

In parallel to the explosive growth in the use of
EMF-dependent gadgets
the incidence of **autism** spectrum disorder (**ASD**) has increased!

IS IT POSSIBLE THAT EMF CONTRIBUTES TO ASD?

Does EMF has an impact on BRAIN development?

What is the impact of EMF on brain development?

EMF	EMF target	Animal	Effect	Reference	comments
900MHz 6w/Kg 1h/day,28 days EMF	Hippocampal pyramidal cells	3.3Months old Female Rat	Neuronal Cells Die	Bas, et al,(2009) Brain Res, 1265:178-185	
900MHz 1h/day E13- E21, analysis P32 EMF	Offspring cerebellum Purkinje cells	Pregnant Rat E13-E21	Neuronal Cells Die	Odaci, E et al (2015) J Chem. Neuroanat. 75:(B)105-110.	
50Hz (ELF-EMF) 1-7h/day 7days analysis Day37	Hippocampus, dentate gyrus	1month old C57Bl mice	Neurogenesis differentiation	CuCCurazzu, B. et al (2010) Exp. Neurol. 226:173-182.	Ca _v 1 up
50Hz (ELF-EMF) In culture Day2, 6, 12	P0, cortices NSC In culture	P0, CD-1 mice	Neurogenesis differentiation	Piacentini, R. et al (2008) J Cell. Physiol. 215:129-139.	Ca _v 1 influx

The Autistic Neuron: **Troubled Translation?**

Raymond J. Kelleher III^{1, ,}, Mark F. Bear^{2,}

Cell Volume 135, Issue 3, 31 October 2008, Pages 401–406

Dysregulation of mRNA Localization and **Translation** in Genetic Disease

The **PI3K/mammalian target of rapamycin (mTOR)** pathway is important for local protein synthesis and **regulated by FMRP**: implications for **FXS** (fragile X) and other **autism spectrum disorders**

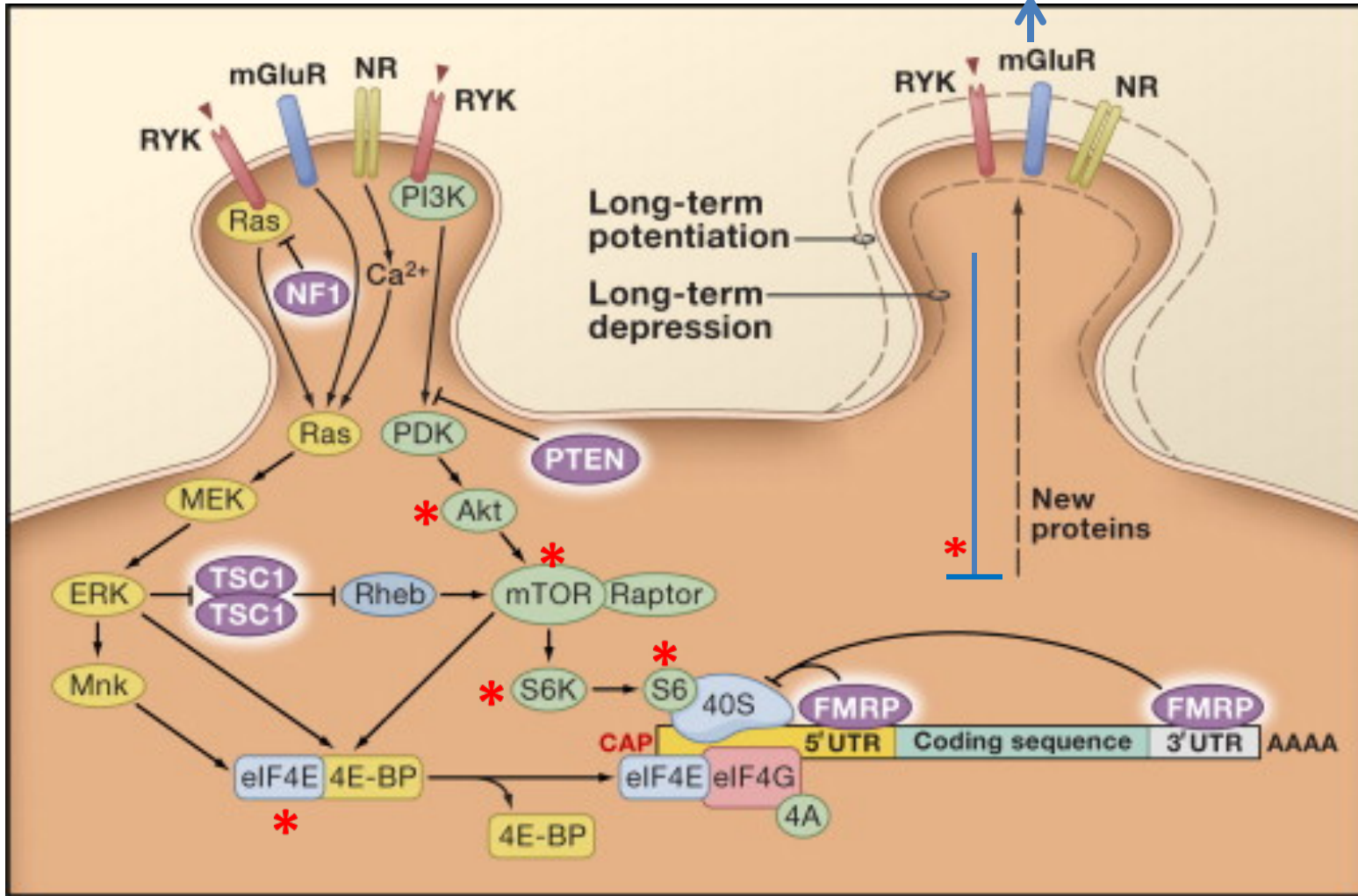
Single-Gene Disorders with High Rates of Autism

