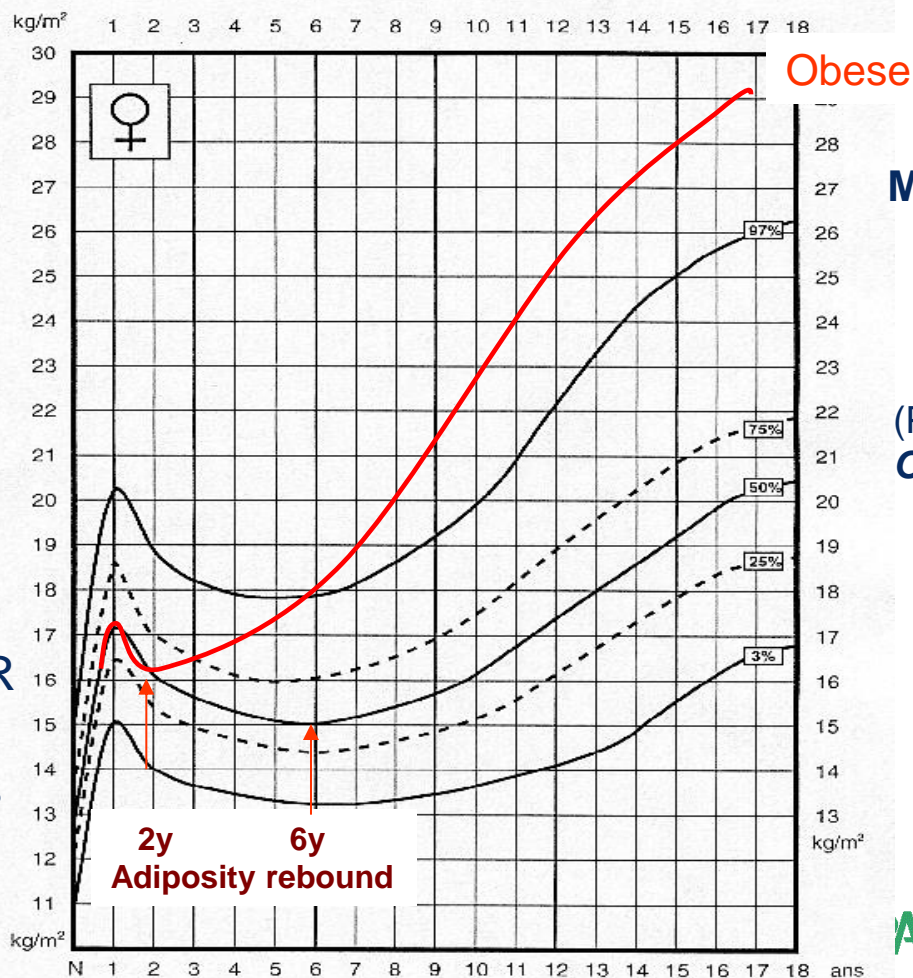


Critical period of development:

«Early Programming »

“1000 day from conception to 24 monthss”

Report of the Standing Committee on Nutrition **WHO 2006**



Very early AR
= very early
determinants

Mean age at Adiposity rebound
= 2yrs in the obese
compared to 6 yrs
in average populations

(Péneau, Thibault, Rolland-Cachera,
Obesity, 2009)

Time trends in nutritional intakes in children

Country	Date	Age	Nutritional intakes				References
			Energy	Proteins	Fat	CHO	
England	1967 - 1993	1.5-2.5	↓	↑	↓	↔	Gregory et coll., 1995
France	1973 - 1986	2		↑	↓	↔	Deheeger et coll.,
USA NHANES I	1974 - 1994	2-5			↓		Troiano et coll., 2000
USA	1977 - 1987	3-5	↓		↓		Schlicker et coll., 1994
England	1950 - 1993	4	↓	↔	↓	↑	Prynne et coll., 1999
USA	1977 - 1987	6-11	↓		↓		Schlicker et coll., 1994
Sweden	1967 - 1981	8				↓	Sunnegardh et coll., 1986
France	1978 - 1995	10	↓	↑	↓	↔	Rolland-Cachera et coll 1996
USA Bogalusa	1973 - 1988	10	↔	↑	↓	↑	Nicklas et coll., 1993
Finland	1970 - 1980	13-18	↓	↑	↓	↔	Räsänen et coll., 1985
USA GB Australia	1930 - 1978	0,5-18	↓				Whitehead et coll., 1982
USA	1977 - 1987	12-19	↓		↓		Schlicker et coll., 1994

