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ISSN: 2167-7182

Journal of Gerontology & Geriatric Research

Review in 3 weeks

Publishing in 72 hours

Open Access



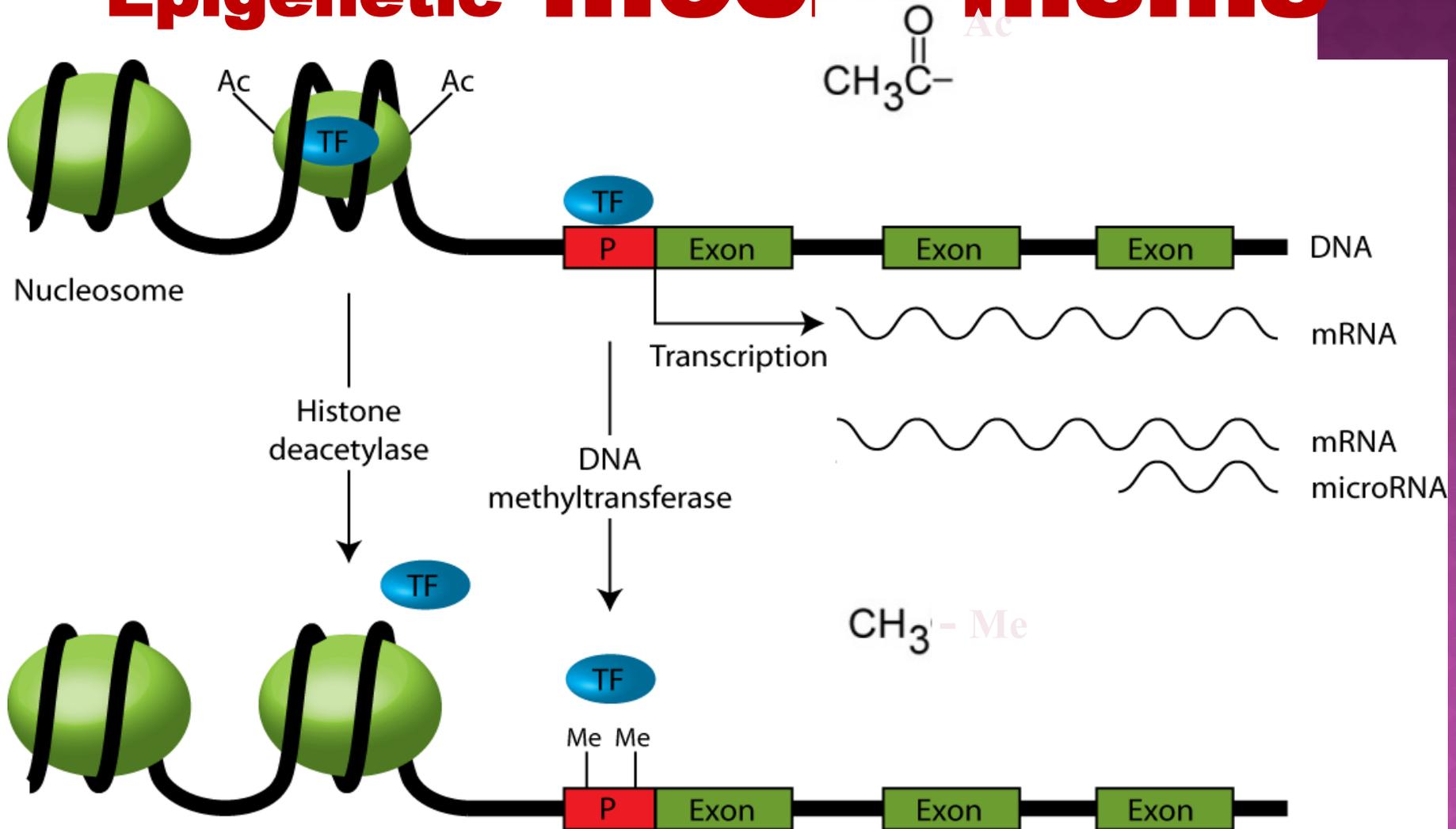
# EPIGENETICS

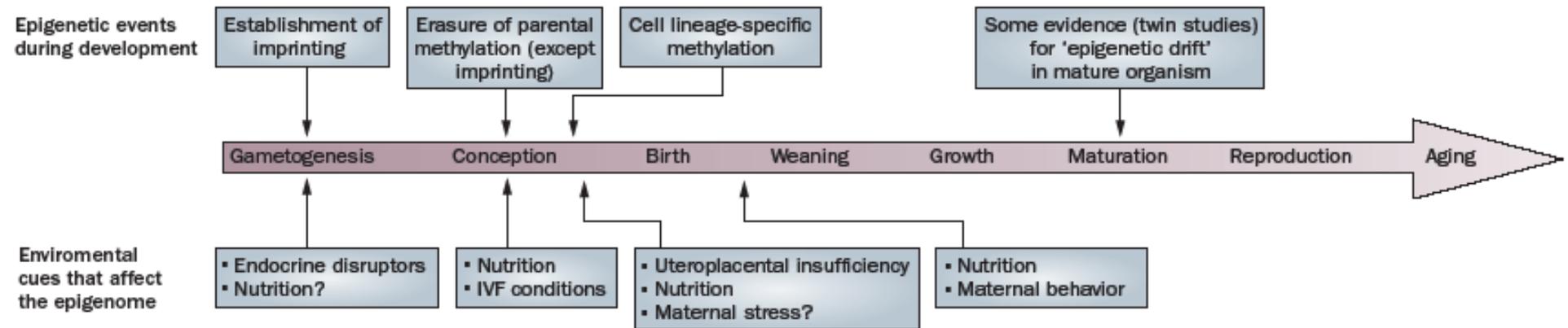
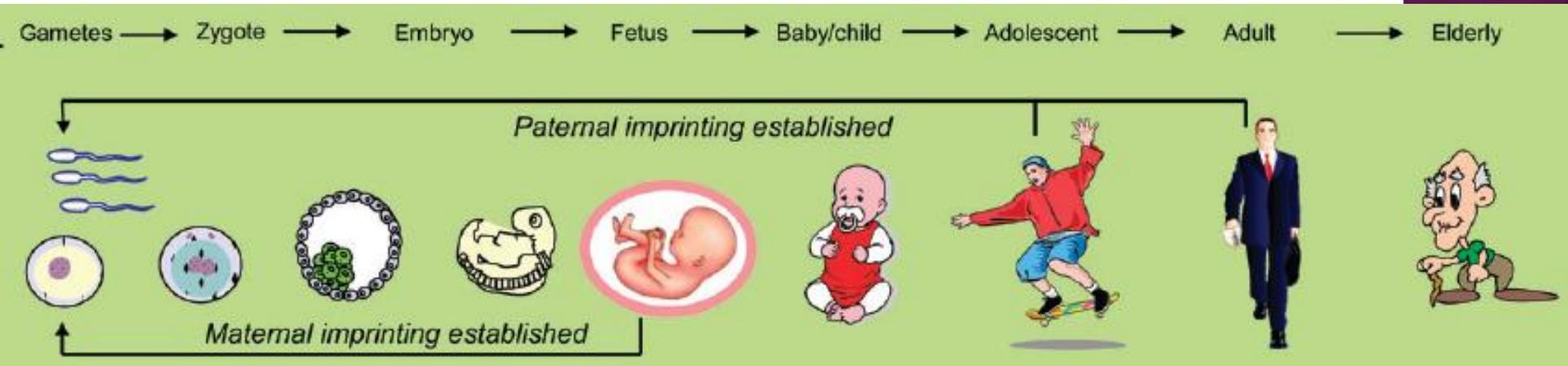
**‘the study of mitotically and/or meiotically heritable changes in gene function that cannot be explained by changes in DNA sequence’**

**Adrian Bird (2007)**



# Epigenetic mechanisms







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# **Disease:** **a price of adaptation?**



