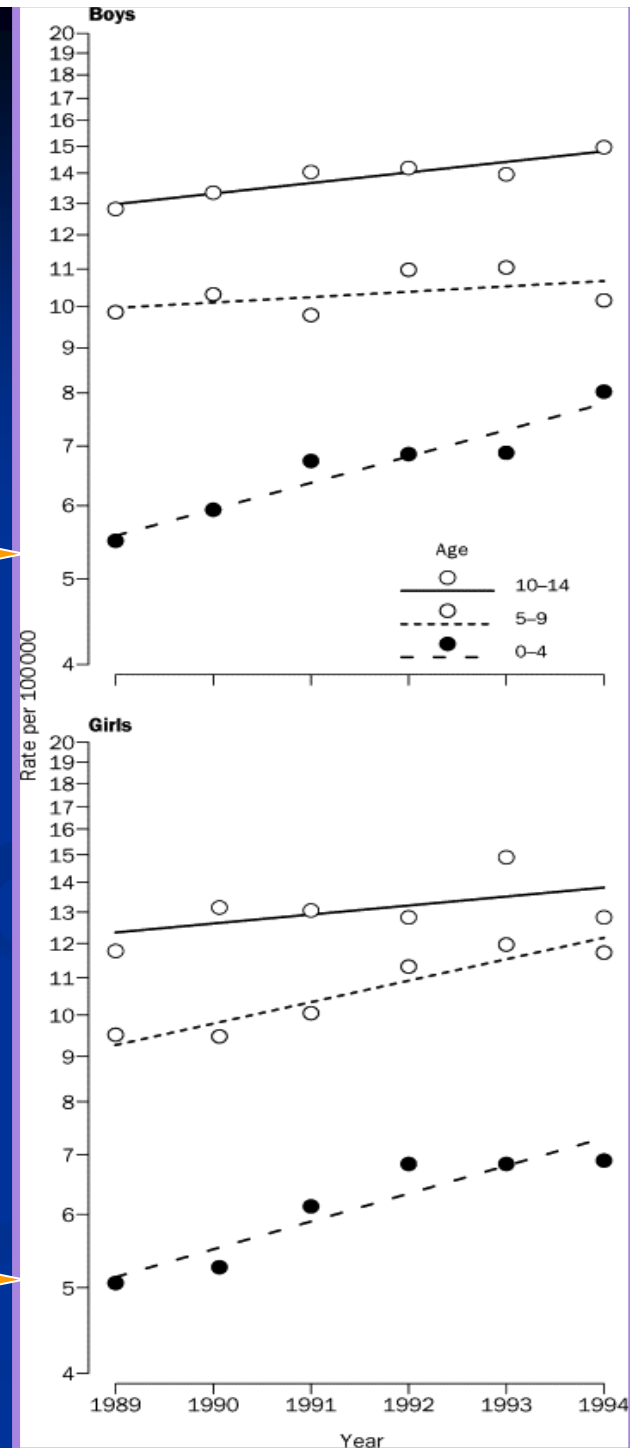


Weight gain in early life predicts islet autoimmunity in children with a first degree relative with type 1 diabetes

