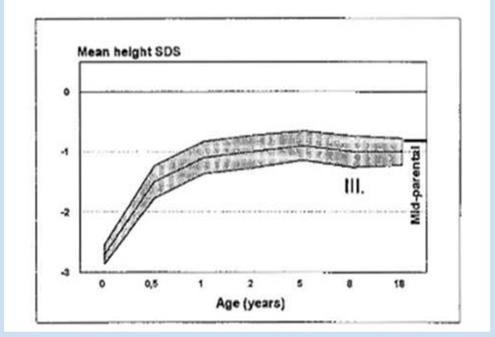

Fig 3. Catch up growth by age 2 years (Karlberg, Pediatric Research 1996)

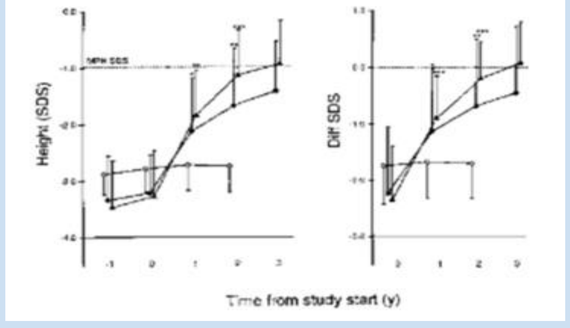

Fig 4. Growth response to GH therapy in SGA pts. (Boguszewski Acta Paediatrica 1998)

Based on the reported incidence of SGA (5-10%) and CUG failure (10%) in the first two years, we encountered unexpected lower demand for growth hormone therapy for this population. This finding triggered us to survey the actual incidence of SGA and failure in CUG.

Objectives: Finding the actual incidence of SGA infants and their failure in CUG.

Methods

Our cohort included the registry of all-43,307 live babies born at Hadassah hospitals between 2008-2011. SGA was defined according to the 2005 Dolberg's (birth weight<2SD) table for Israeli newborns (similar to WHO parameters). Our calculated birth weight percentiles were compared to the nationally/internationally used percentile data (NUPD). Follow-up measurements of height and weight were obtained in mother and child centers or at the pediatrician.

References

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Results

Out of 43,307 live births at the study hospitals only 524 babies (1.2%) were SGA (52% of expected- Fig 5) approximately 132 out of each 10,000 births. This finding was repeated in every one of the four consecutive years that were examined. Birth weight percentile comparisons showed that 1st and 5th percentile weights in our cohort were significantly (20%) higher while the 95th and 99th percentiles were 5% lower than the NUPD.

			Birth Year				Total
			2008	2009	2010	2011	
small	AGA or LGA	Count	11050	10653	10540	10540	42783
		% within birth_year	98.6%	98.9%	98.8%	98.8%	98.8%
	SGA	Count	155	120	123	126	524
		% within birth_year	1.4%	1.1%	1.2%	1.2%	1.2%
Total		Count	11205	10773	10663	10666	43307
		% within birth_year	100.0%	100.0%	100.0%	100.0%	100.0%

Table 1. SGA incidence during the study period

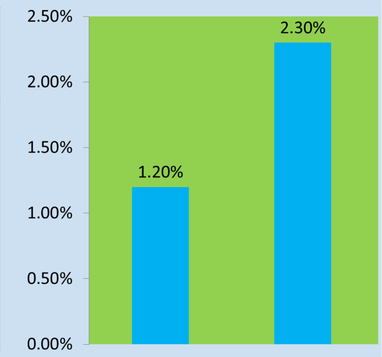

Fig 5. SGA incidence in the study population compared to expected data

CUG parameters (available for 447/524 SGA) indicated that 427 (95.7%) had CUG (height >2.5 SD below the mean: Table 2). CUG rate among term SGA infants was even higher (Fig 7). When catch up growth was defined as a standardized height that is greater than -2.0 (SD) 91.3% of the children performed adequately catch up growth (Table 2 , Fig 6).