## Predictive Adaptive Response (PAR) hypothesis

*The epigenetic adaptation processes implying alterations of gene expression to buffer the organism against environmental changes support adaptability to the expected life-course conditions.*

*Gluckman and Hanson, 2004*



### EXAMPLE: MEADOW VOLE

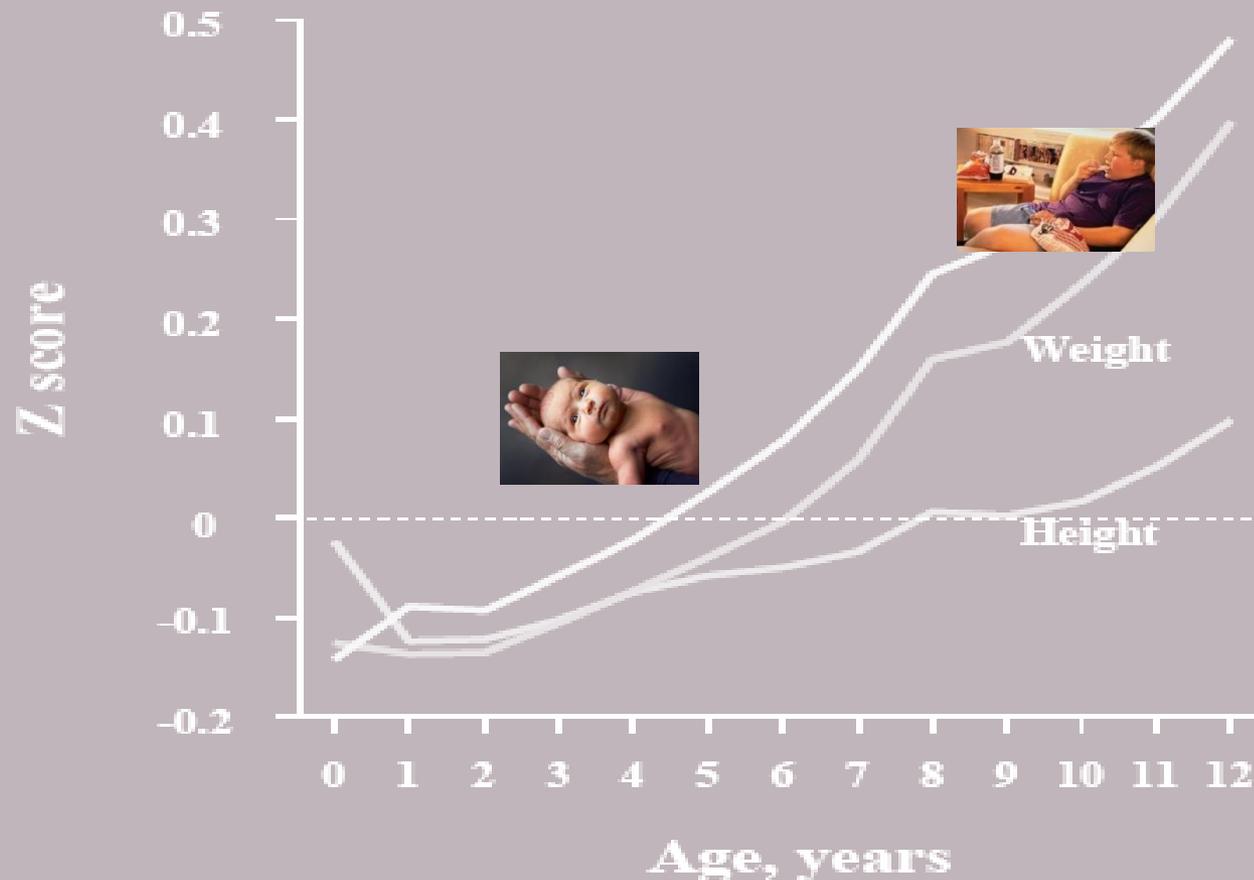
*spring-born offspring –  
thin coat*

*autumn-born offspring –  
thick coat*



## Catch-up growth and adult-onset metabolic disease

Childhood growth of 290 men and women with Type 2 diabetes from a cohort of 8760, Helsinki, Finland