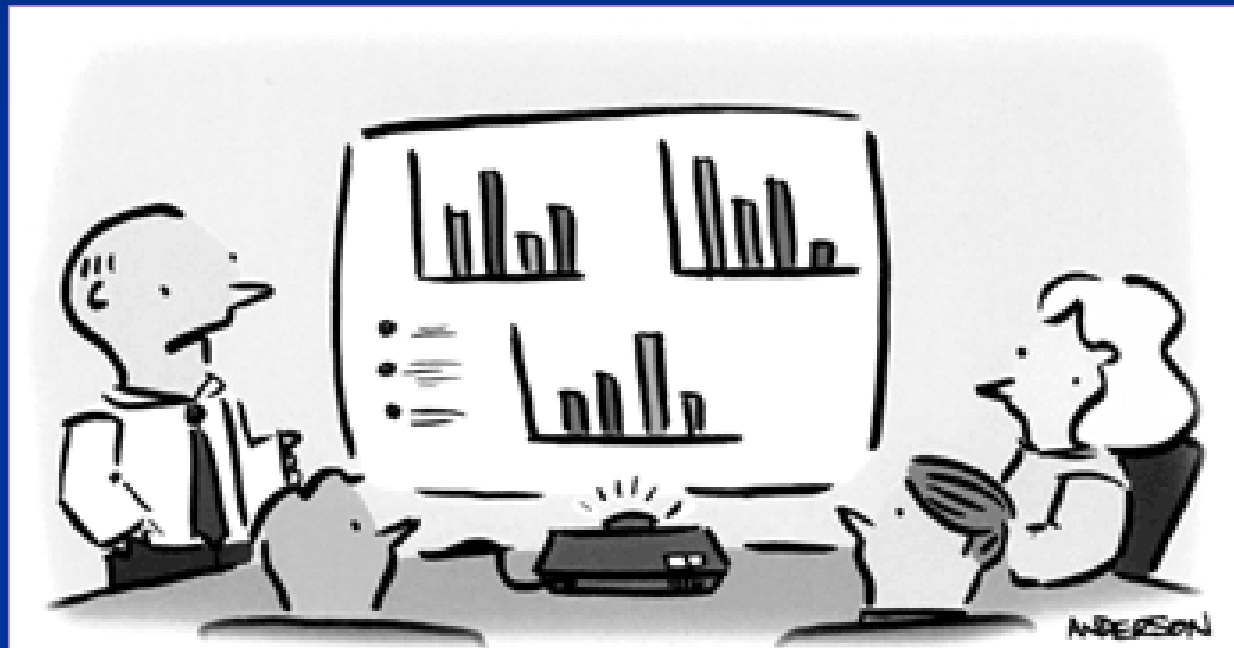
Jennifer Couper, Sarah Beresford,
Craig Hirte, Angie Pollard, Peter Baghurst,
Brain Tait, Leonard Harrison, Peter Colman.

Increasing incidence of type 1 diabetes

EURODIAB ACE Study Group 2000



Is increased weight of the population driving increases in both type 1 and type 2 diabetes?



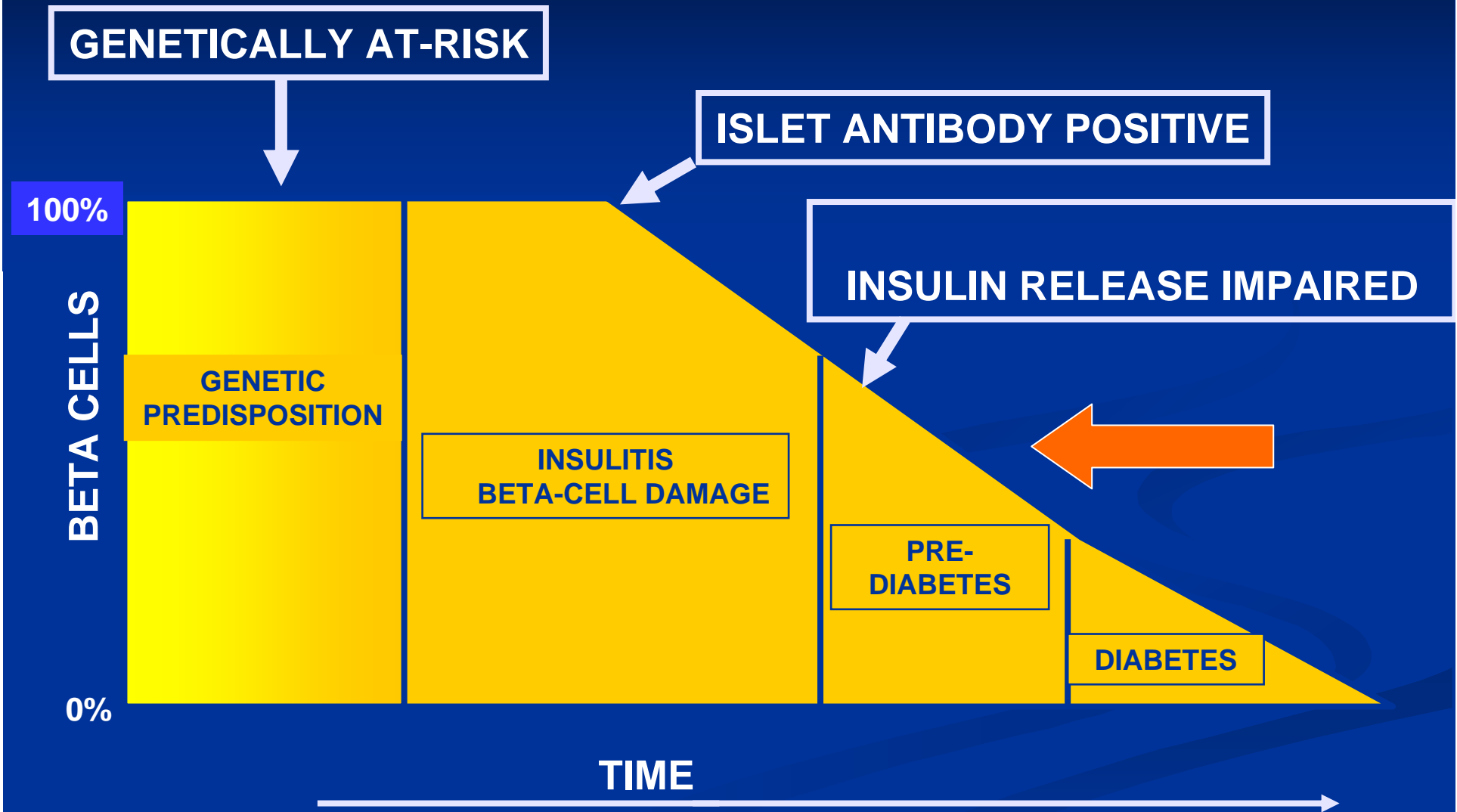
"Finally, to help those of us counting carbs, we've moved to bar graphs instead of pie charts."

