AVC chez les jeunes causes et devenir

Barbara Goeggel Simonetti

Chef de clinique groupe de recherche neurovasculaire

Neurologie Hôpital de l'Ile et Université de Berne

Médecin adjoint en neuropédiatrie,
Ospedale Regionale EOC Bellinzona

barbara.goeggelsimonetti@insel.ch
barbara.goeggelsimonetti@eoc.ch

Who has the greatest stroke risk?

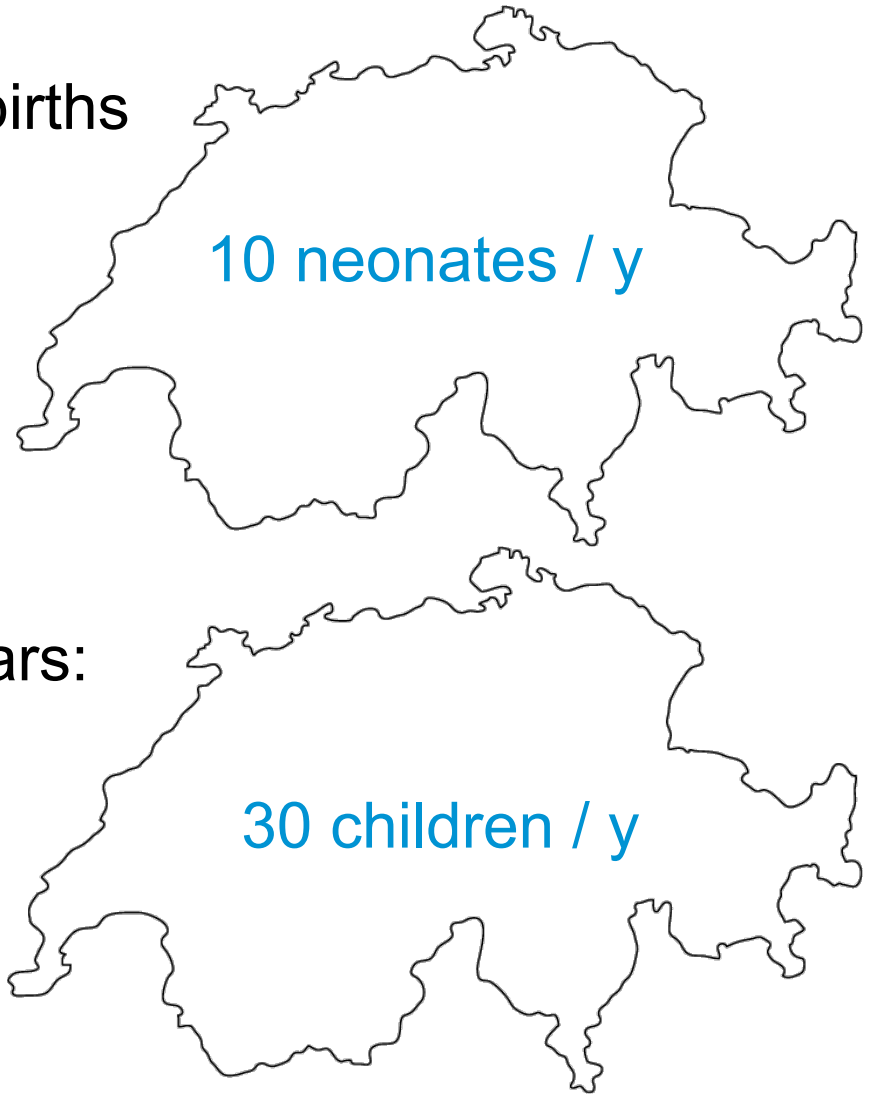
A neonate, a young smoker, or a diabetic pensioner?