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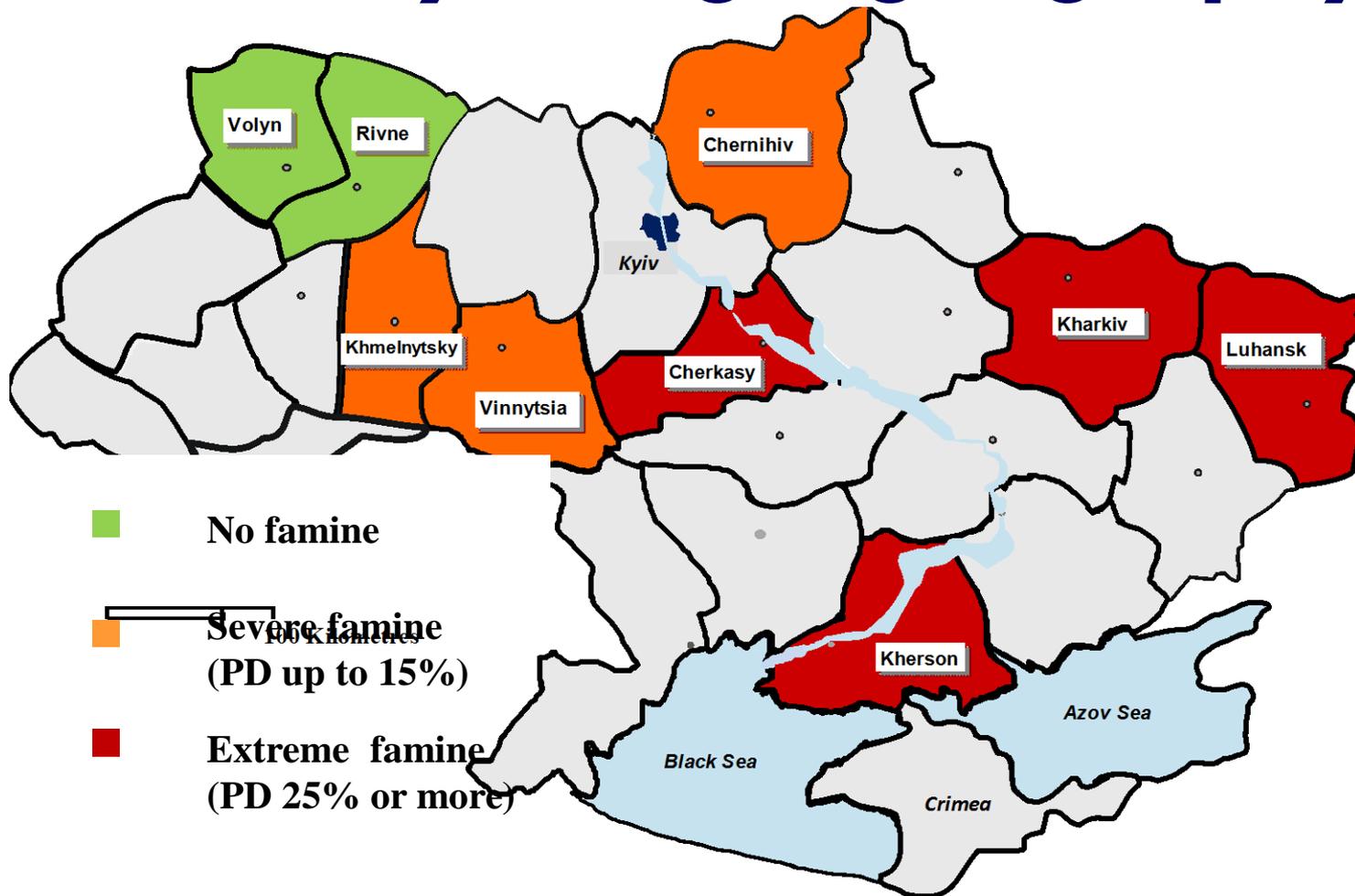
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## **Type 2 diabetes in cohorts exposed to the Ukraine famine of 1932-33 in early life**