Accelerator hypothesis

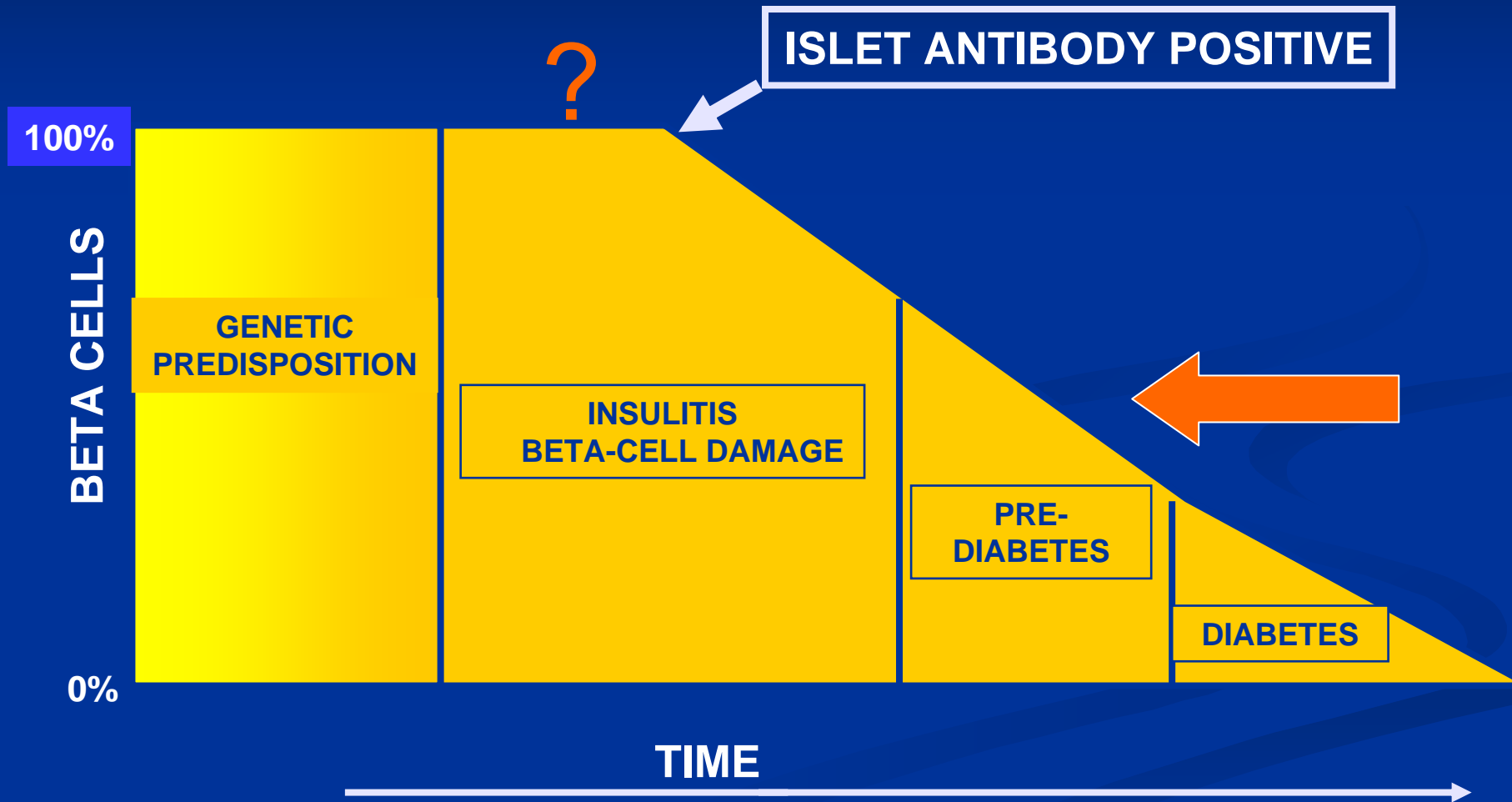
weight gain as the missing link between
type 1 and type 2 diabetes