"Neonates have a > 3x weekly AIS risk
of a smoking adult with diabetes mellitus and hypertension"

Mineyko A et al. J Child Neurol 2011
Nelson KB. Stroke 2007

Incidence of Arterial Ischemic Stroke (AIS) in the Pediatric Population

- Neonates: 13/100’000 life births



- Children >1 month – 16 years: 2-3/100’000/y

Grunt S et al. Pediatrics 2015.
Mallick AA et al. Eur J Paediatr Neurol 2010
Agrawal N et al. Stroke 2009.
Steinlin M et al. Neuropediatrics 2005.

Incidence of AIS in Young Adults

- Helsinki Young Stroke Registry (20-50 years of age):
  - 2.4/100'000/y 20-24 y old
  - 4.5/100'000/y 30-34 y old
  - 32.9/100'000/y 45-49 y old

Putaala et al. Stroke 09

- NOMASS: 10/100'000/y (20-45 years of age)

Jacobs et al. Stroke 02

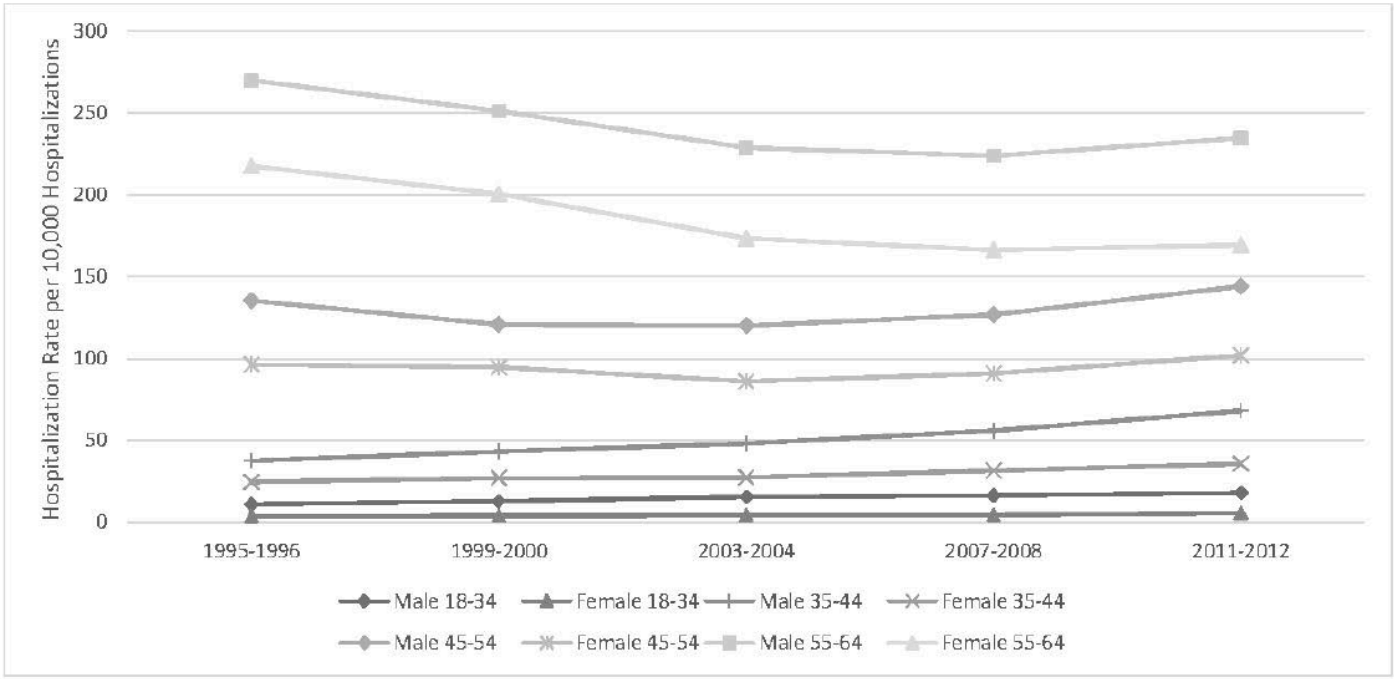
The Washington Post

To Your Health

Stroke rates appear to be rising steadily in young adults

By Jia Naqvi April 15

eFigure. Acute Ischemic Stroke hospitalization Rates/10,000 Hospitalizations by Age and Sex, 1995-1996—2011-2012