## Study design: geography

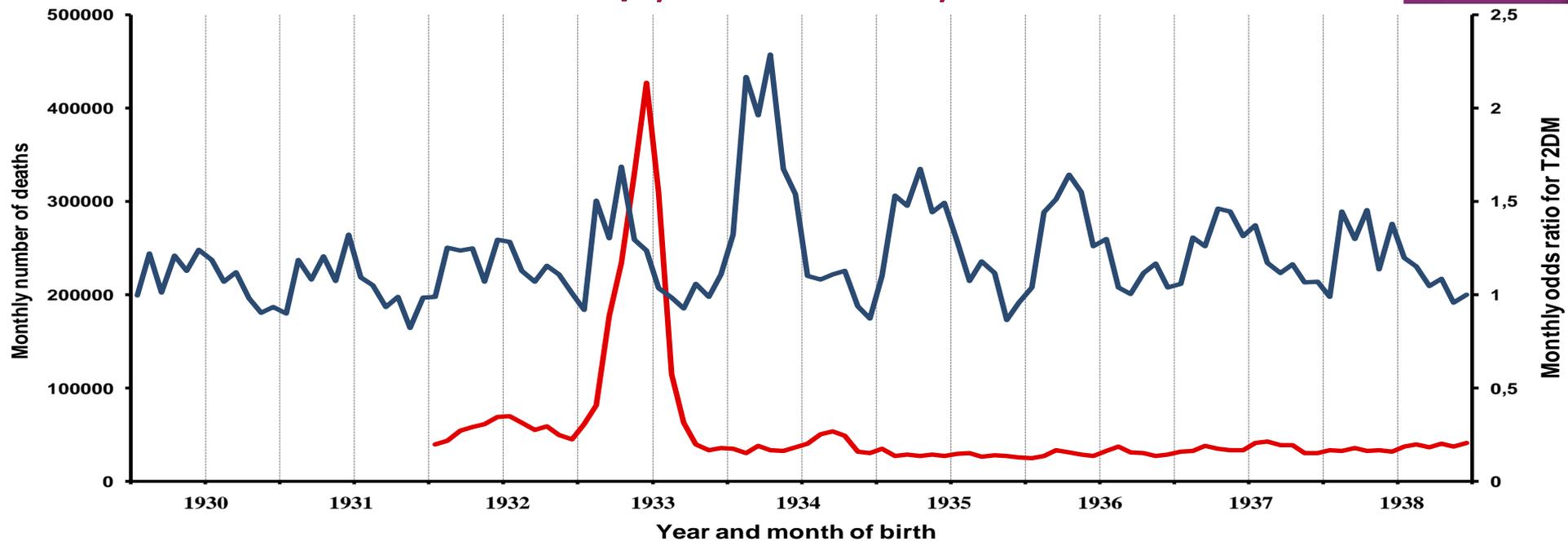




## TYPE 2 DIABETES ODDS RATIO'S UKRAINE, ALL REGIONS COMBINED RELATIVE TO BIRTHS IN DECEMBER, 1938

**PREVALENT CASES, 2000-2008**

**IN RELATION TO MONTHLY DEATHS/1,000 POPULATION, 1932-1938**





## Conclusions

1. *In utero* exposure to Ukraine famine led to an increased risk of type 2 diabetes in adulthood.
2. The highest risk was seen in those persons who were exposed to the famine periconceptionally.
3. It suggests an epigenetic basis for this long-term programming effect.



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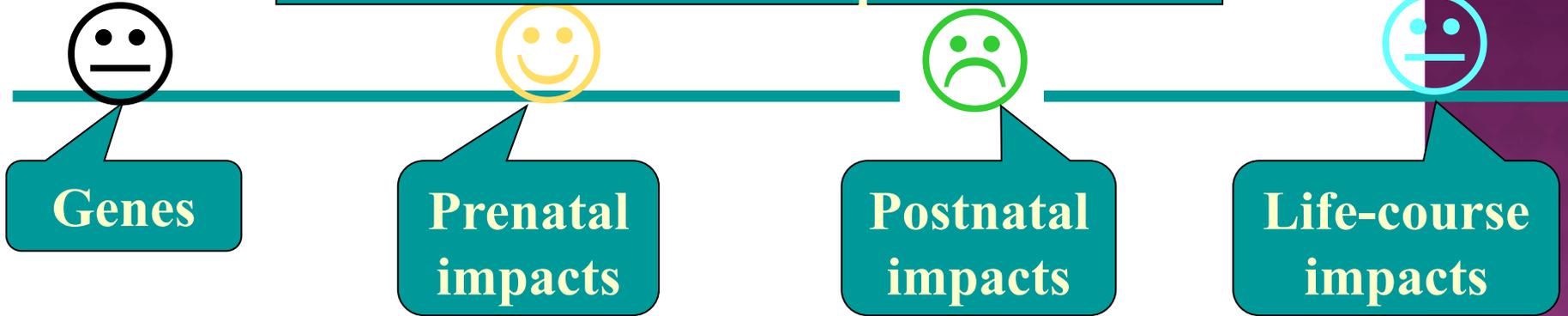
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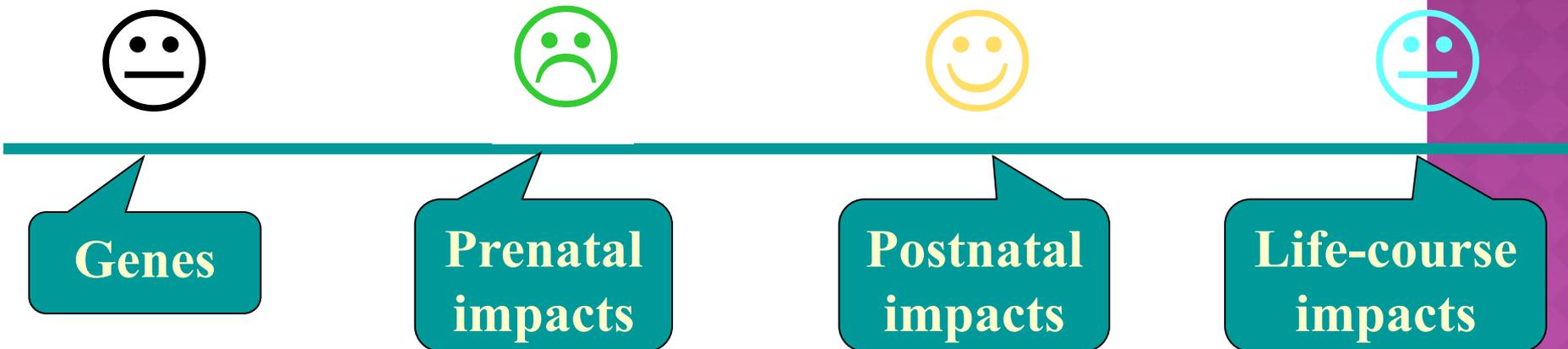
# Seasonal programming of diabetes mellitus in Ukraine