- Weight gain and Insulin resistance accelerate loss of beta cells in both type 1 and type 2 diabetes

Progression to Type 1 Diabetes

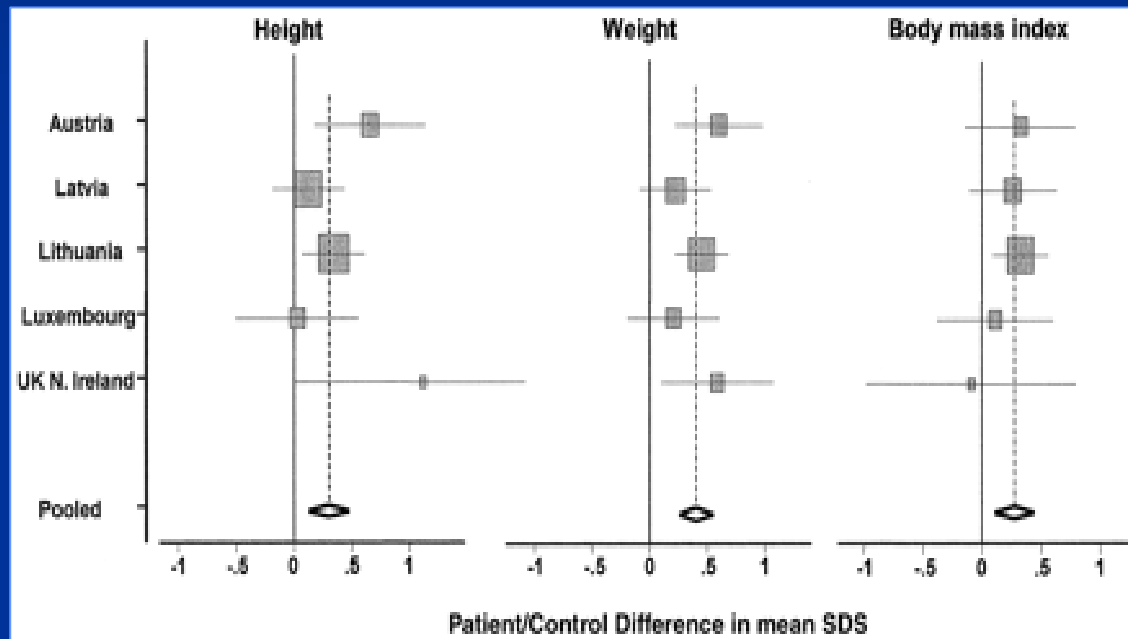


Progression to Type 1 Diabetes



Fourlanos S 2004, Knerr I 2005, Sosenko J 2008

Children with type 1 diabetes are heavier in infancy : retrospective case control studies



EURODIAB Study Group Diabetes Care 2002

Birth Cohort Studies

Australian Baby Diab

BABYDIAB (Germany)

DAISY (Colorado, US)

TEDDY

TRIGR

Putative dietary influences on development of type 1 diabetes



Norris JAMA 2003, 2007
Ziegler JAMA 2003,
Kimpimaki T 2001

Australian Baby Diab Study

- To determine the influence of infant feeding and growth on the development of islet autoimmunity in children with a first degree relative with Type 1 diabetes
- Does infant feeding or growth predict risk of islet autoimmunity?

