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Rapid BMI gain during later infant accelerates skeletal maturationat prepubertal obese children

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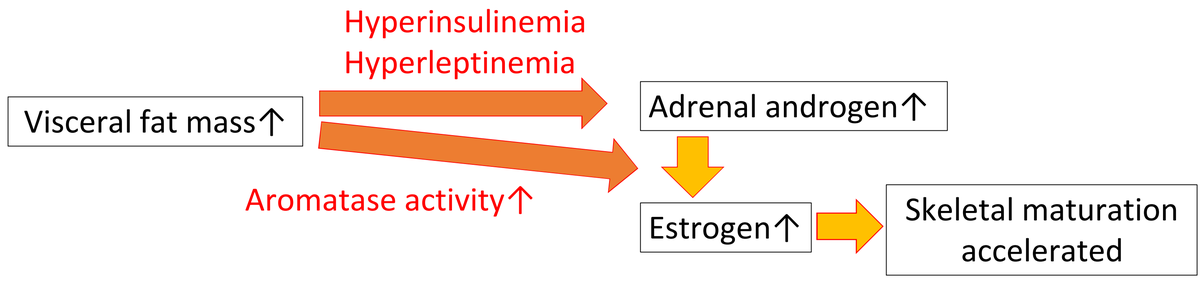
INTRODUCTION & OBJECTIVES

The aim of this study was to reveal the increase of BMI during later infant related with skeletal maturation in prepubertal obese boys.



SUBJECTS and METHODS

Subjects: 63 Japanese 10-years old obese boys

Measurements: Height, weight, BMI, Bone age (BA)

BA of left hand-wrist radiographs was assessed using RUS score of the Japanese-standardized Tanner-Whitehouse 2 method.

Weight and length or height at birth, 1.5, 3 and 6 year old were obtained from maternal and child health handbook or school health check-up card.

Statistical analysis (JMP 9.0.0):

1) Regression analysis between relative BA and BMI or ΔBMI
   Dependent variables: relative BA
   Simple liner regression: independent variables : BMI or ΔBMI
   Multiple liner regression: independent variables : Model 1 or 2
2) Logistics regression analysis: Odd's ratio of relative BA ≥ 2 yo

Model 1	BMI	BMI (birth)	BMI (1.5yrs)	BMI (3yrs)	BMI (6yrs)	BMI (10yrs)
Model 2	ΔBMI		ΔBMI (1.5 to 3 yrs)	ΔBMI (3 to 6 yrs)	ΔBMI (6 to10yrs)	

RESULTS 1

The profiles of the subjects

	Mean	±	SD	Min	Median	Max
Chronological age yo	10.1	±	0.3	9.6	10.2	10.5
Bone age yo	11.8	±	1.4	7.7	12.1	14.1
Relative bone age yo	1.7	±	1.3	-1.9	2.0	3.7
BH cm	141.4	±	6.2	122.4	142.3	153.1
BW kg	51.6	±	6.3	38.1	51.2	64.6
BH SD score	1.00	±	1.03	-1.96	1.10	3.18
Relative weight %	47.1	±	12.9	29.8	44.3	92.6
Birth weight kg	3284	±	445	2360	3228	4324
BMI (birth)	13.2	±	1.4	10.8	13.0	16.9
BMI (1.5 yo)	17.0	±	1.4	14.2	17.1	21.1
BMI (3 yo)	17.5	±	2.1	14.2	17.1	25.4
BMI (6 yo)	20.4	±	3.0	15.6	20.2	29.3
BMI (10 yo)	25.8	±	2.1	22.7	25.2	32.6
ΔBMI (1.5 to 3 yo)	0.4	±	1.7	-2.2	0.1	6.4
ΔBMI(3 to 6 yo)	3.0	±	2.4	-2.5	2.8	7.7
ΔBMI(6 to 10 yo)	5.3	±	2.3	0.0	5.3	9.9

Relative bone age =Bone age - Chronological age

RESULTS 2

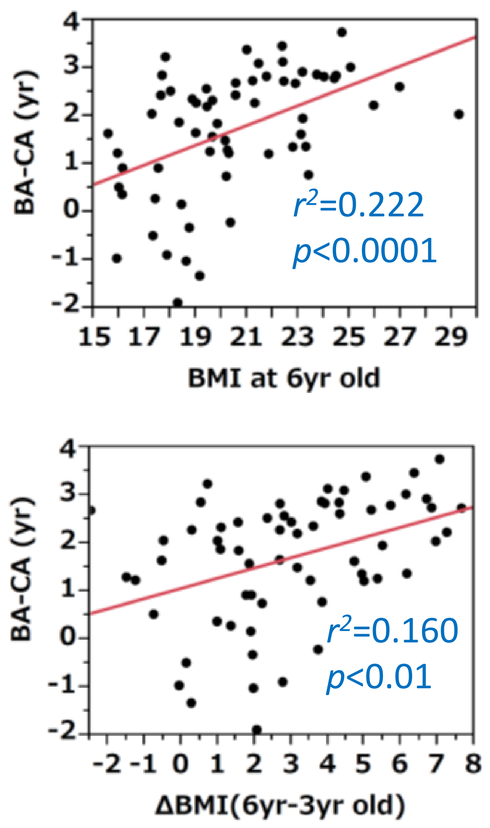
The results of the simple and multiple linear regression analyses of relationship between relative BA and BMI at each age