Nutritional intakes in early life

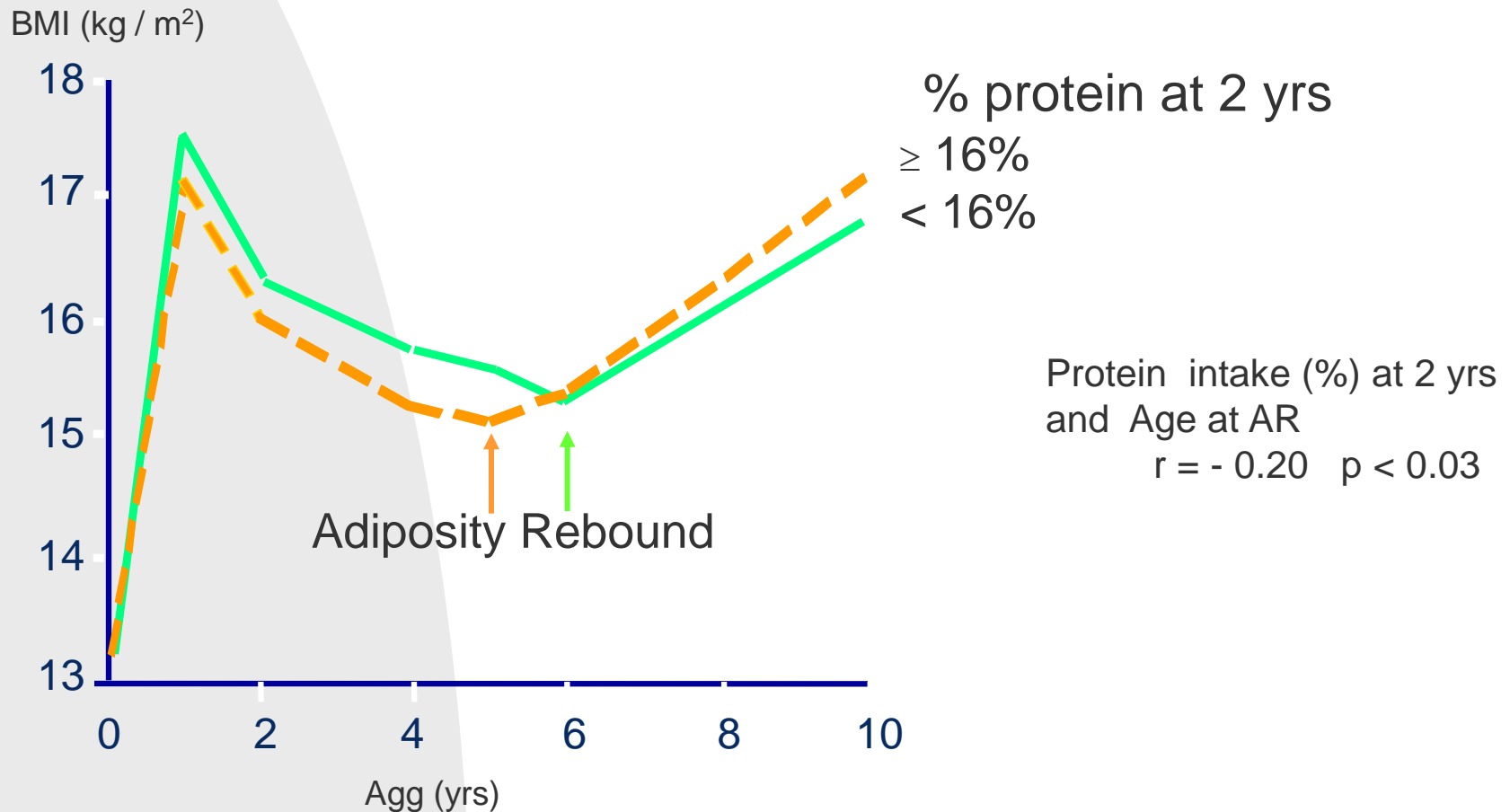
Protein intake was high and fat intake was low in 9-12y old children