Recruitment during pregnancy

Follow up from birth 6 monthly

- Length/height and weight
- Diet diary recorded prospectively at home
- No systematic feeding advice
- Islet antibodies (GAD, IA2, insulin)
- Transglutaminase antibodies
- HLA genotype on cord blood

Primary outcome measure

- Islet autoimmunity defined as persistent elevation of one or more islet antibodies on consecutive 6 monthly tests including last measure

Statistics

- Parametric survival models to calculate hazard ratios accounting for inconsistent length of followup
- 4598 weight and height (length) measurements in 548 subjects converted to z scores
- Risk of weight z and BMI z controlled for HLA type and birth weight confounders

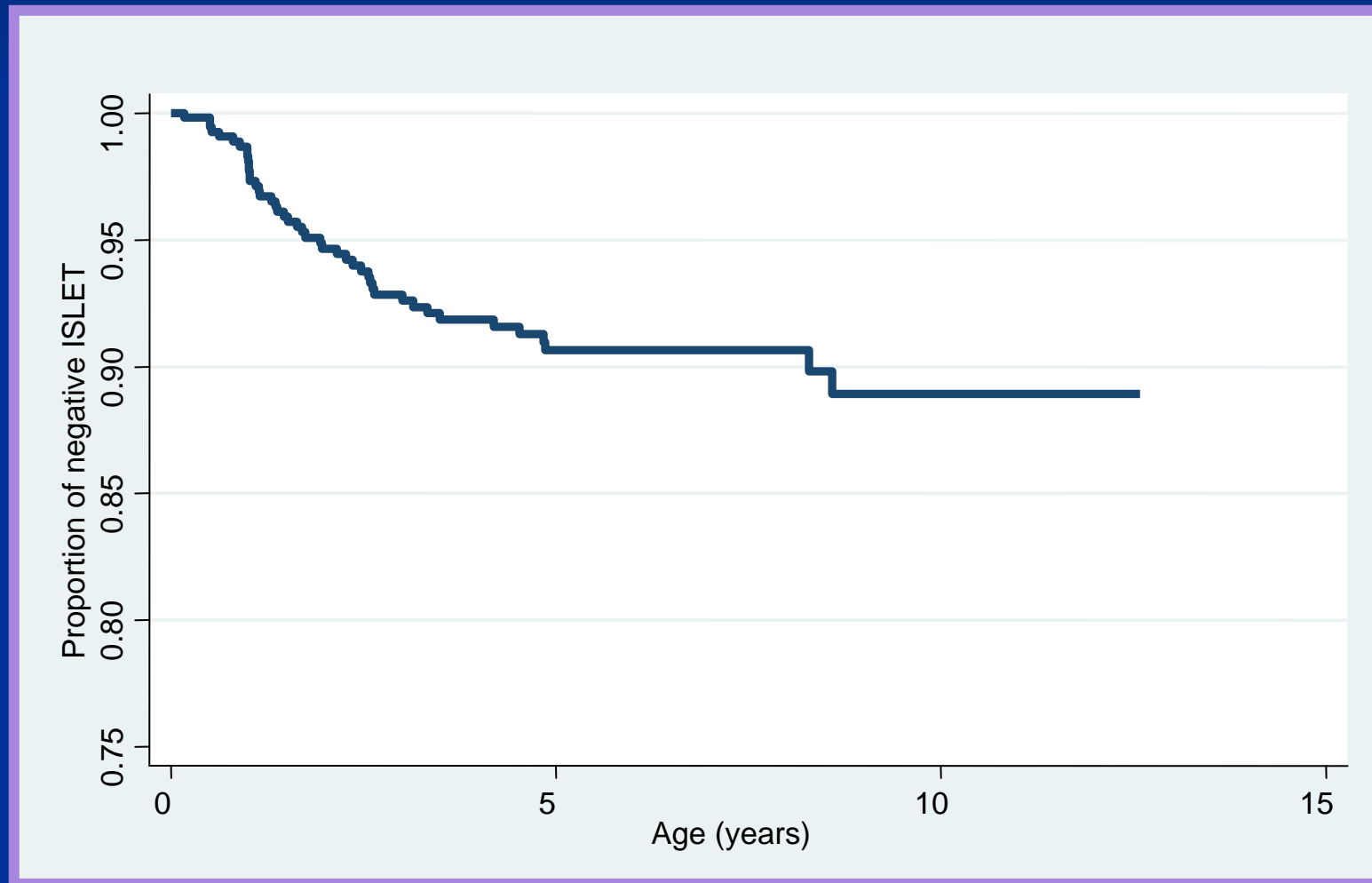
Birth cohort followed over 5.7 (2.2) years