## December-born persons

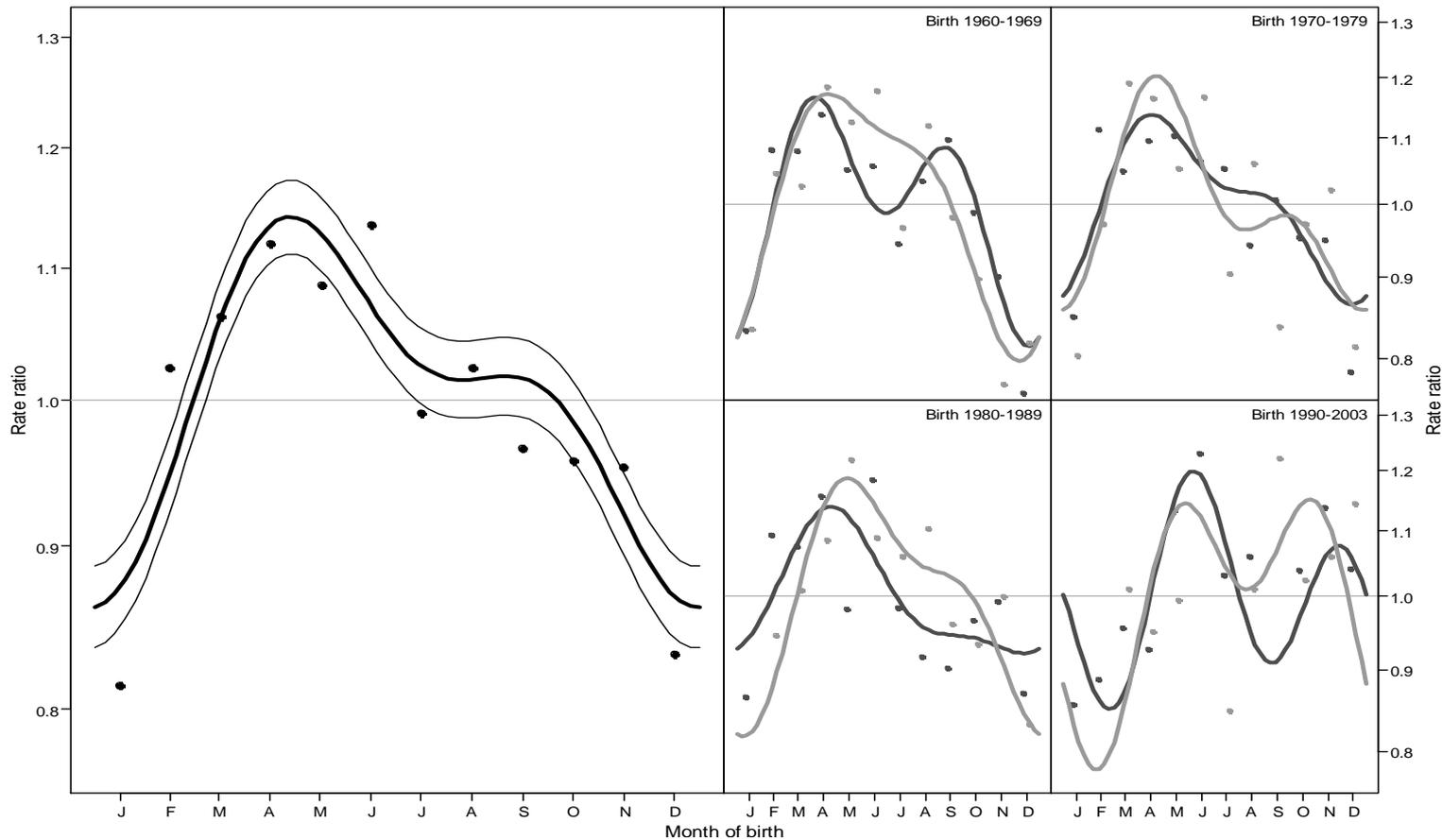


## May-born persons



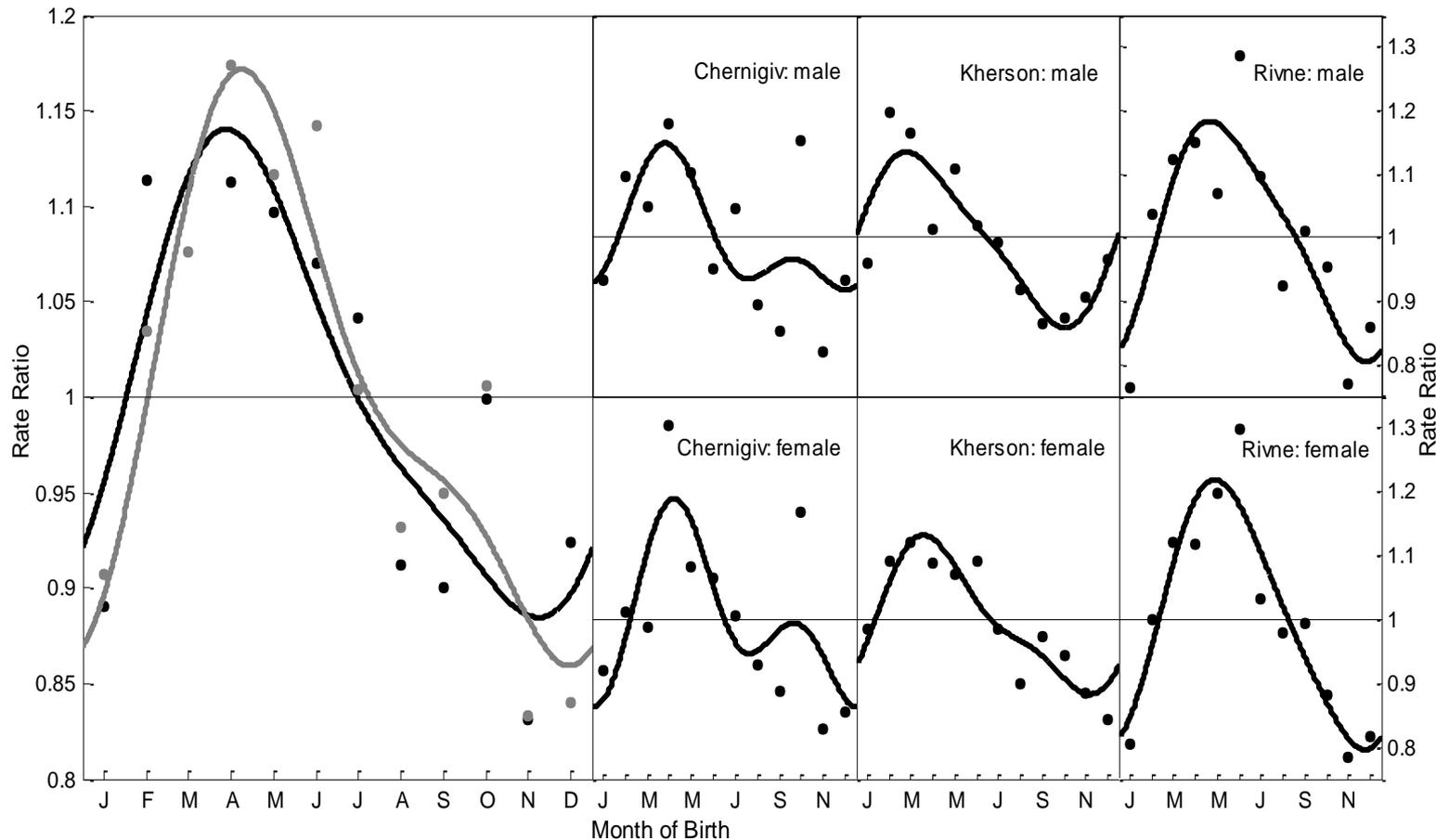