	Age Months	Intakes			Sources
		Protein g/kg/day	Fat % energy	CHO % energy	
Human milk					
Protein needs	9-12	1.15	6	52	42 DHSS, 1977 WHO, FAO, UNU
Countries					
Belgium	12-36	3.8	15.8	29.2	55 Monzin MJ
Denmark	12	3.3	15.0	28.0	57 Michaelsen KF
France	10-12	3.8	16.0	28.0	56 Boggio et al.
Italy	12	5.1	19.5	30.5	50 Bellù et al.
Spain	9	4.4	15.7	26.4	57.9 Capdevilla et al.
The Netherlands	16	3.7	16.8	28.5	54.7 Hoffmans et al.
Average intake		4g/kg/d	16%	28%	56%

(Rolland-Cachera et al, *Acta Paediatr*, 1999)



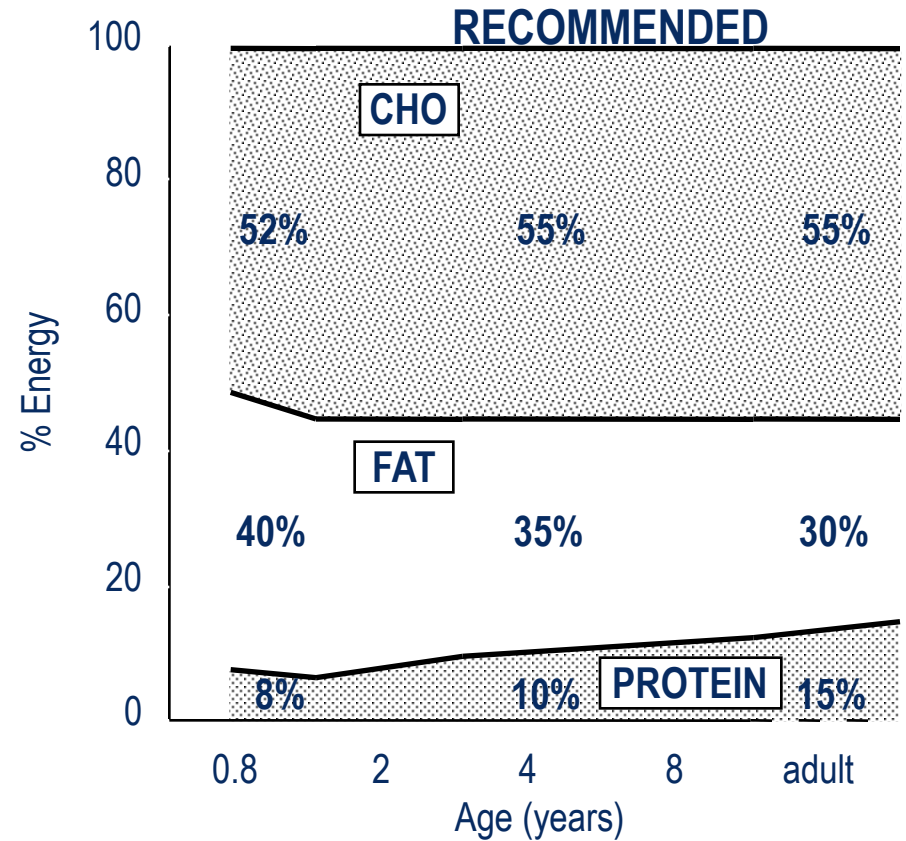
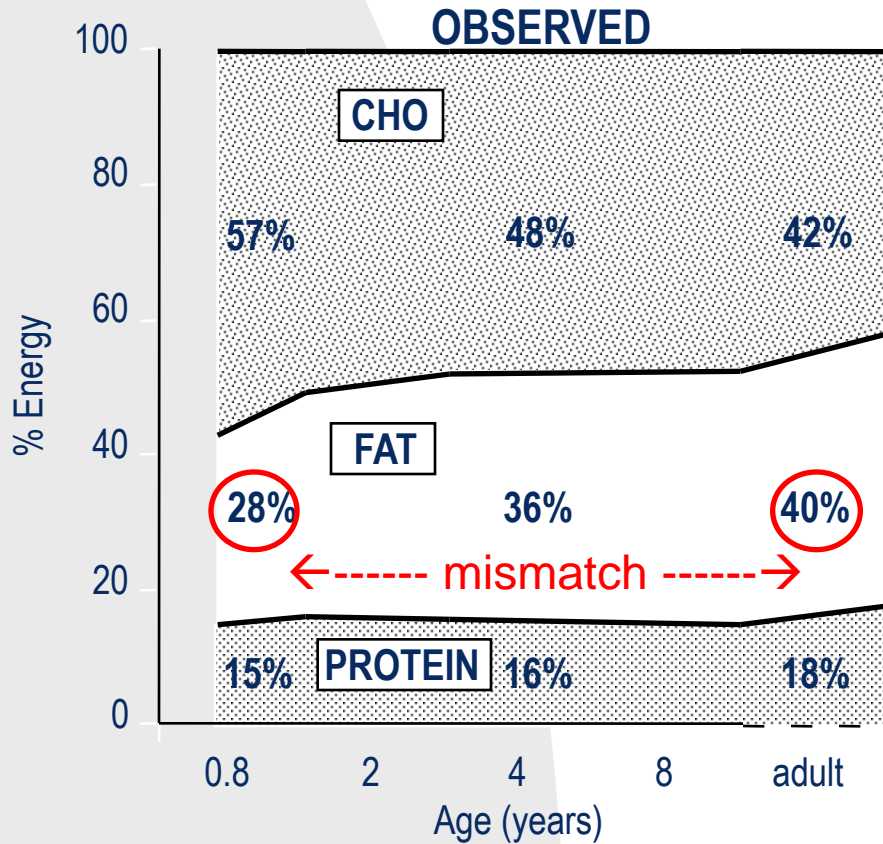
BMI pattern according to protein intake at 2 years