548 infants with first degree relative with T1DM

46 developed persistent islet autoimmunity

12 developed T1DM

Development of Islet Autoimmunity



Subject characteristics

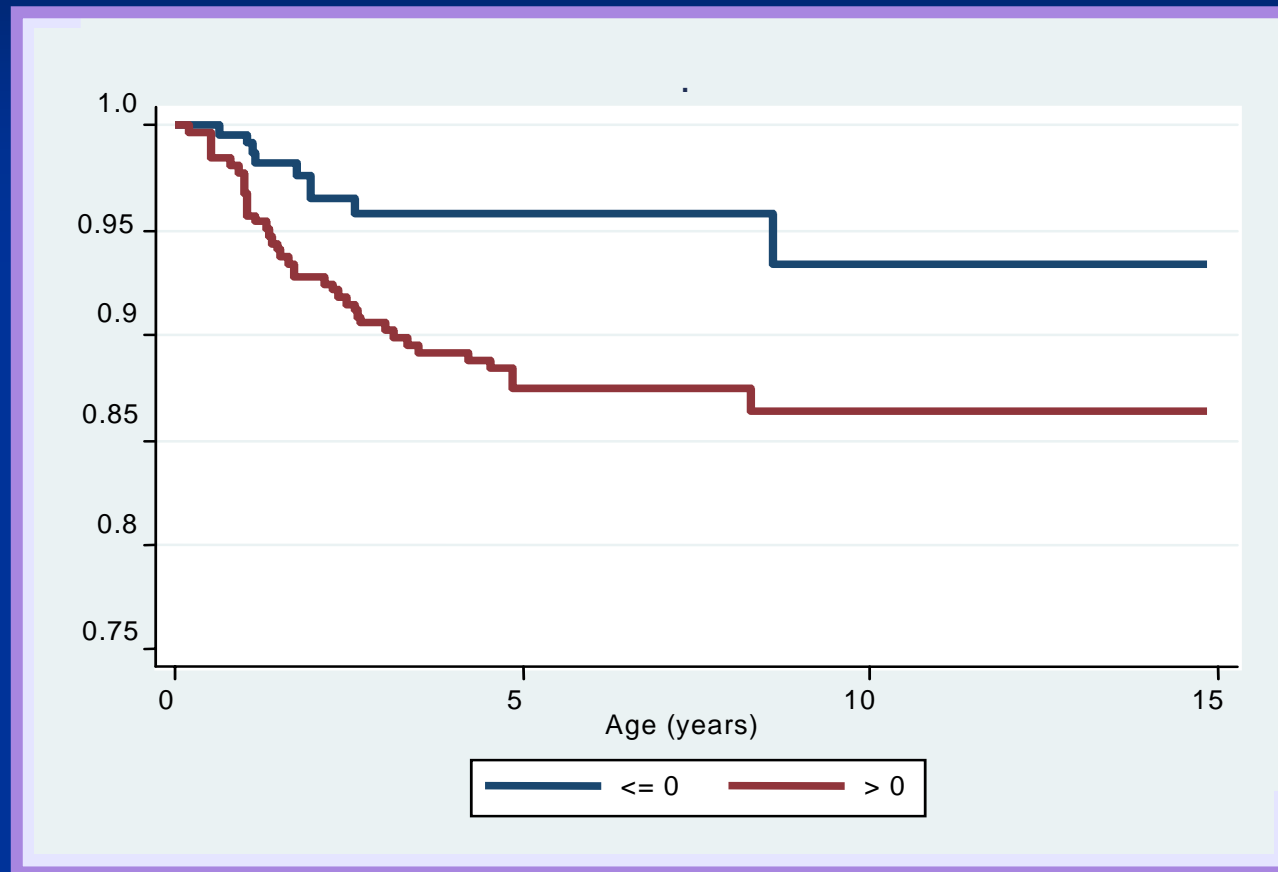
	Islet autoimmune	Not islet autoimmune	p
n	46	502	
Age (years)	2.2(1.7)	5.8 (3.2)	
Weight z : 2 years	0.8	0.3	0.02
BMI z: 2 years	0.9	0.4	0.02
HLA DR 3,4	35%	10%	0.001