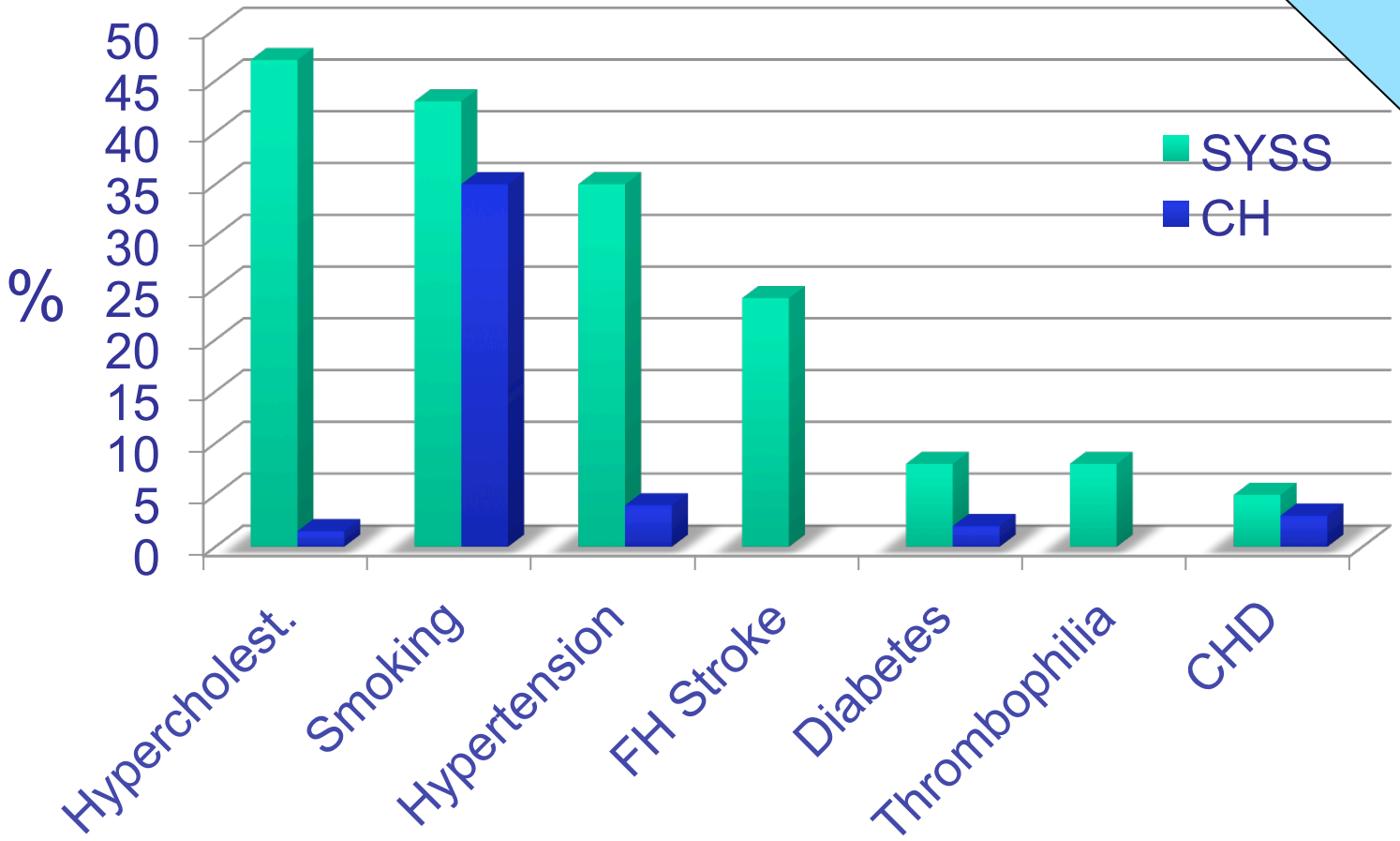


George MG et al.
JAMA Neurology 2017

Risk Factors in Young Adults

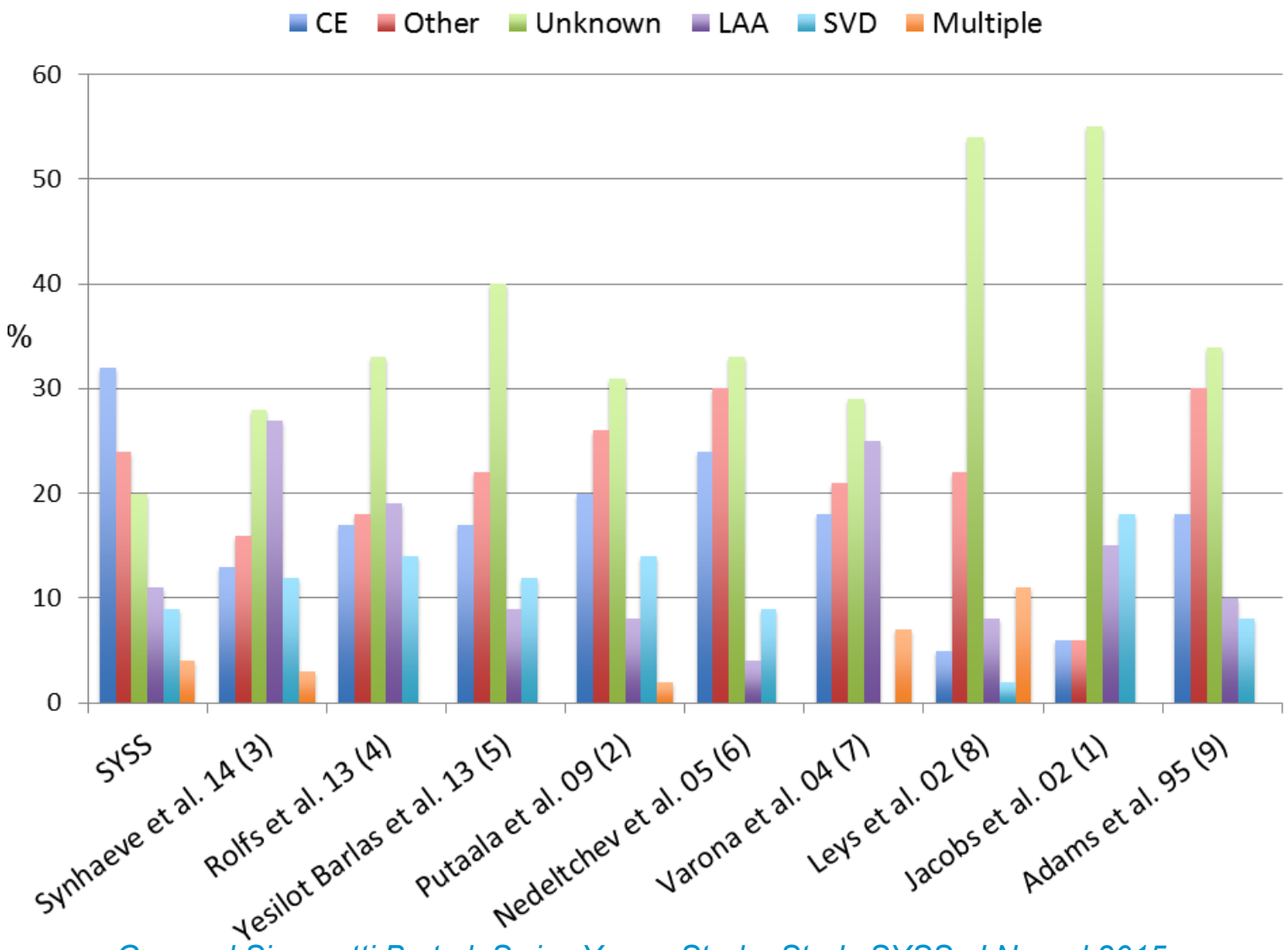
Modifiable RF ≥ 1

73%



Federal Statistical Office (FSO). Swiss Health Survey 2012. www.bfs.admin.ch.
Goeggel Simonetti et al. Swiss Young Stroke Study SYSS. J Neurol 2015. Rosamond et al. Circulation 2008.

Etiologies of Arterial Ischemic Stroke in Young Adults



Goeggel Simonetti B et al. Swiss Young Stroke Study SYSS. J Neurol 2015

Etiologies of AIS in Young Adults and Children

TOAST	Children (n=128)	Young Adults (n=199)
Cardioembolic	22 (17%)	74 (37%)
Large artery disease	0	6 (3%)