(after Rolland-Cachera et al., *Int. J. Obes.*, 1995)



Nutritional intakes according to age



(Rolland-Cachera et al., Nestlé Workshop, China, 2002)

Metabolic programming of early nutrition

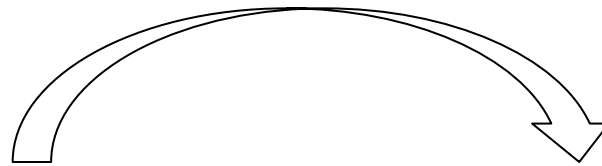
(Hypothesis)

Early intakes

High protein intake
↑Igf1



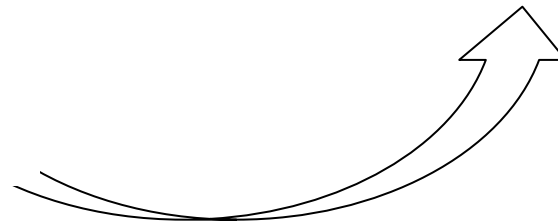
Rapid growth, early adiposity rebound « short term effects »



Impact on adult health

Fat restriction
↓Leptin

(metabolic adaptation > ↑increased susceptibility to high fat intakes)



↑Body Fat and leptin (résistance)
« long term effects »

0 2 yrs 8 yrs

Adult age

Plasticity
(low fat intakes)

« Mismatch »

Inadequate response to new challenge
(high fat intakes)