No difference in birth weight or gestation

No difference in feeding history

- Breast feeding duration (exclusive and total)
- Introduction of cows milk (infant formulae, solids, cows milk)
- Introduction of cereals (gluten or non gluten)
- Introduction of fruits, vegetables, meats

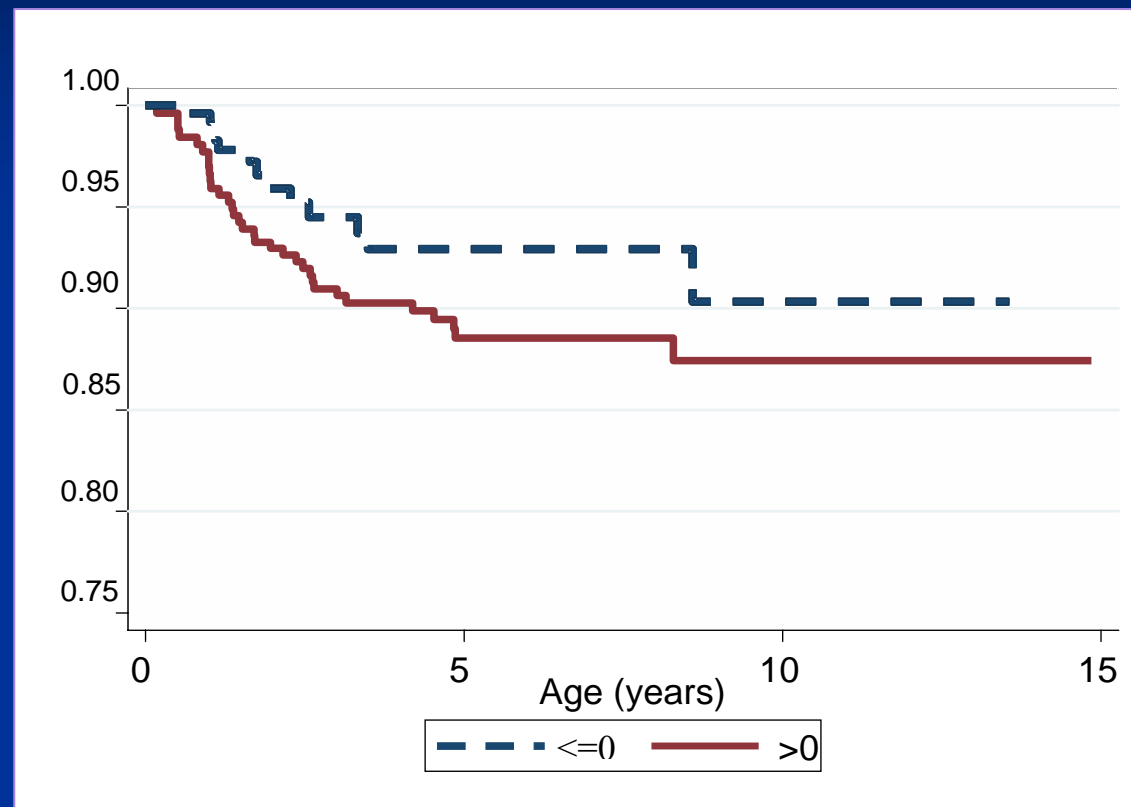
Development of Islet Autoimmunity



2.8 times greater risk when weight z above 0

($\chi^2(1) = 7.5, p=0.006$)

Development of Islet Autoimmunity



1.7 times greater risk when BMI z above 0
($\chi^2(1) = 2.7, p=0.09$)

Risk of islet autoimmunity: parametric survival model

Risk factor	Adjusted Hazards Ratio (95 th CI)	p
Weight z	1.44 (1.12-1.87)	0.004
Weight z at 2 years	1.38 (1.05-1.83)	0.02
Change in weight z : birth to 2 years	1.28 (1.04-1.59)	0.02
BMI z	1.31 (1.02-1.68)	0.03
BMI z at 2 years	1.42 (1.06-1.89)	0.02

No effect on risk of islet autoimmunity: parametric survival model

- Age of introduction of gluten
- Age of introduction of non gluten cereals
- Duration of exclusive breast feeding
- Total duration of breast feeding
- Age of introduction of cows milk protein
- Age of introduction of fruits, vegetables, meats

Risk of islet autoimmunity related to

- Weight z and BMI z over time
- Weight z and BMI z at 2 years
- Change in weight z from birth to 2 years