Small vessel disease	0	8 (4%)
Other determined etiology	66 (52%)	57 (29%)
- Cervical artery dissection	13 (10%)	45 (23%)
- Moyamoya	7 (5%)	1 (0.2%)
- Vasculitis	4 (3%)	2 (0.4%)
- Inherited metabolic disease	4 (3%)	0
Multiple causes	19 (15%)	2 (1%)
No cause identified	18 (14%)	45 (23%)

Bigi S et al. Ann Neurol 2011

Differential Diagnosis

MRI!

- Trauma
- Migraine
- Seizure of non-AIS origin (e.g. Rolandic seizure)
- Metabolic, non-arterial stroke (MELAS)
- Encephalitis, ADEM, intoxication
- Posterior reversible encephalopathy syndrome (PRES)

Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study

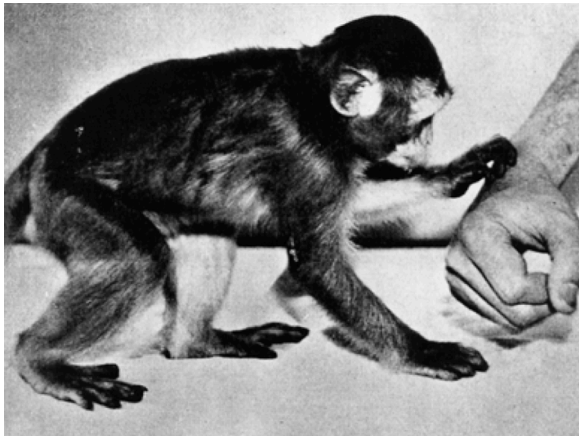
Mark S Pearce, Jane A Salotti, Mark P Little, Kieran McHugh, Choonsik Lee, Kwang Pyo Kim, Nicola L Howe, Cecile M Ronckers, Preetha Rajaraman, Sir Alan W Craft, Louise Parker, Amy Berrington de González

Summary

Background Although CT scans are very useful clinically, potential cancer risks exist from associated ionising

Lancet 2012; 380: 499–505

And so what − the younger the better!?



Kennard MA et al. J Neurophysiol 1938

Outcome after Stroke in the Young

Variable	Neonates	Children	Young Adults
Case fatality rate	2-4%	3-15%	3-21%
Sequelae	60%	50-75%	30-77%
Recurrent stroke	<2%	7-40%	4-20%

