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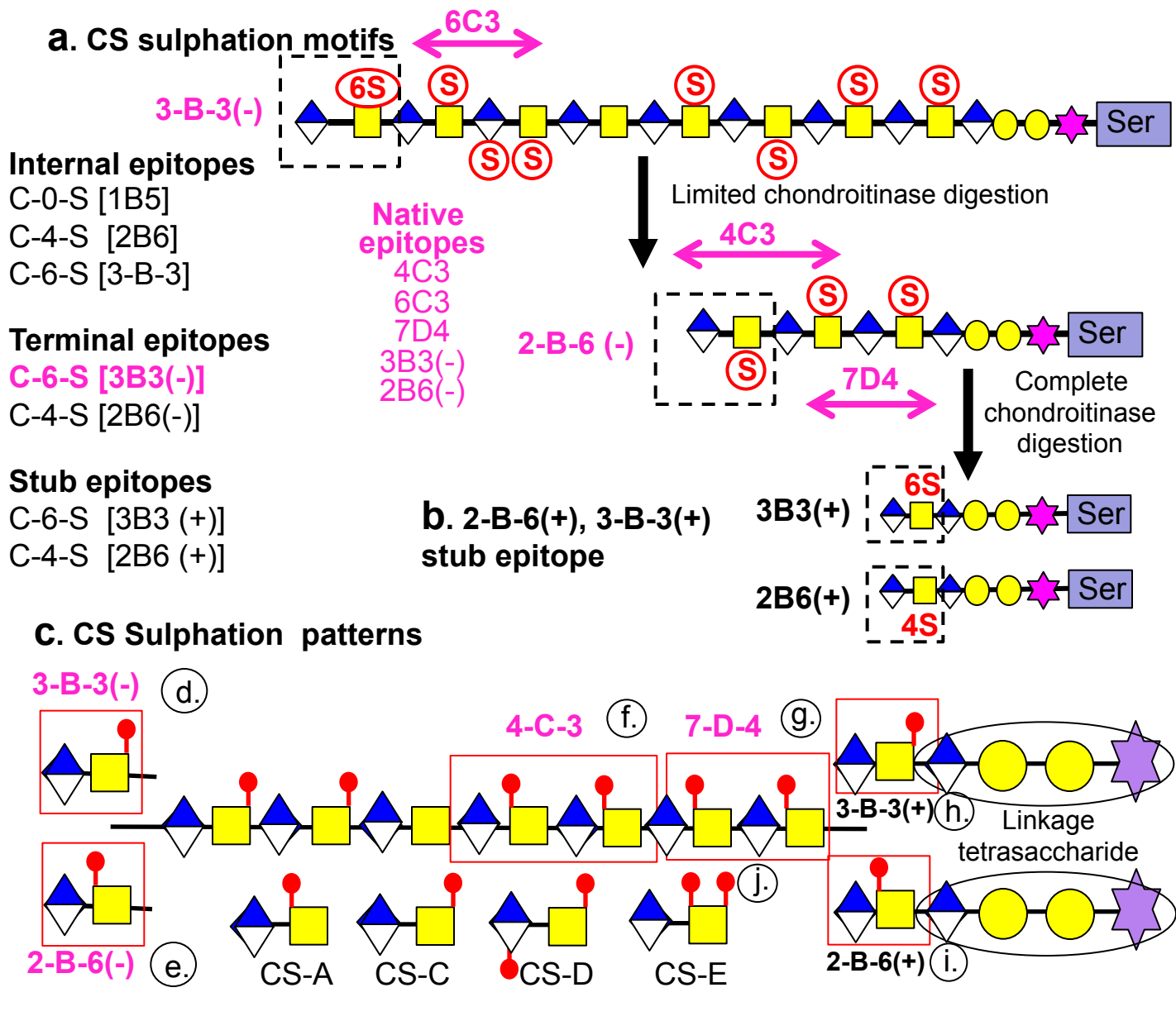