## Seasonality of birth for T1D in Ukraine



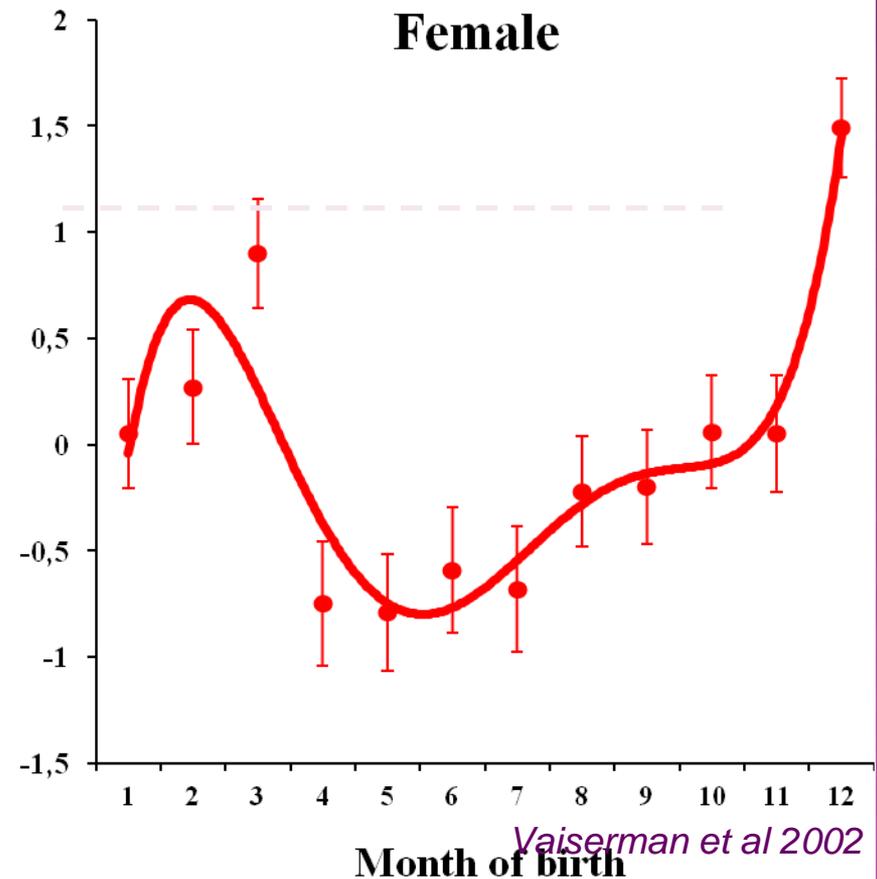
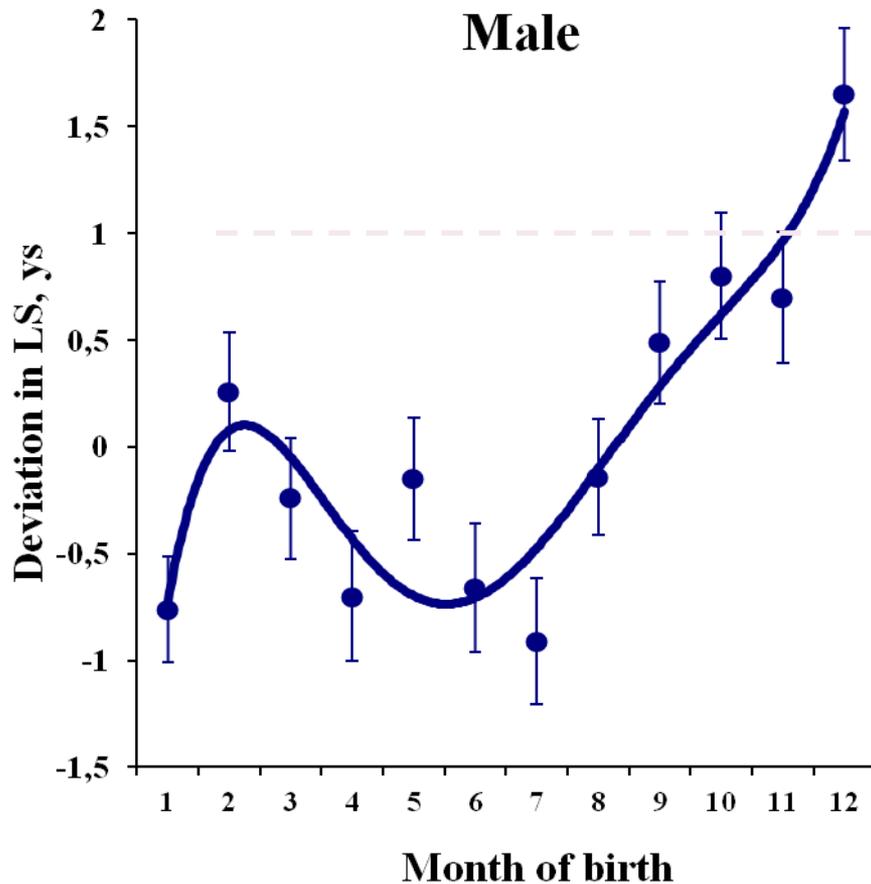


