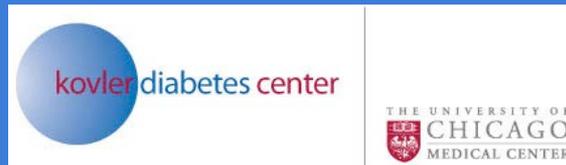


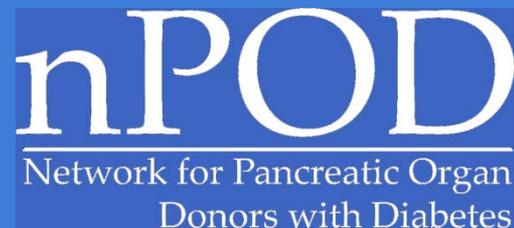
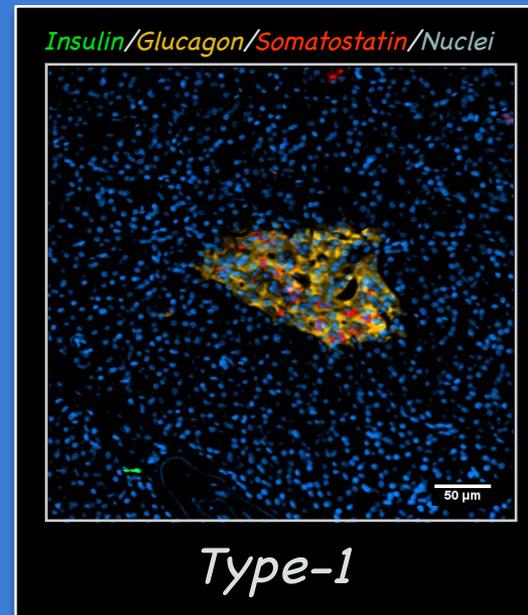
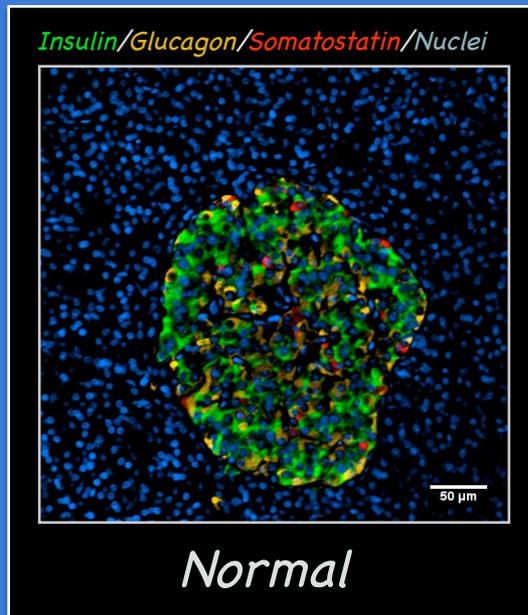
Formation of a Baseline Pancreatic β -Cell Mass in Humans is Completed Early in Life

Christopher J. Rhodes Ph.D.