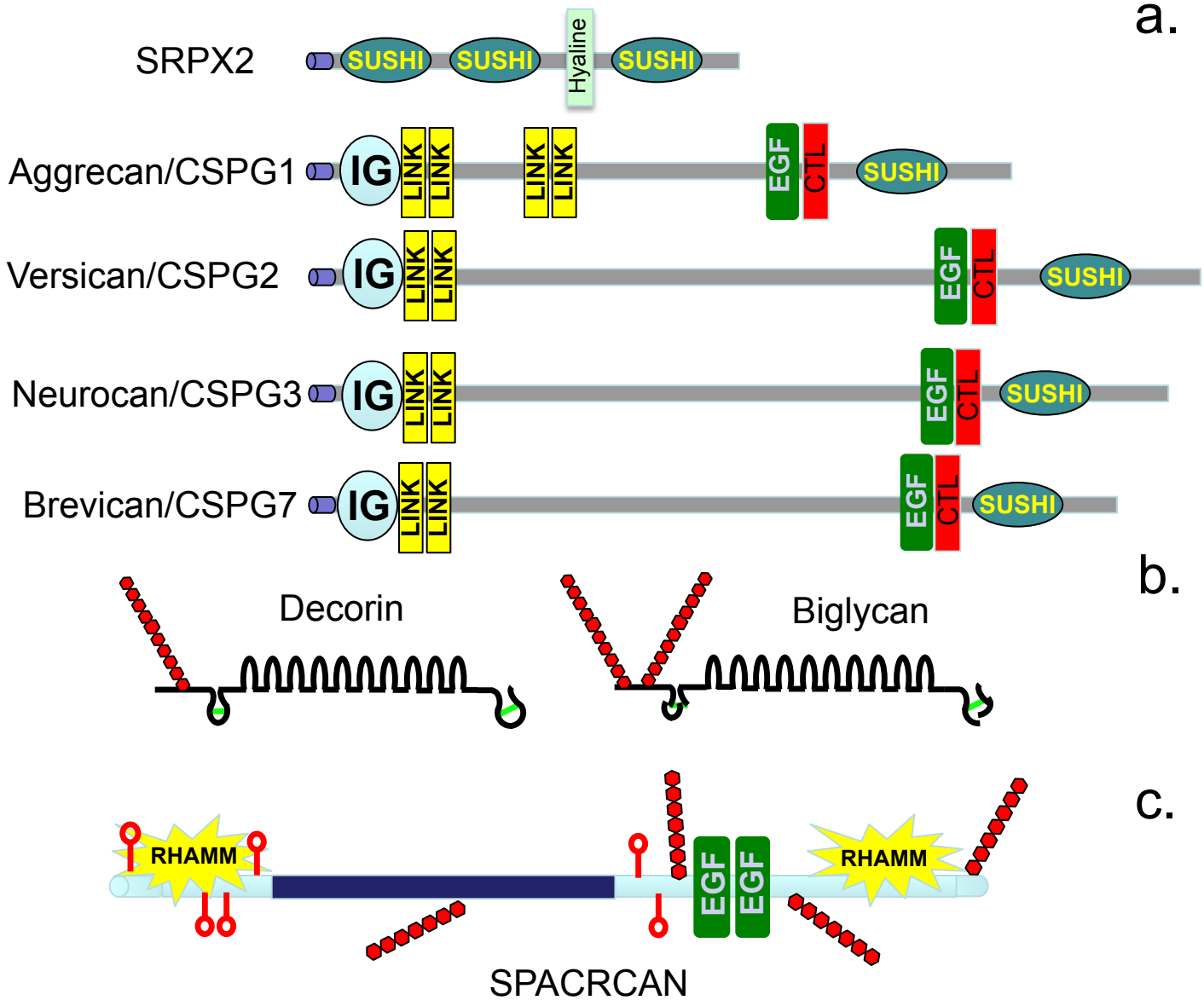
CS disaccharide nomenclature based on sulphation motifs

CS isomer	Sulphation Position(s)	Nomenclature
Chondroitin	0 S	CS-O
Chondroitin-4-*O* sulphate	4 S	CS-A
Chondroitin-6-*O* sulphate	6 S	CS-C
Chondroitin-2, 4-*O* sulphate	2,4 S	CS-B
Chondroitin-2, 6-*O* sulphate	2,6 S	CS-D
Chondroitin-4, 6-*O* sulphate	4,6 S	CS-E
Chondroitin-2, 4, 6-*O* sulphate	2,4,6 S	CS-T