BUT

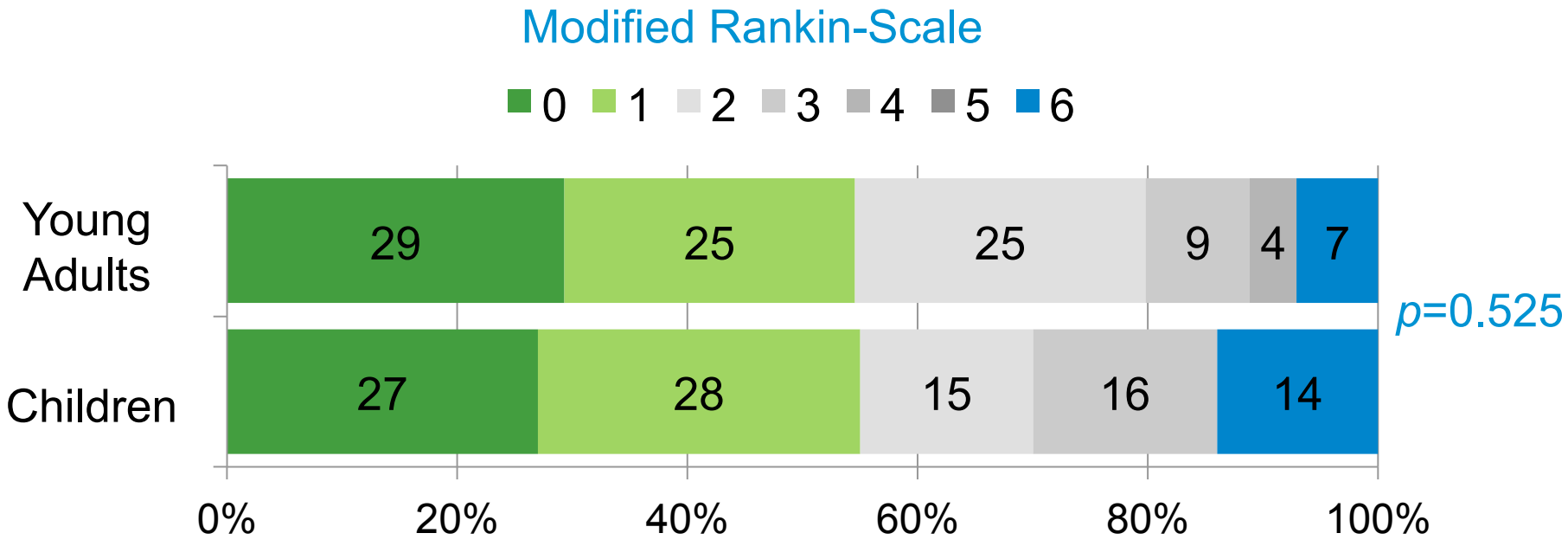
- Heterogeneous study designs, populations, follow-up periods and -variables
- Inexistence of an outcome variable valid for both children and adults

Goeggel Simonetti B et al. Dev Med Child Neurol 2013
Elbers J et al. J Child Neurol 2013
Neuner B et al. Ann Neurol 2011
Steinlin M et al. Eur J Paediatr 2004
Ganesan V et al. Dev Med Child Neurol 2000

Goeggel Simonetti B et al. J Neurol 2015
Rutten-Jacobs LCA et al. Ann Neurol 2013
Nedeltchev K et al. J Neurol Neurosurg Psychiatry 2005
Varona JF et al. J Neurol 2004
Leys D et al. Neurology 2002