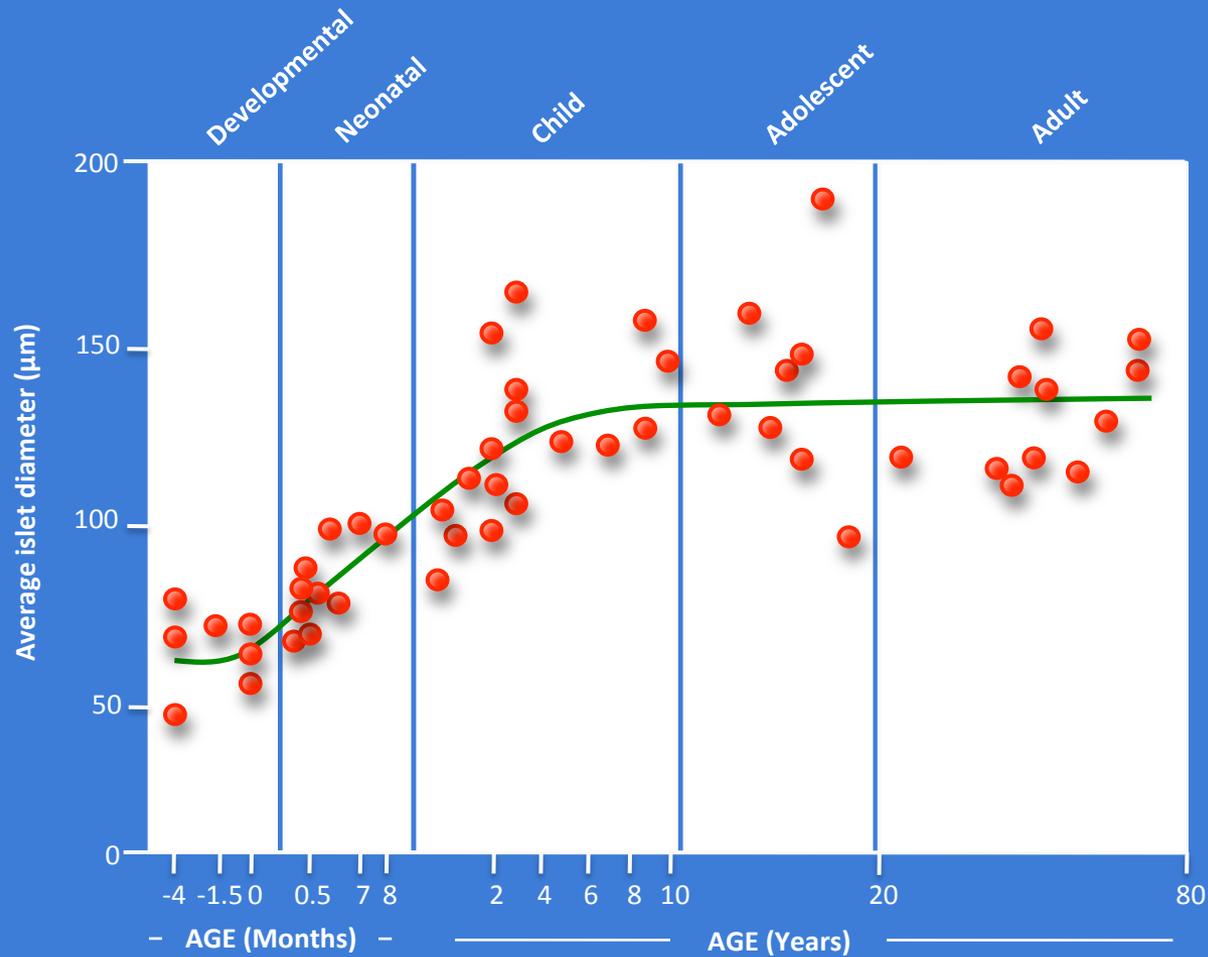


The Study:

- 44 normal pancreatic specimens (BMI ≤ 30), age 24 weeks premature – 72 years.
- Immunofluorescence analysis, confocal microscopy, morphometric counting.
- Examine the growth and formation of the pancreatic β -cell population relative to other associated cell types
- **Insulin**/**Glucagon**/**Somatostatin**/**Nuclei** (DAPI)