Key: (+)/(-) = ± chondroitinase ABC

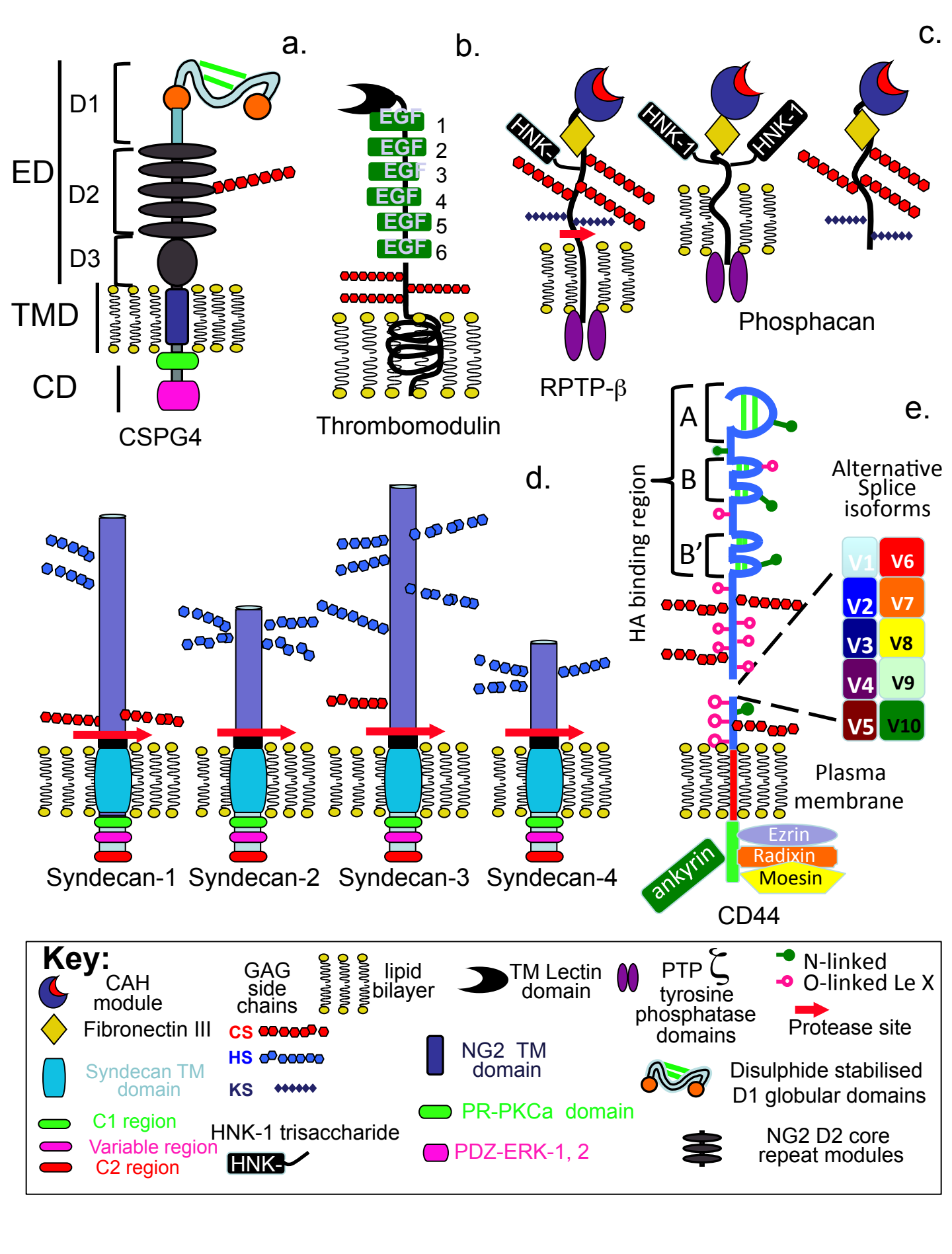
D-Xyl *D*-Gal *N*-AcGalNH$_2$ L-IduA

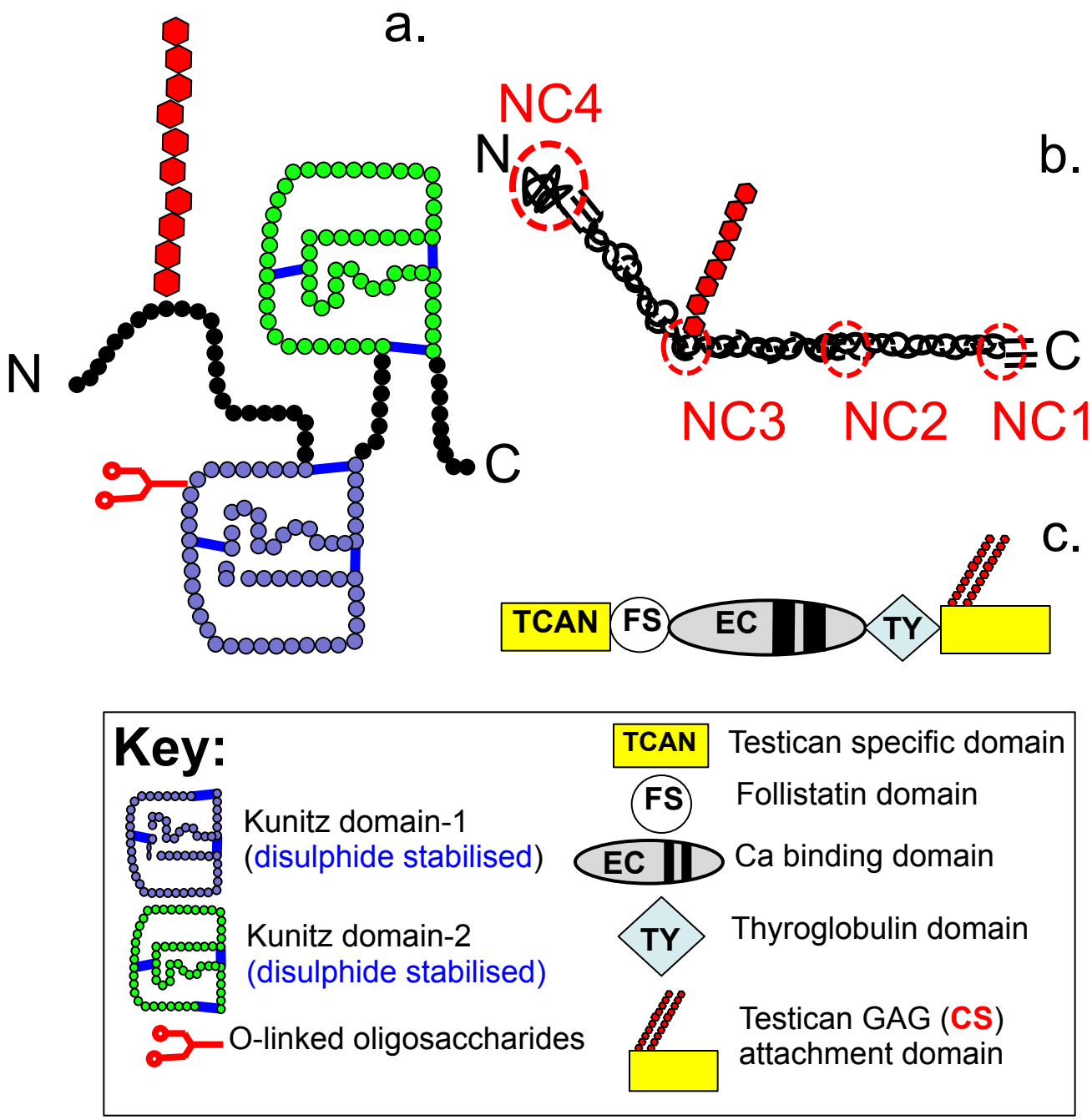
D-GlcUA **2S, 4S, 6S** sulphation motifs SO_4



Key:

- Signal peptide
- Hyaline peptide domain
- Immunoglobulin (IG) link module HA Binding region Aggrecan-like G1
- Epidermal growth factor repeat (EGF), C type lectin (CTL) domains
- SUSHI protein module
- Leucine rich repeats
- O-linked oligosaccharides
- RHAMM-like HA binding region


a.
b.
c.
D1
ED
D2
D3
TMD
CD
CSPG4
EGF 1
EGF 2
EGF 3
EGF 4
EGF 5
EGF 6
Thrombomodulin
HNK-1
HNK-1
HNK-1
RPTP-β
Phosphacan
d.
Syndecan-1
Syndecan-2
Syndecan-3
Syndecan-4
e.
A
B
B'
HA binding region
Alternative Splice isoforms
V1
V2
V3
V4
V5
V6
V7
V8
V9
V10
Plasma membrane
Ezrin
Radixin
Moesin
ankyrin
CD44
Key:
CAH module
Fibronectin III
Syndecan TM domain
C1 region
Variable region
C2 region
GAG side chains
CS
HS
KS
HNK-1 trisaccharide
HNK-
lipid bilayer
NG2 TM domain
PR-PKCa domain
PDZ-ERK-1, 2
TM Lectin domain
PTP tyrosine phosphatase domains
Disulphide stabilised D1 globular domains
NG2 D2 core repeat modules
N-linked
O-linked Le X
Protease site