GENE	DISORDER	RATE OF AUTISM	RATE IN AUTISM	MR	GENE FUNCTION
FMR1	Fragile X syndrome	15-30%	2-5%	+	Translation repressor *
TSC1/2	Tuberous sclerosis	25-60%	1-4%	+	Inhibitor of mTORC1 *
PTEN	PTEN Hamartoma ASD with macrocephaly	ND	1%	+	Inhibitor of PI3K/mTORC1 signaling *
NF1	Neurofibromatosis type1	4%	0-4%	+	Ras GAP *
MECP2	Rett's syndrome	100%	2%	+	Global transcriptional repressor *
UBE3A	Angelman's syndrome	40%	1%	+	E3 ubiquitin ligase
CACNA1C	Timothy's syndrome	60%	<1%	+	L-type voltage gated calcium channel (CaV1.2) ?
NLGN3/4	Familial ASD	ND	<1%	+	Synaptic adhesion
NRXN1	Familial ASD	ND	<1%	+	Synaptic adhesion
SHANK3	Familial ASD (microdeletion syndrome(22q13))	ND	<1%	+	PSD scaffolding

***=affects translation**

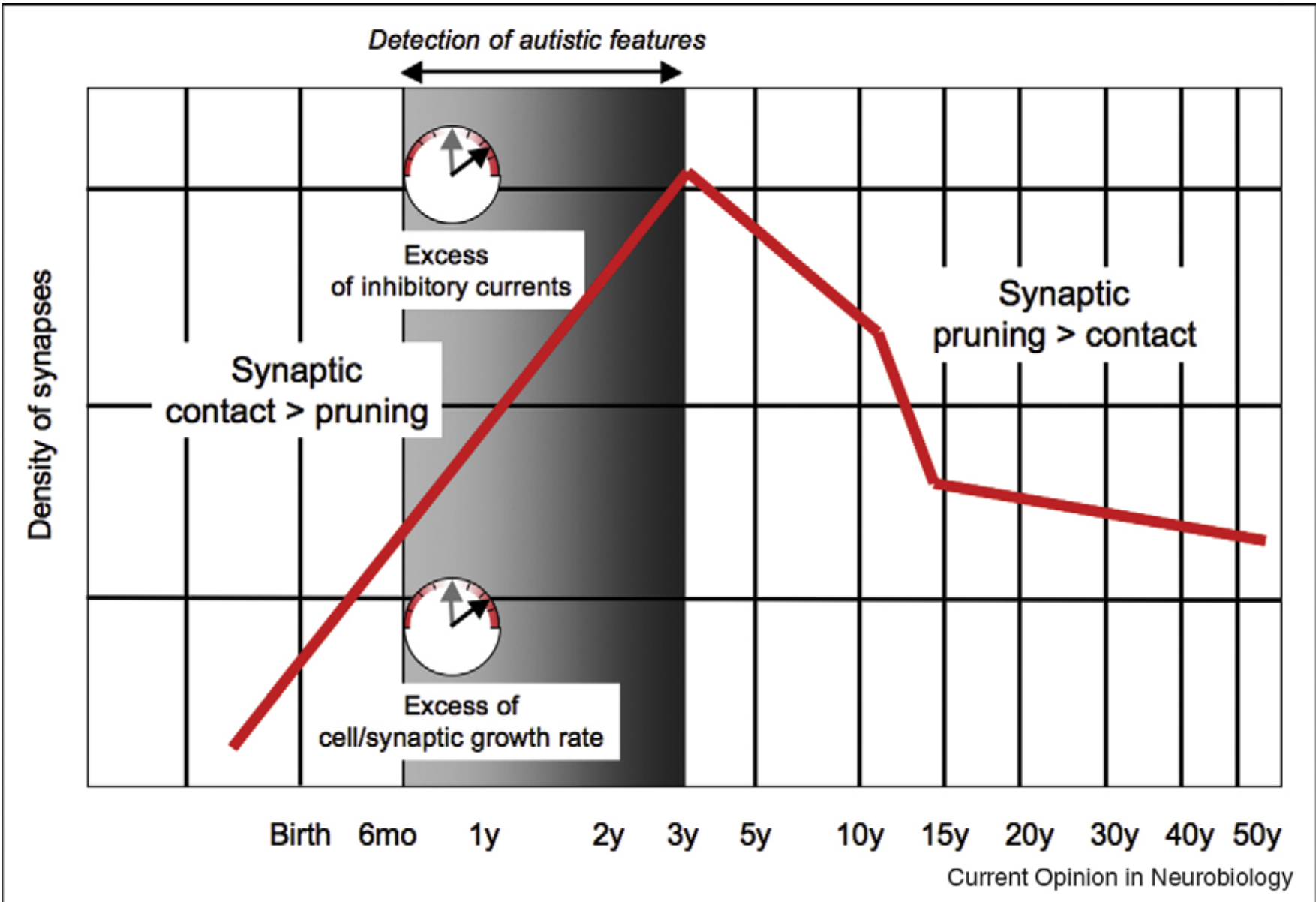