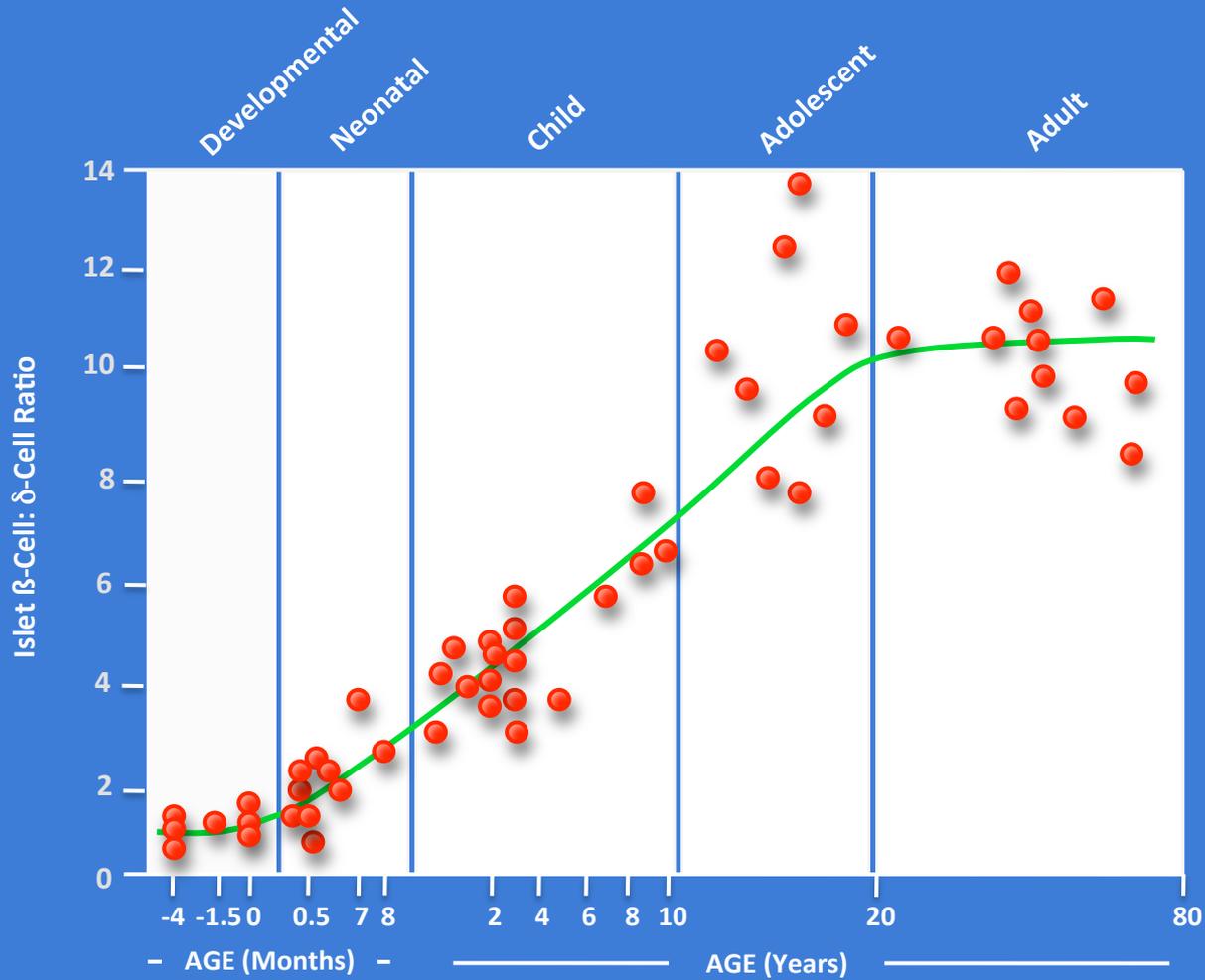
Average islet diameter



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Human β -Cell to δ -Cell Ratio

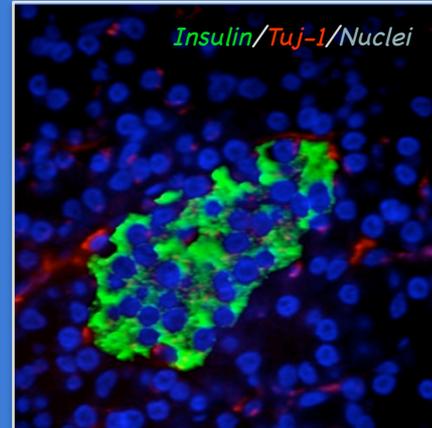
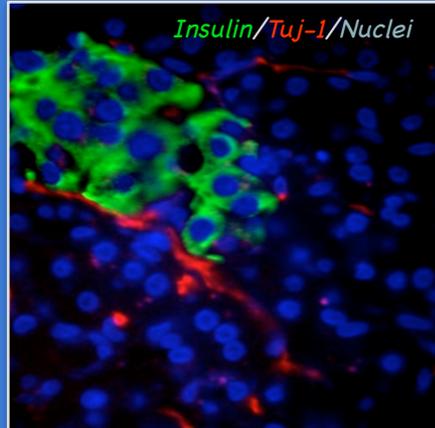


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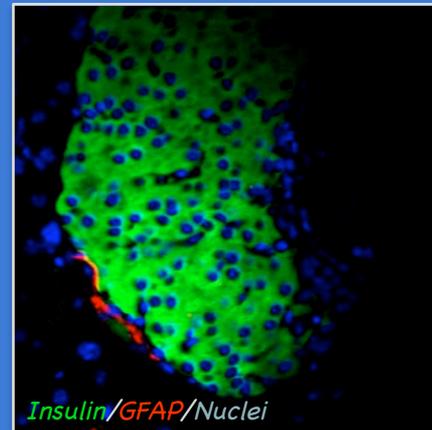
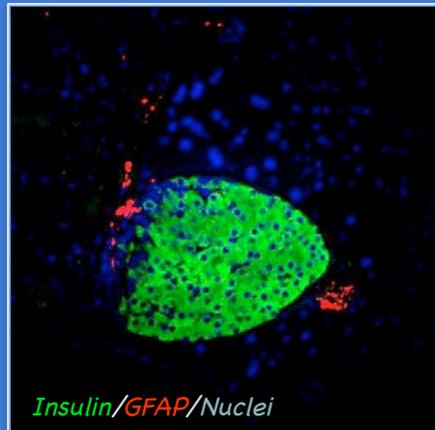


Neuronal Association to Pancreatic Islets -

- Insulin/Tuj-1 (Neuronal Specific MAP2)/Nuclei (DAPI)
- Insulin/Glial fibrillary acidic protein (GFAP)/Nuclei (DAPI)