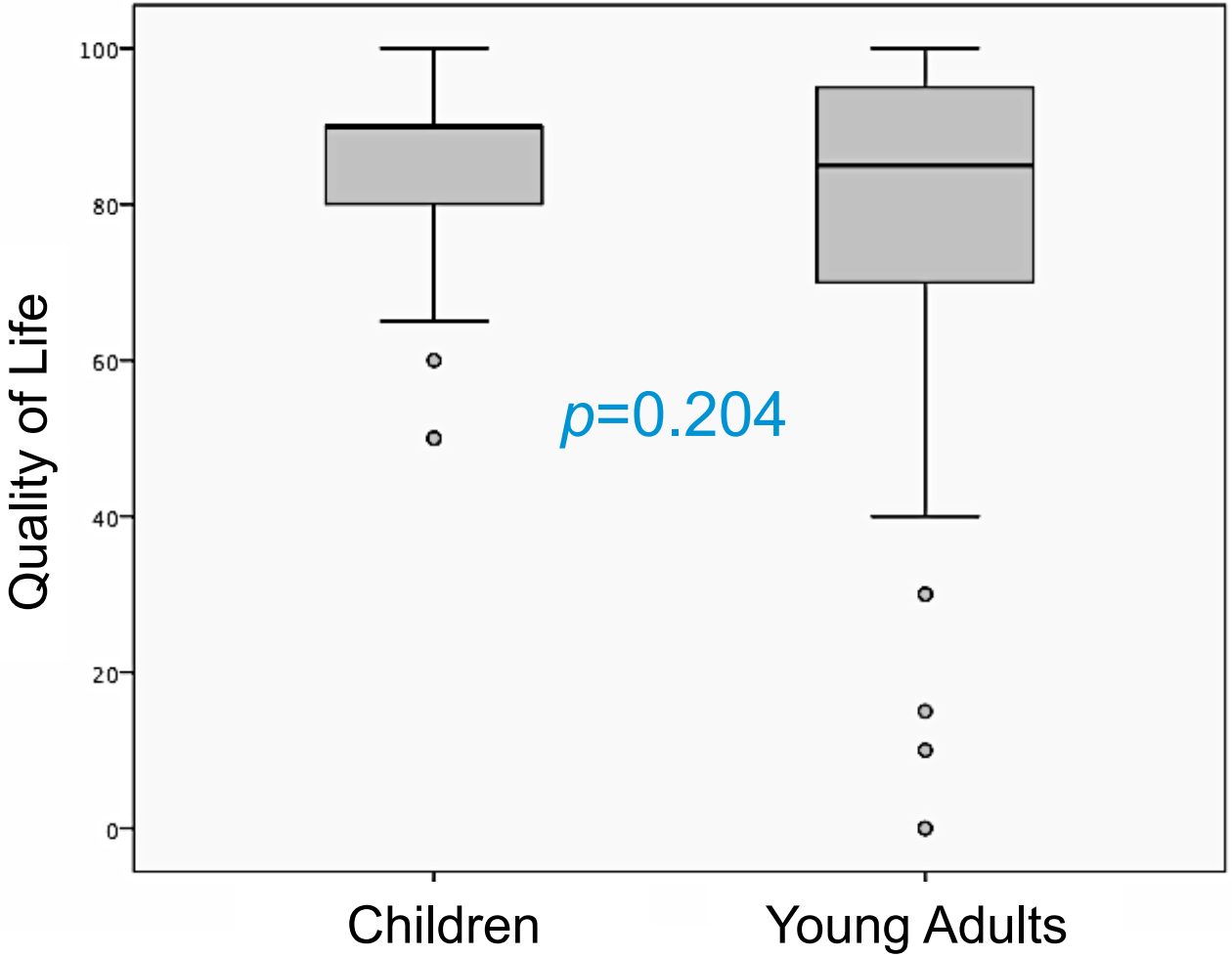
Chabrier S et al. J Pediatr 2016. Grunt S et al. Pediatrics 2015. Kirton A, deVeber G. Stroke 2013

Functional outcome 7 (IQR 4.7 – 9.4) years after stroke



Goeggel Simonetti B et al. Neurology 2015

Quality of Life



Goeggel Simonetti B et al. Neurology 2015

Is being plastic fantastic?

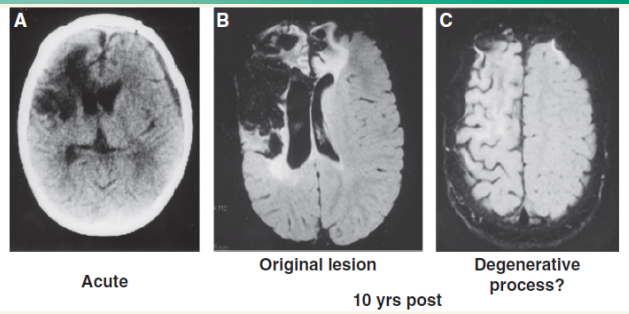


Figure 3 Brain pathology following brain insult in a 3-year old child (J.B.). (A) Acute CT scan, demonstrating extent of initial injury, which includes extensive right frontal and subcortical damage. (B) MRI scans 8 years post-injury, illustrating the residual pathology, as well as generalized right hemisphere atrophy (C).