## Seasonality of birth for T2D in Ukraine





## Seasonal programming of adult longevity in Ukraine





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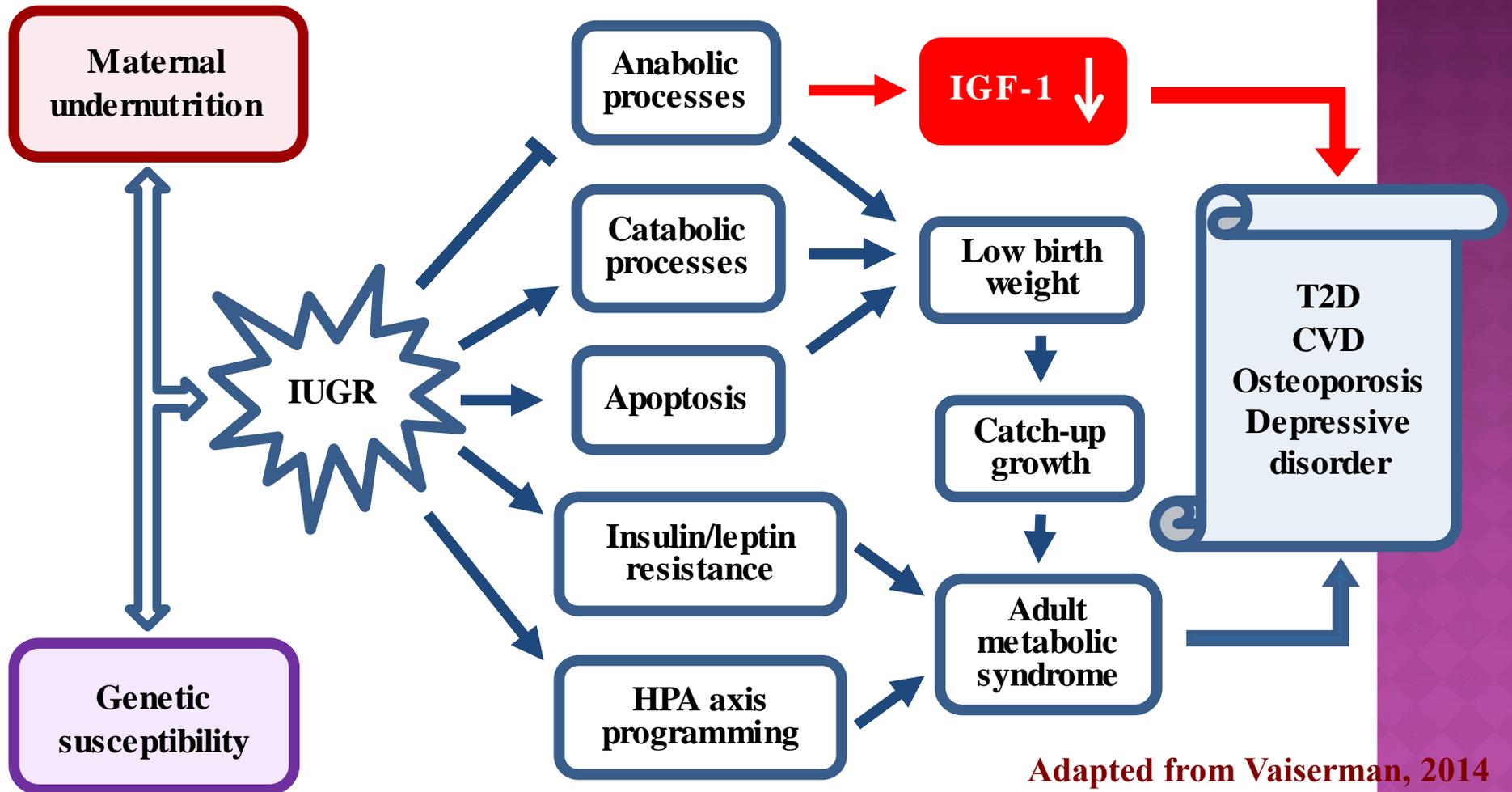