Axons



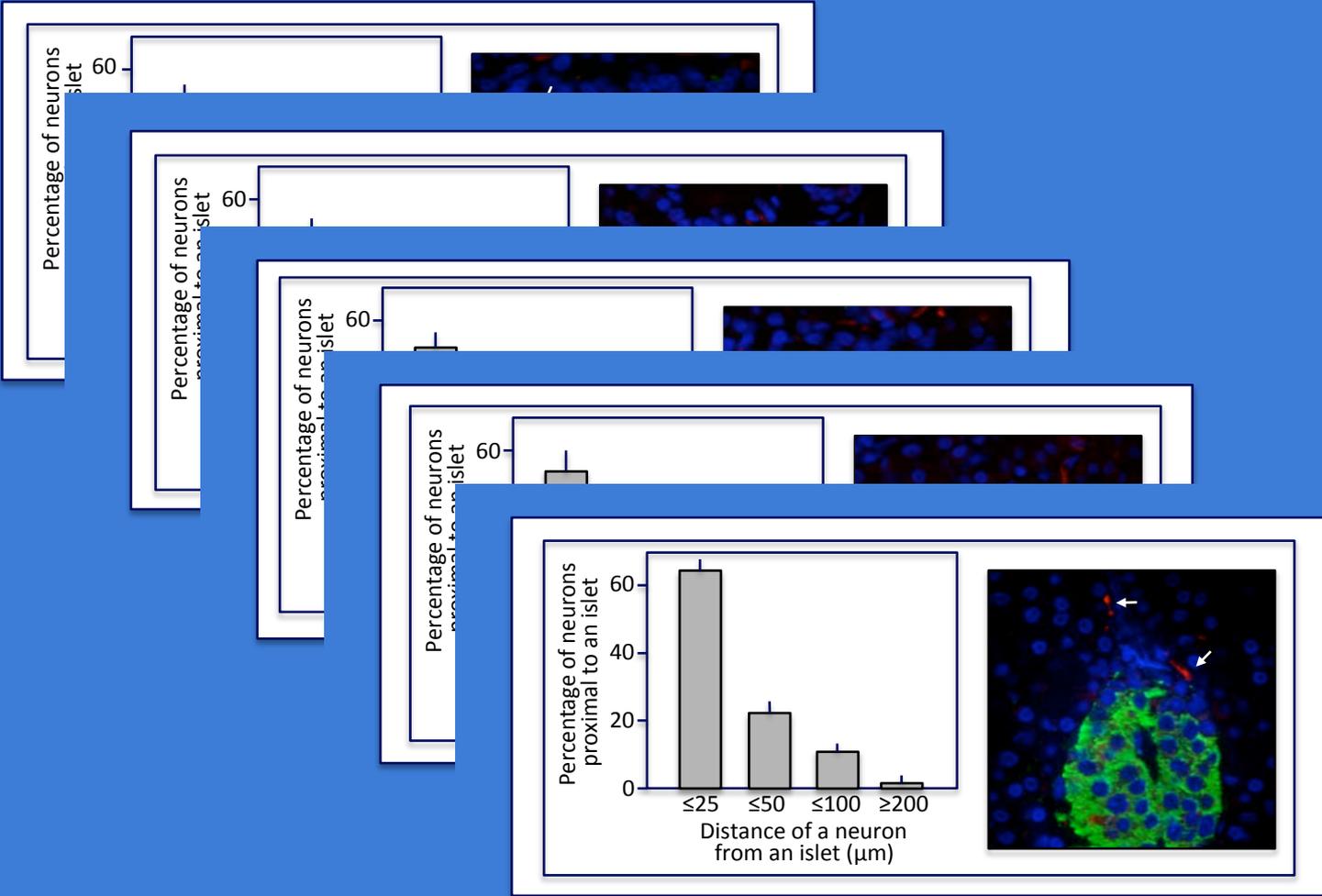
Glial Cells



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Human Pancreatic Neurons and β -Cells Stay Proximal to Each Other Throughout Life



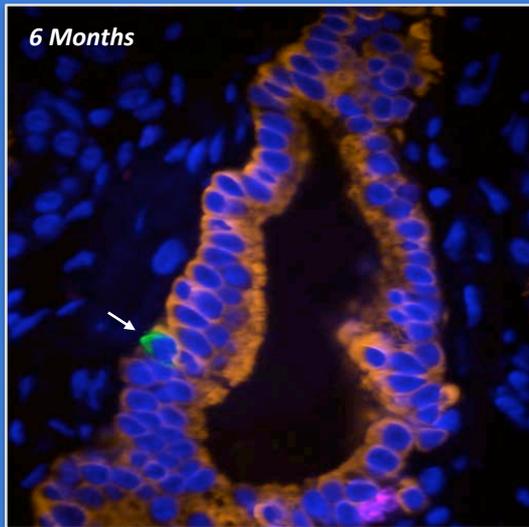
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Pancreatic β -Cell and Ductal Cell Growth -