? =indirect

Too much dendrites=over connectivity=
 Deranged pruning=failure to process
 Information= ASD.

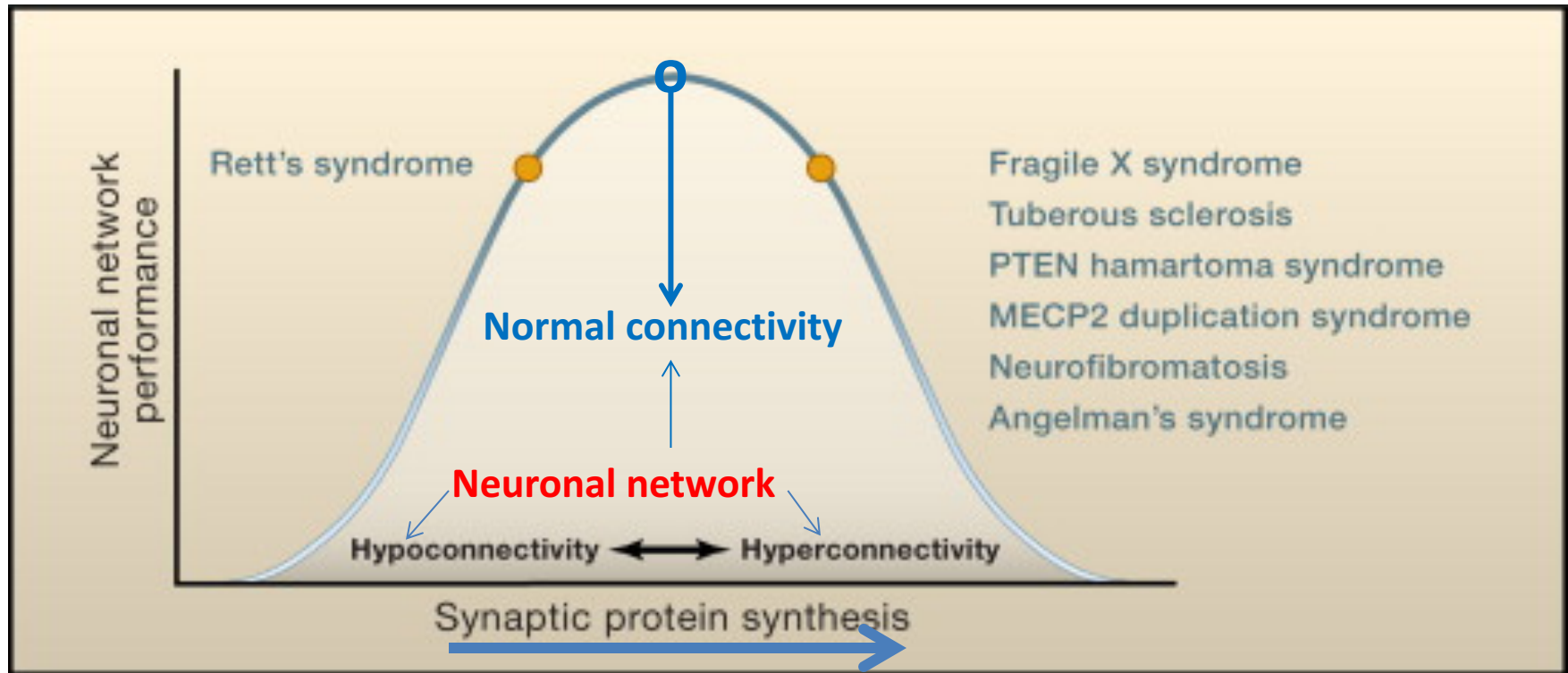


* = Antagonized by oxytocin

Extremely low frequency/EMF?



Control of mRNA translation and brain wiring



Suggested investigation

Titration of EMF on neural stem cells to determine conditions for :

A) In culture

- 1) Overgrowth of dendrites, (hyper-connectivity)
- 2) Proteomic and other protein-level analysis (controls vs hyper-connectivity)

B) In vivo

- 1) Screen rats for dendrite overgrowth (EMF conditions)
from pregnancy to weaning in pups
- 2) Use information gained by in-culture studies to inhibit EMF induced
hyper-connectivity
- 3) Accompany biological effects by behavioral testing in vivo.