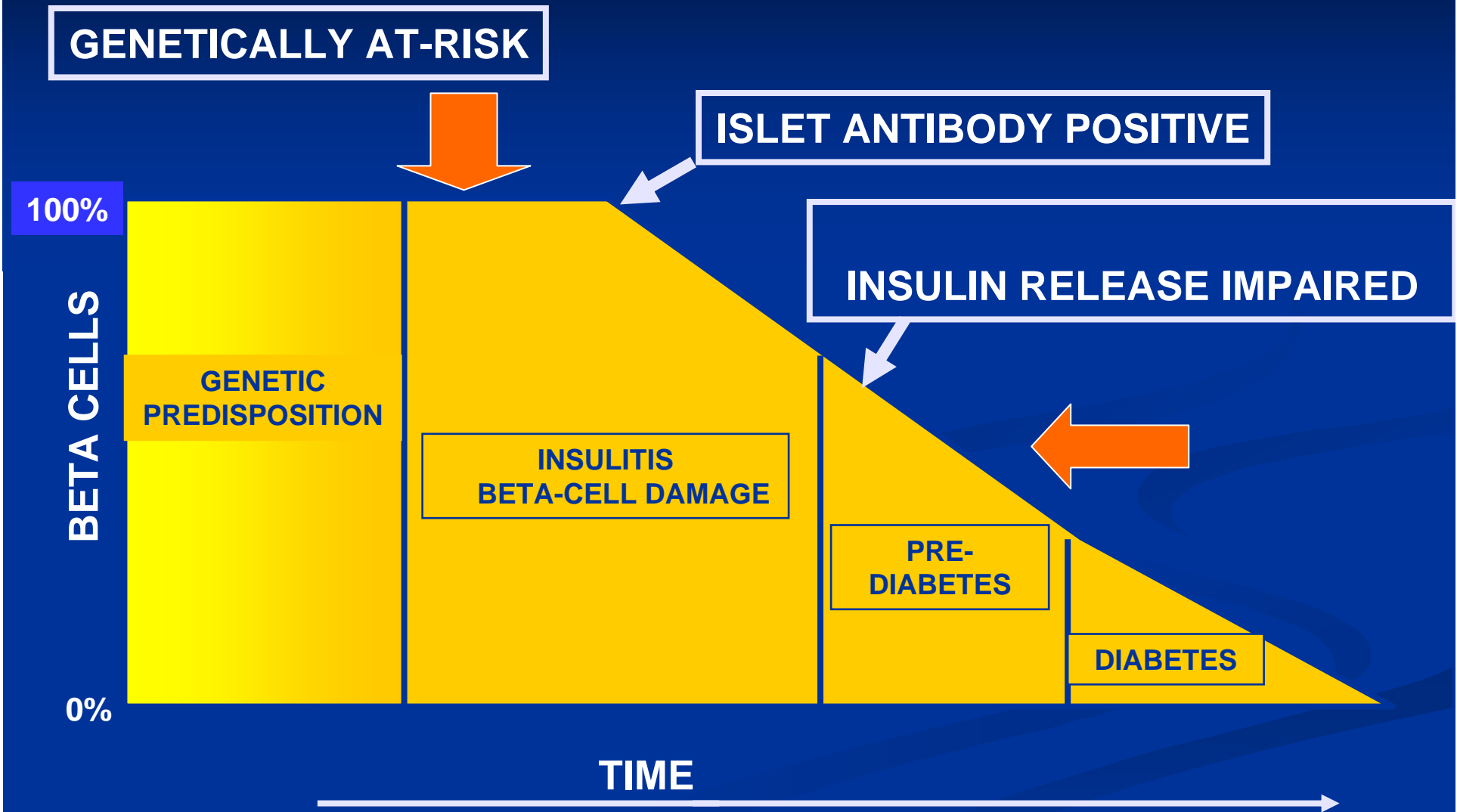
BUT NOT TO :

- Introduction of cereals
- Introduction of meat, fruit or vegetables
- Introduction of cows milk protein
- Duration of breast feeding

CONCLUSION

- Early weight gain from birth independently predicts risk of islet autoimmunity in children at risk of type 1 diabetes
- Early infant feeding does not contribute to risk

Progression to Type 1 Diabetes



Australian Baby Diab Study

- Sarah Beresford
- Craig Hirte
- Angie Pollard
- Tania Kelly
- Peter Baghurst



- Peter Colman
- Cheryl Steele
- Shane Gellert
- Brian Tait
- Len Harrison