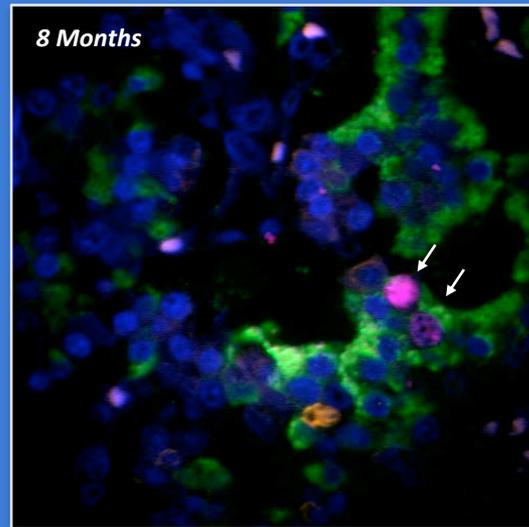
- Insulin/Cytokeratin-19 (CK-19)/Ki67/Nuclei (DAPI)

- β -Cell/Ductal Cell/Proliferation/Nuclei



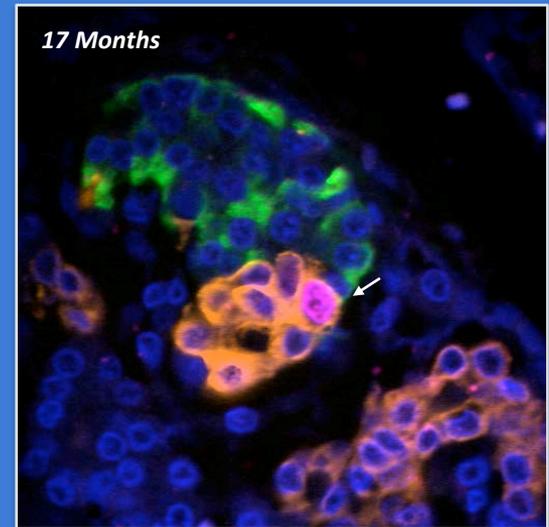
6 Months

' β -Cell Neogenesis'