# **Aging trajectory:**

**could it be epigenetically programmed?**



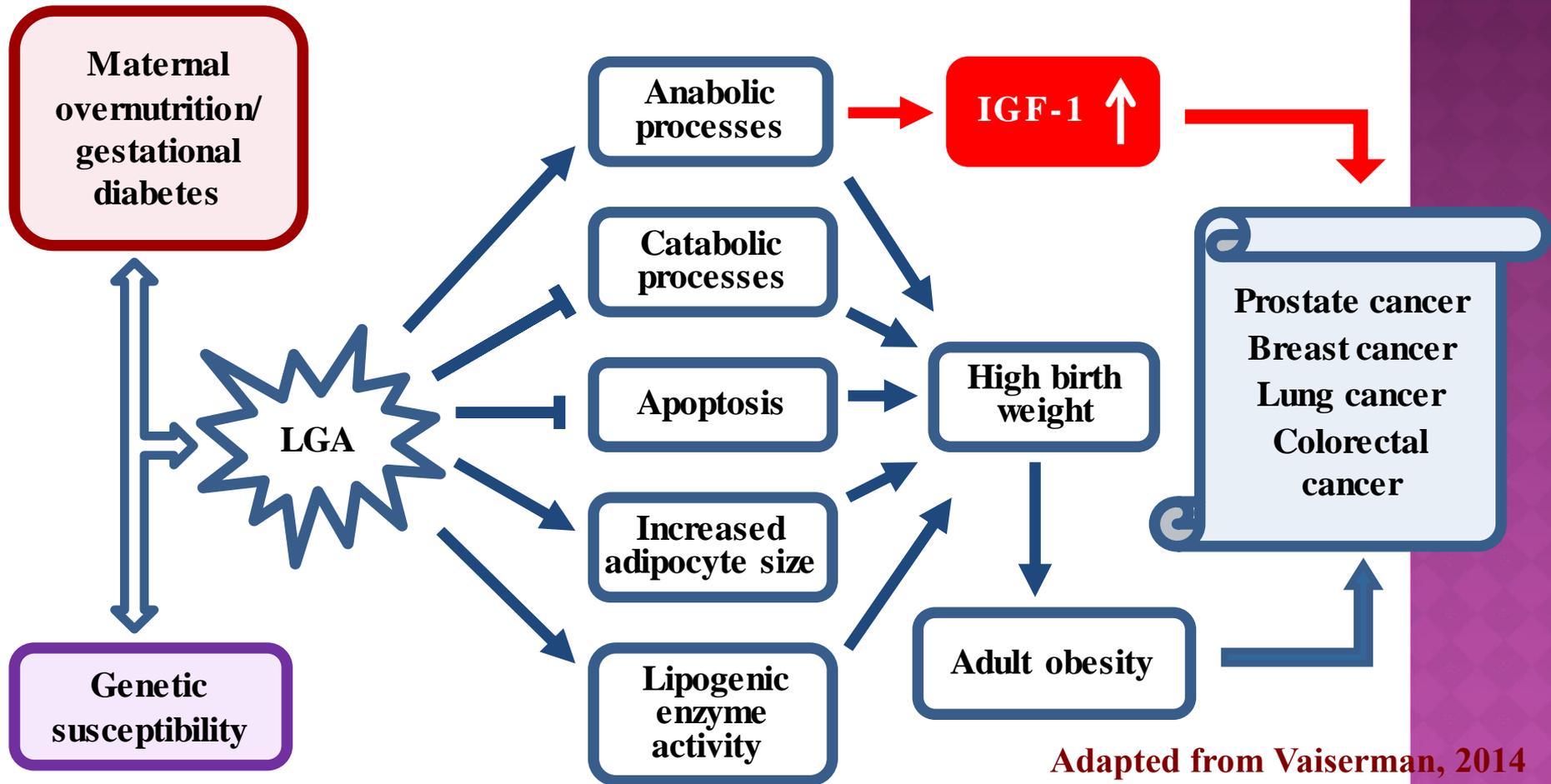
## 'Diabetic' aging trajectory (BW < 2.5 kg)



Adapted from Vaiserman, 2014



## 'Cancerous' aging trajectory (BW>4.5 kg)



Adapted from Vaiserman, 2014



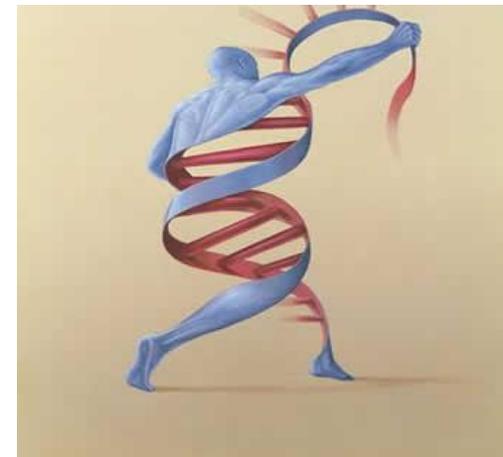
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## **Epigenetic programming of aging trajectories in early life**

**Alexander Vaiserman,**  
*Institute of Gerontology, Kiev*

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- Alzheimer's Disease & Parkinsonism
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