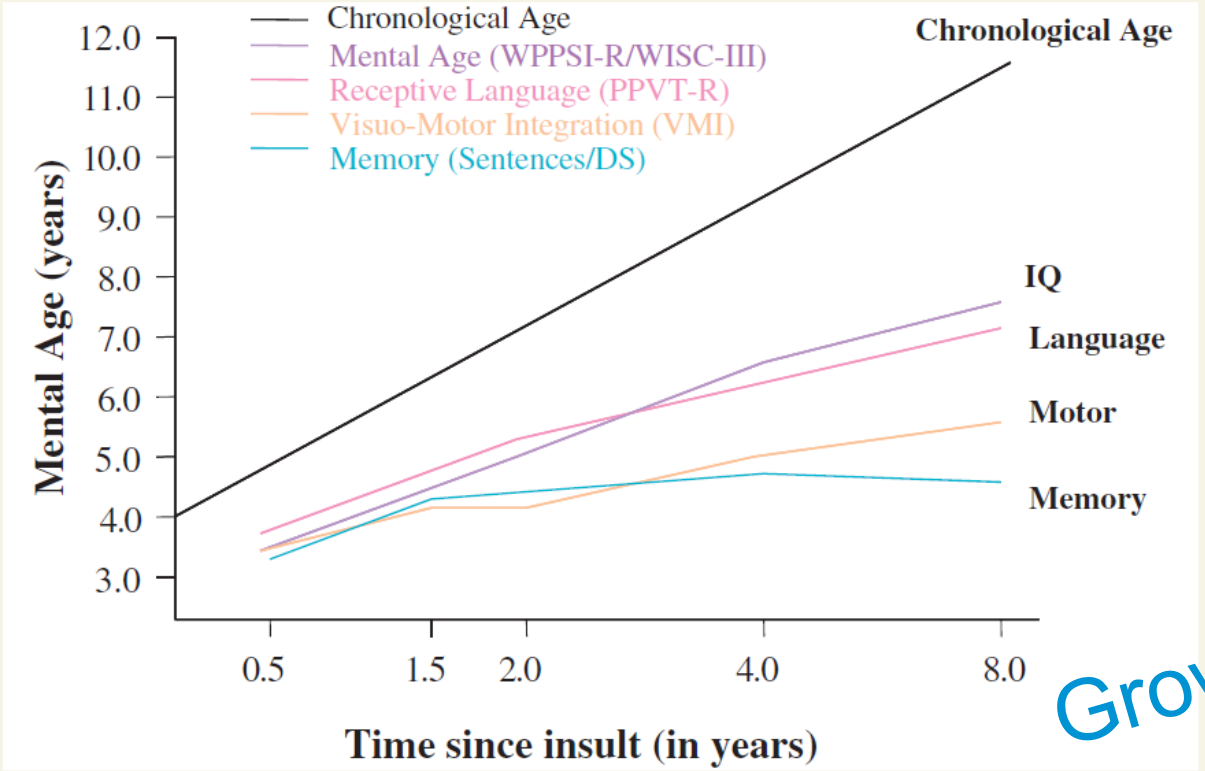


Figure 4 Neurobehavioural outcome to 8 years post-insult

Growing into deficit

Anderson V et al. Brain 2011

Take Home

1. Stroke happens even in the very young
   - ↑ Awareness

2. Etiologies are different than in the elderly
   - Adapt investigations (MRI) and management

3. The younger is NOT the better in terms of outcome after brain injury
   - Functional impairment in 1/3 – 2/3 of patients with longer life expectancy
   - If you really want to know about outcome in the young, you need time