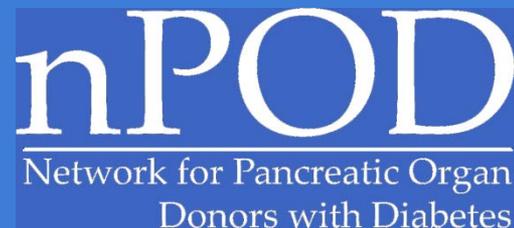
8 Months

β -Cell Proliferation

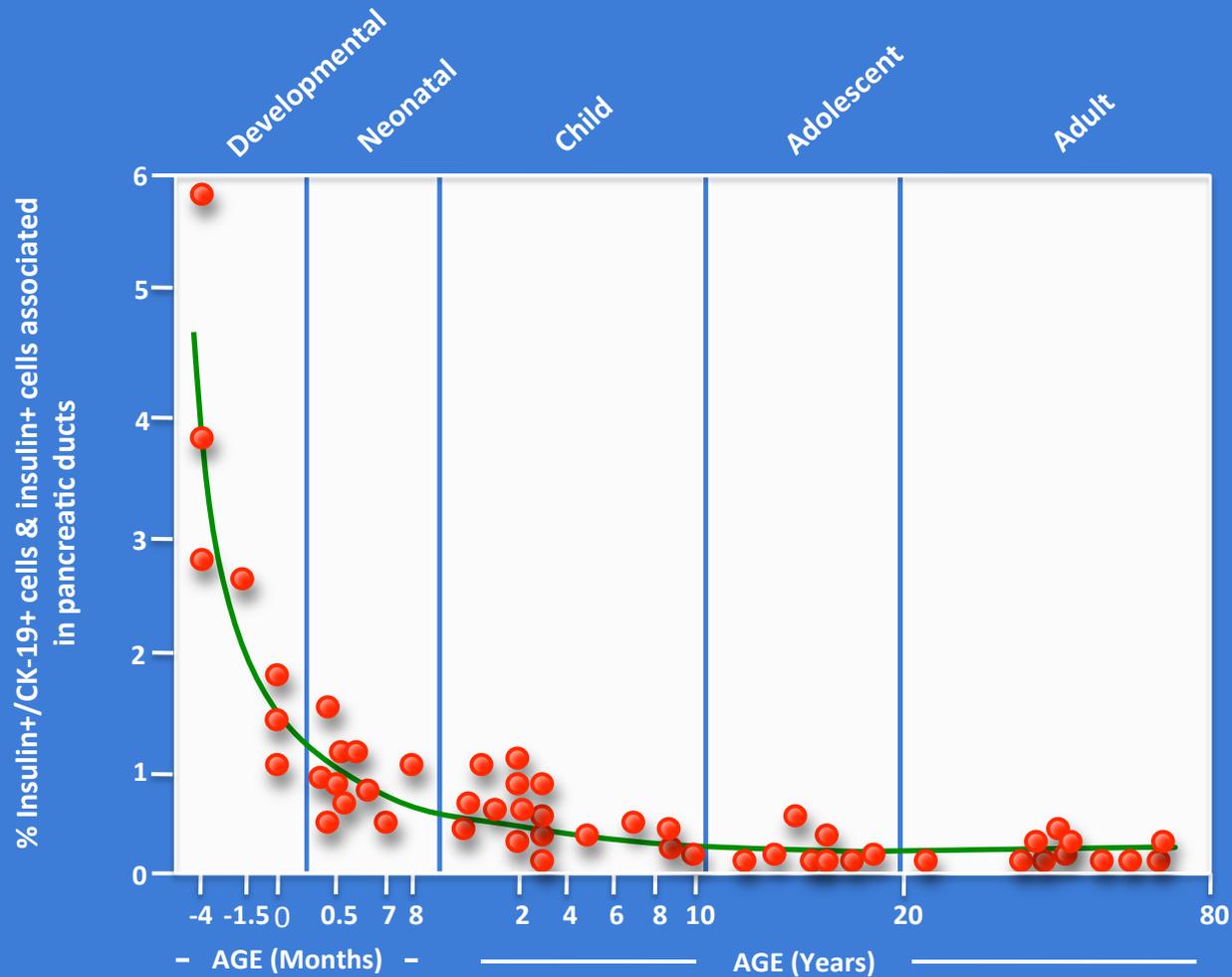


17 Months

Ductal-Cell Proliferation



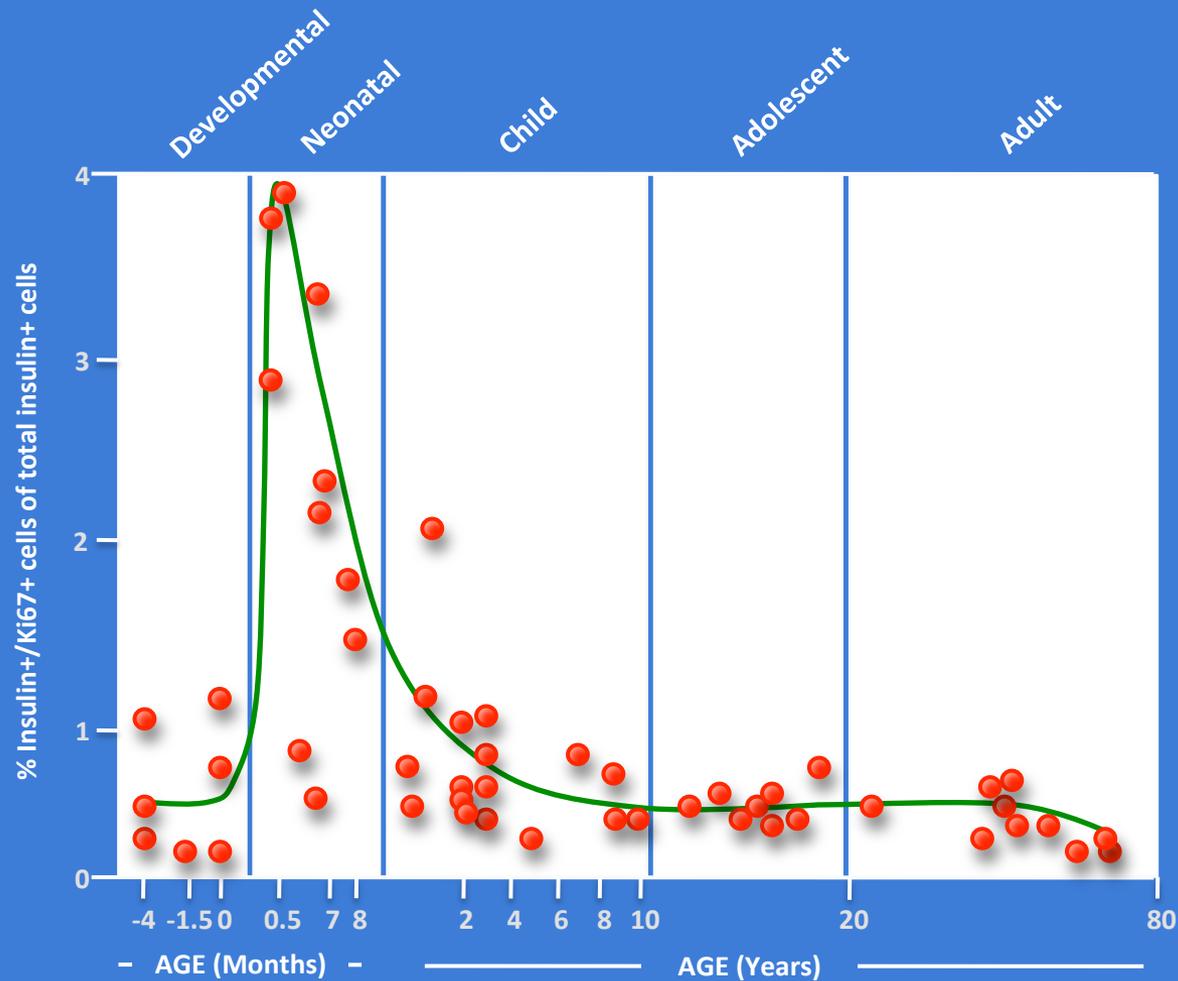
Human β -Cell Neogenesis