		Catch up growth prevalence		Height standard scores median
		Height < -2 SD	Height < -2.5 SD	Med
Age	1 month	68.2% (150)	83.2% (183)	-1.52
	6 months	83.7% (261)	90.1% (281)	-1.09
	12 months	86.6% (284)	92.1% (302)	-1.27
	24 months	92.3% (361)	96.4% (377)	-1.07
	5 years	92.1% (372)	96.3% (389)	-0.83
	6 years	92.3% (386)	96.4% (403)	-1.04
	7 years	91.6% (395)	96.3% (415)	-1.11
	8 years	91.3% (407)	95.7% (427)	-0.86

Table 2. CUG prevalence in SGA children
(The numbers in parentheses indicate no. of patients)

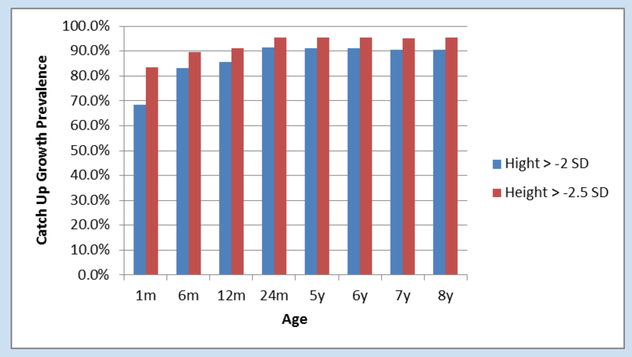

Fig 6. CUG prevalence in SGA children

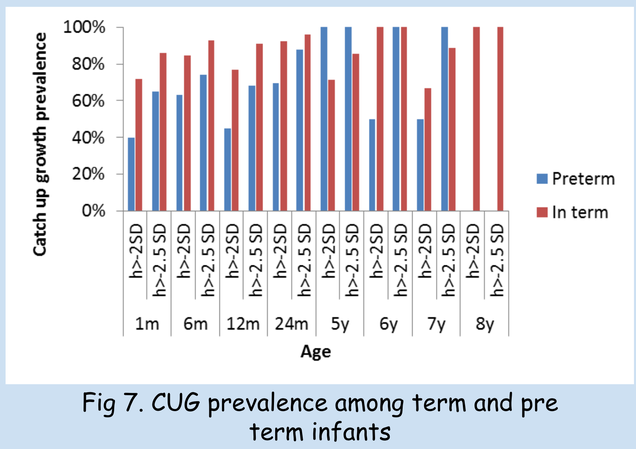

Fig 7. CUG prevalence among term and pre term infants

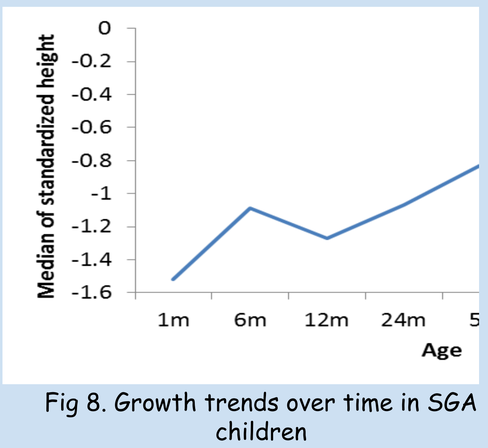

Fig 8. Growth trends over time in SGA children

Conclusions

- The actual number of SGA newborns is nearly half of the expected according to the current WHO/NUPD criteria- only 1.2%.
- The incidence of infantile CUG in SGA infants reaches 95.7%, significantly higher than in previously reported series.
- This study redefines the incidence and the growth pattern of SGA children and should influence the postnatal preventive care practices and complications management of this high risk population.
- Given the impact of our data on health cost planning and GH requirements in SGA babies, it is recommended that similar large European and American cohorts will be conducted to re-determine the incidence of SGA births, catch up growth and standard deviations amplitudes.

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