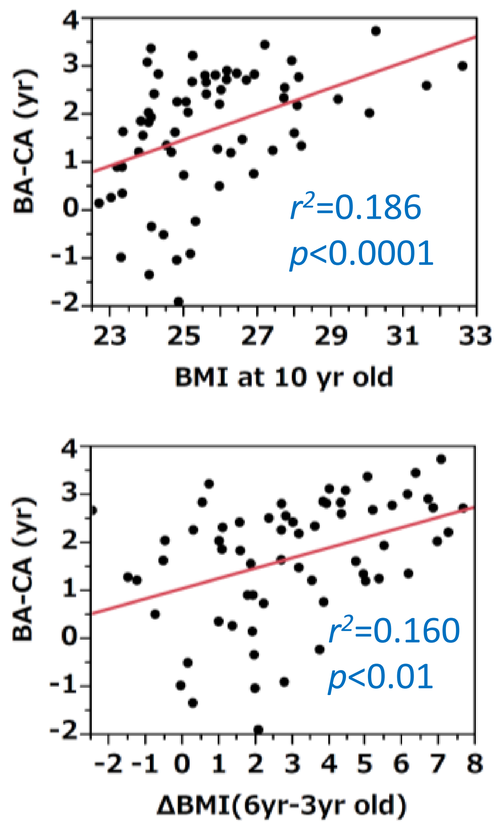
	Simple regression		Multiple regression (model 1)		
Independent variables	r^2	*p*	*slope*	*p*	R^2
BMI (birth)	0.017	0.3032	0.049	0.674	
BMI (1.5 yo)	0.001	0.8052	-0.174	0.215	
BMI (3 yo)	0.047	0.0873	0.019	0.858	0.275
BMI (6 yo)	0.223	<0.0001	0.171	0.027	
BMI (10 yo)	0.186	0.0004	0.102	0.309	

The results of the simple and multiple linear regression analyses of relationship between relative BA and ΔBMI at each period

	Simple regression		Multiple regression (model 2)		
Independent variables	r^2	*p*	*slope*	*p*	R^2
ΔBMI (1.5 to 3yo)	0.087	0.019	0.263	0.007	
ΔBMI (3 to 6yo)	0.156	0.001	0.246	0.001	0.257
ΔBMI (6 to 10yo)	0.049	0.081	0.062	0.442	

The scatter graphs of the relationship between relative BA and BMI or ΔBMI



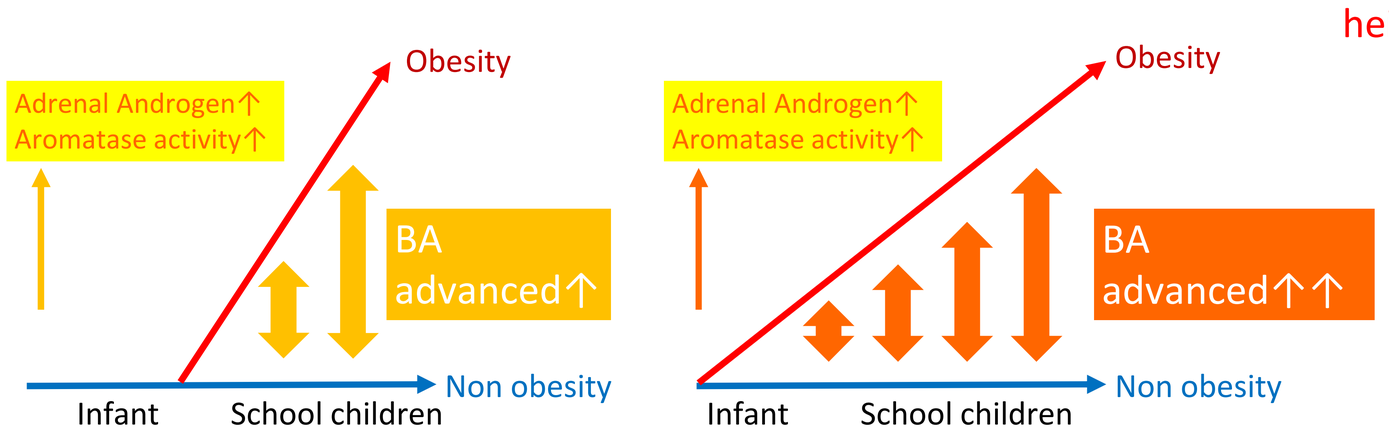


Odd's ratio of relative bone age over 2 yo using logistics regression analysis

	Logistics regression analysis				Multiple logistics regression analysis			
Independent variables	OR	95% CI	R^2	*p*	OR	95% CI	R^2	*p*
ΔBMI (1.5 to 3 yo) ≥0	1.61	(1.07-2.44)	0.0089	0.0213	1.47	(0.95-2.30)		
ΔBMI (3 to 6 yo) ≥2	2.18	(1.46-3.29)	0.0248	0.0001	1.99	(1.18-3.40)	0.0313	0.0003
BMI (6 yo) ≥20.0	1.94	(1.28-2.96)	0.0171	0.0014	1.10	(0.61-1.95)		

DISCUSSION

Bone age advanced in childhood obesity would be related to duration and grade of obesity which associates the increase of androgen and activated aromatase activity.



CONCLUSION

Rapid BMI gain and high BMI at later infant period accelerates skeletal maturation in prepubertal obese children. This disorders of bone growth are irreversible and will lead to suboptimal final height and will affect their quality of life.

57 th ESPE 2018 Meeting
Disclosure of head presenter's COI
Name of head presenter, Toru Kikuchi
In connection with the presentation,
I disclose COI with the following companies/organizations
Honoraria for lectures: Sanofi k.k., Novo Nordisk A/K