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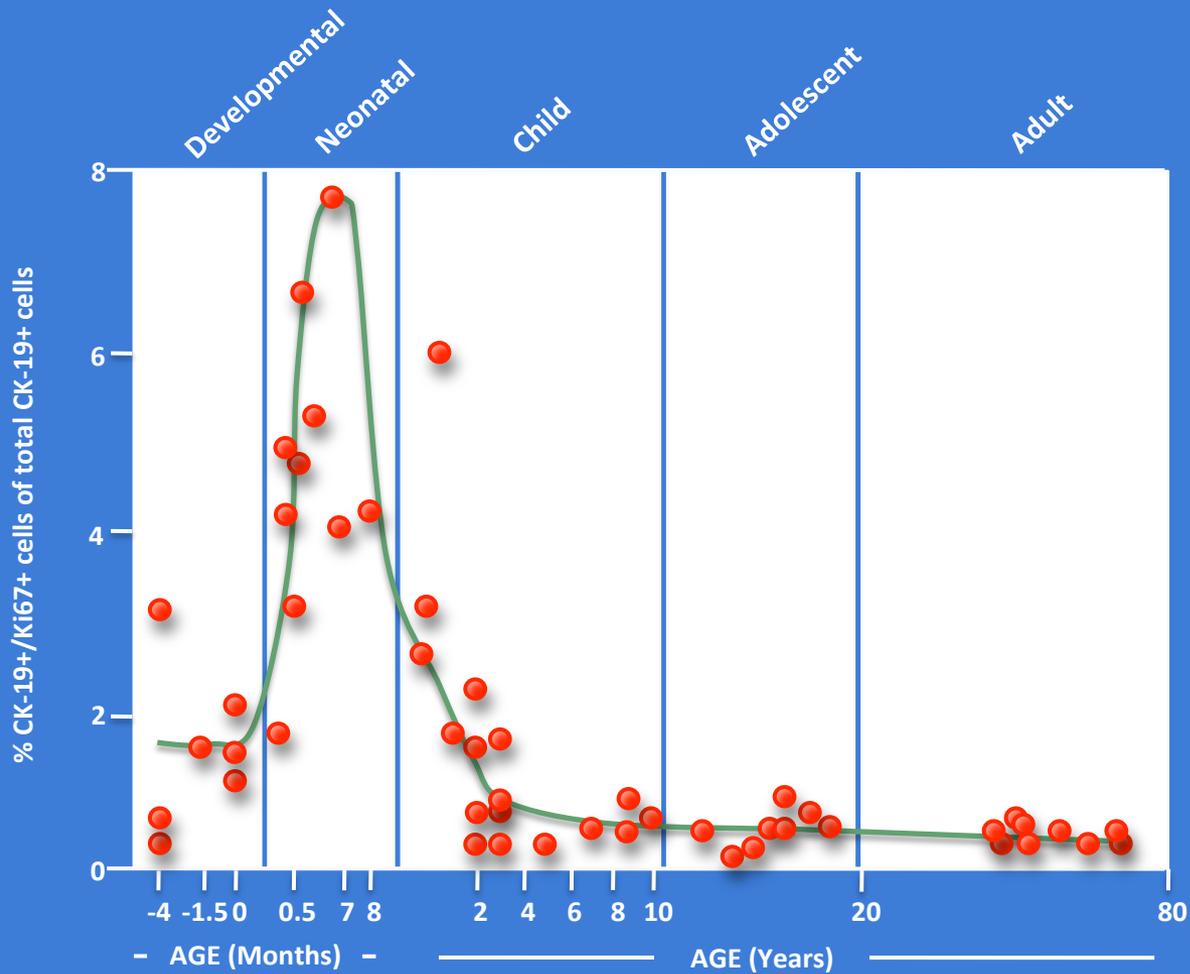
Human β -Cell Replication



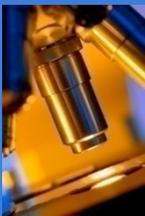
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Donors with Diabetes



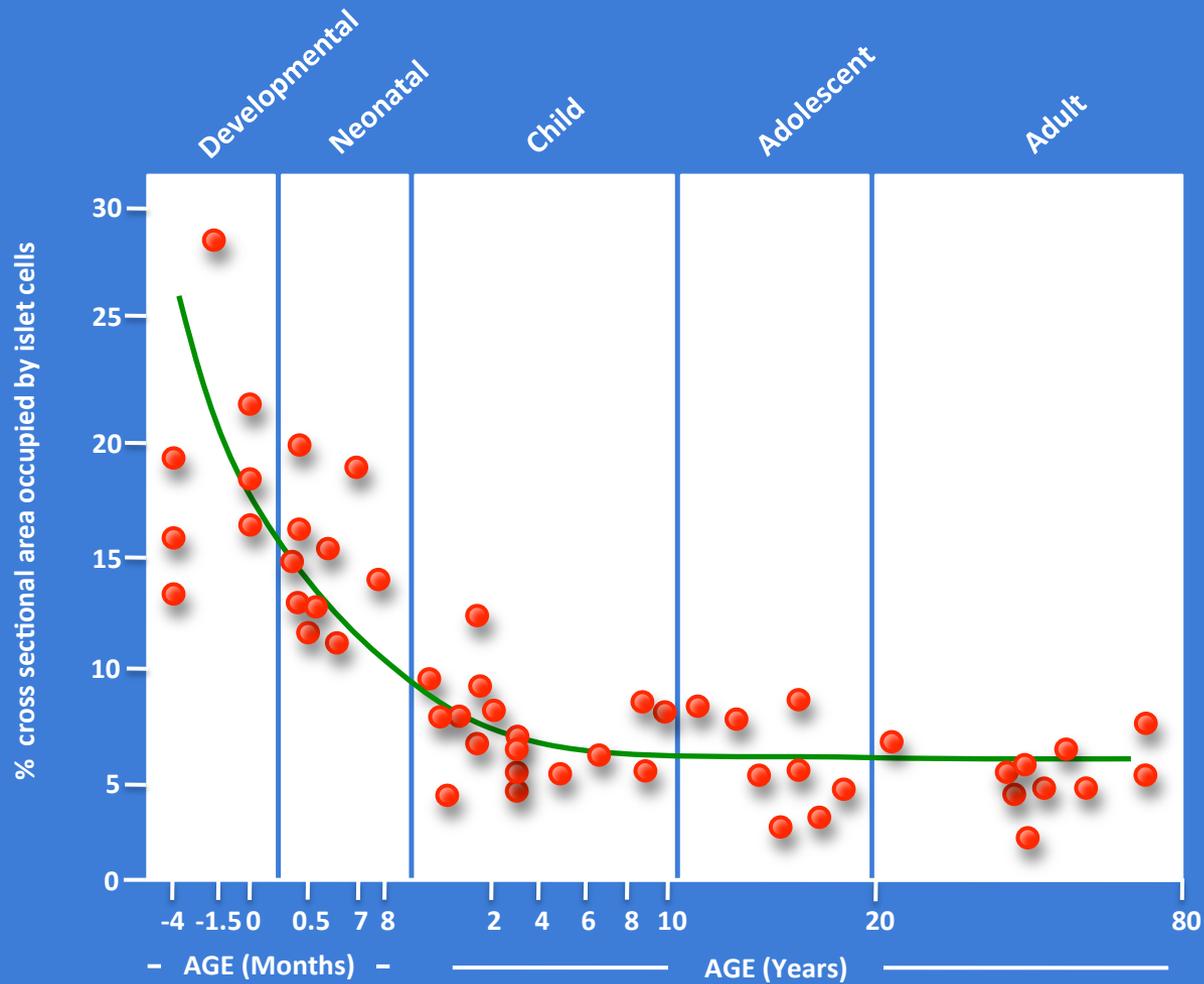
Human Pancreatic Ductal Cell Replication



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Cross-sectional islet area of pancreas

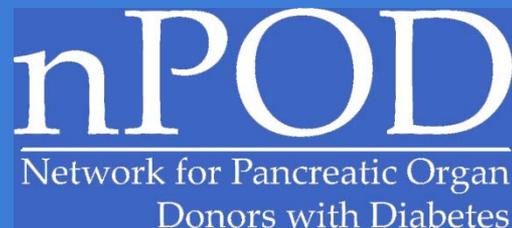


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Summary:

- *Pancreatic islet size ~doubles in the first 2 years of life*
- *β -cell to α -cell ratio ~triples in the first 2 years of life*
- *β -cell to δ -cell ratio increases ~20-fold in the first 20 years of life*
- *Pancreatic neurons and islets closely associate throughout life*
- *' β -cell neogenesis' mostly observed developmentally*
- *Neonatal burst of β -cell proliferation drives early increase in β -cell numbers*
- *Neonatal burst of ductal-cell proliferation associated with exocrine expansion*
- ***Baseline complement of β -cells is set \leq 5 years human life***



Acknowledgements:

Brigid Gregg

Patrick Moore

Damien Demozay

Mei Li

Aliya Husain

Amy J. Wright

Mark A. Atkinson