Key:

Kunitz domain-1 (disulphide stabilised)

Kunitz domain-2 (disulphide stabilised)

O-linked oligosaccharides

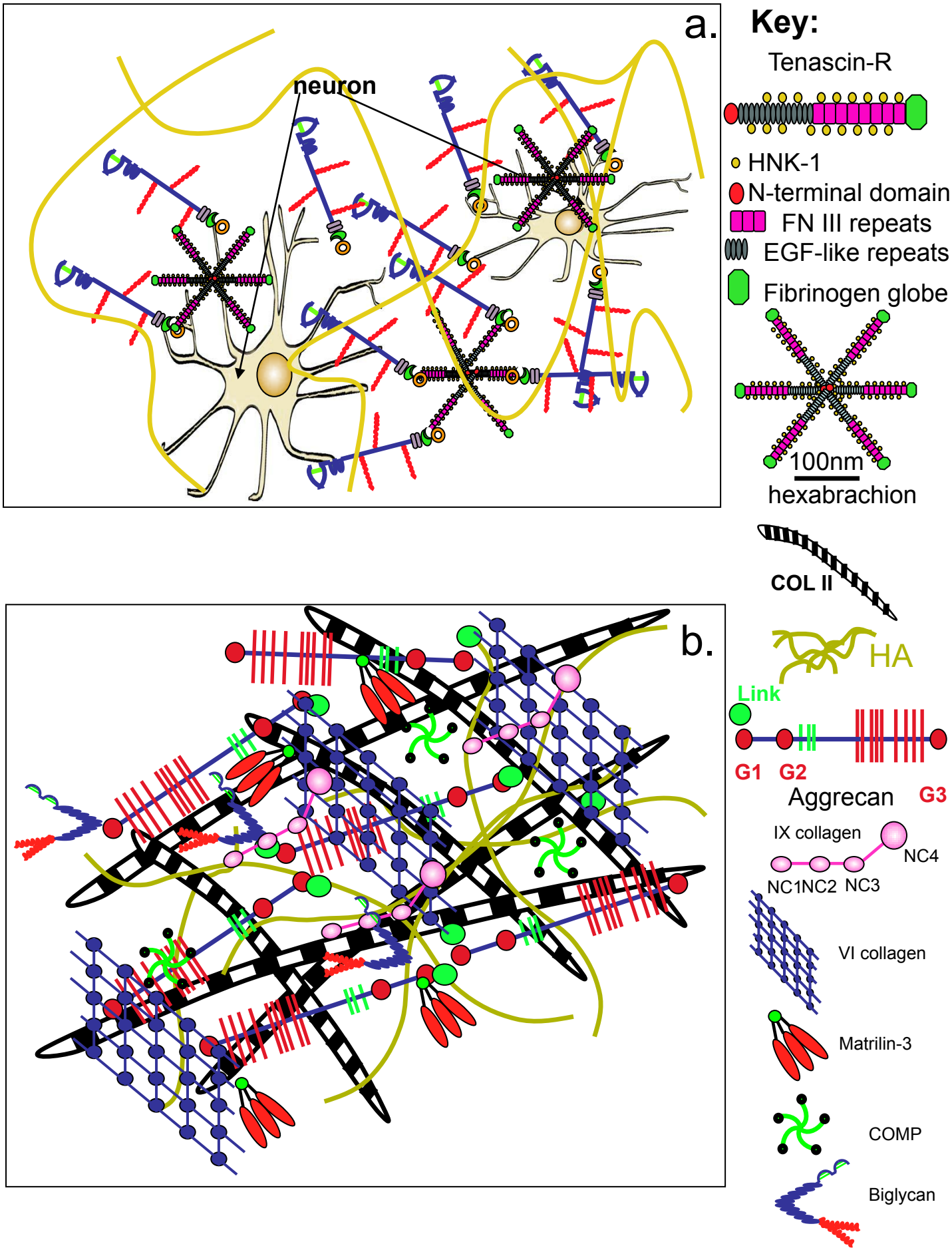
TCAN — Testican specific domain

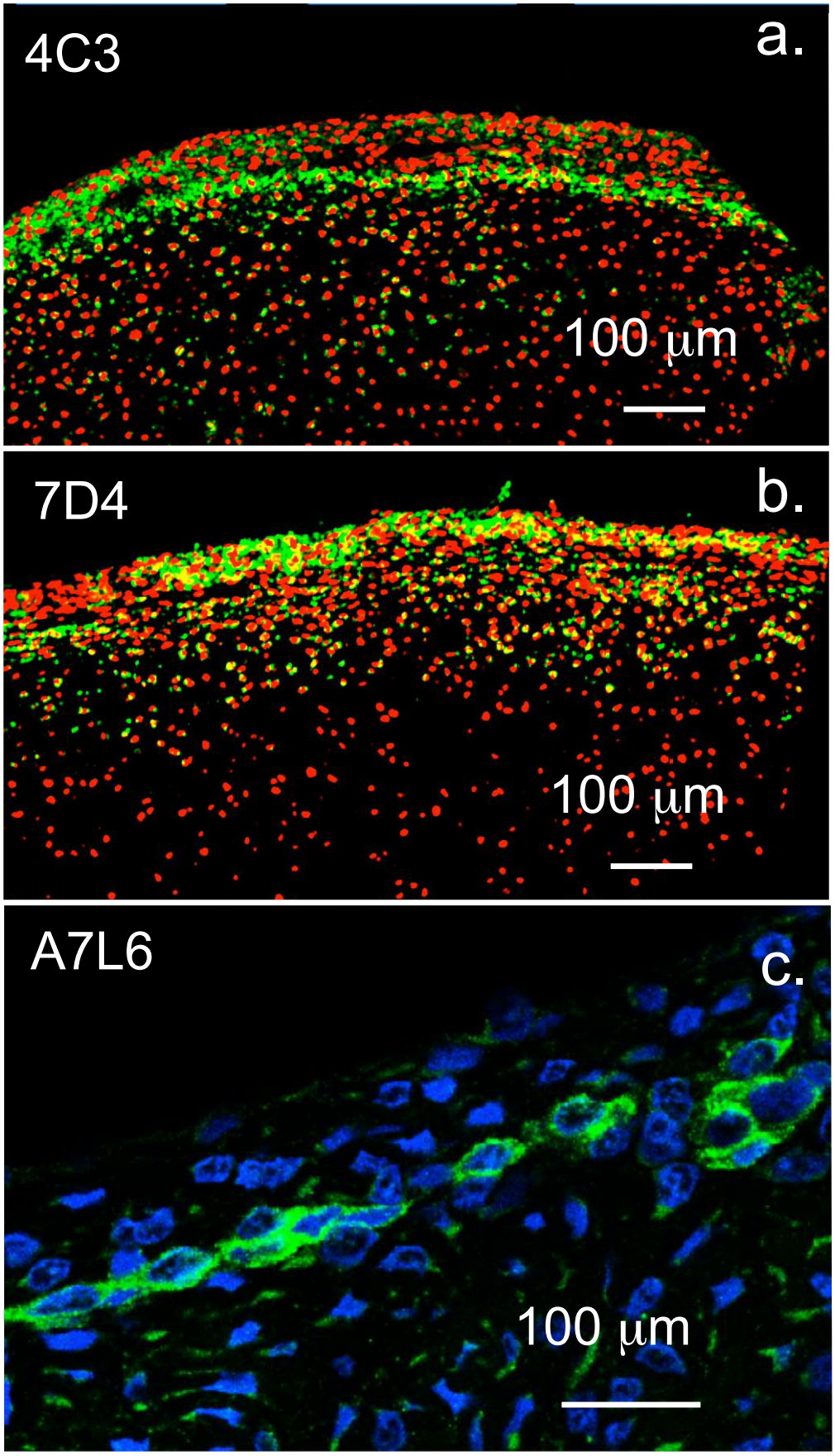
FS — Follistatin domain

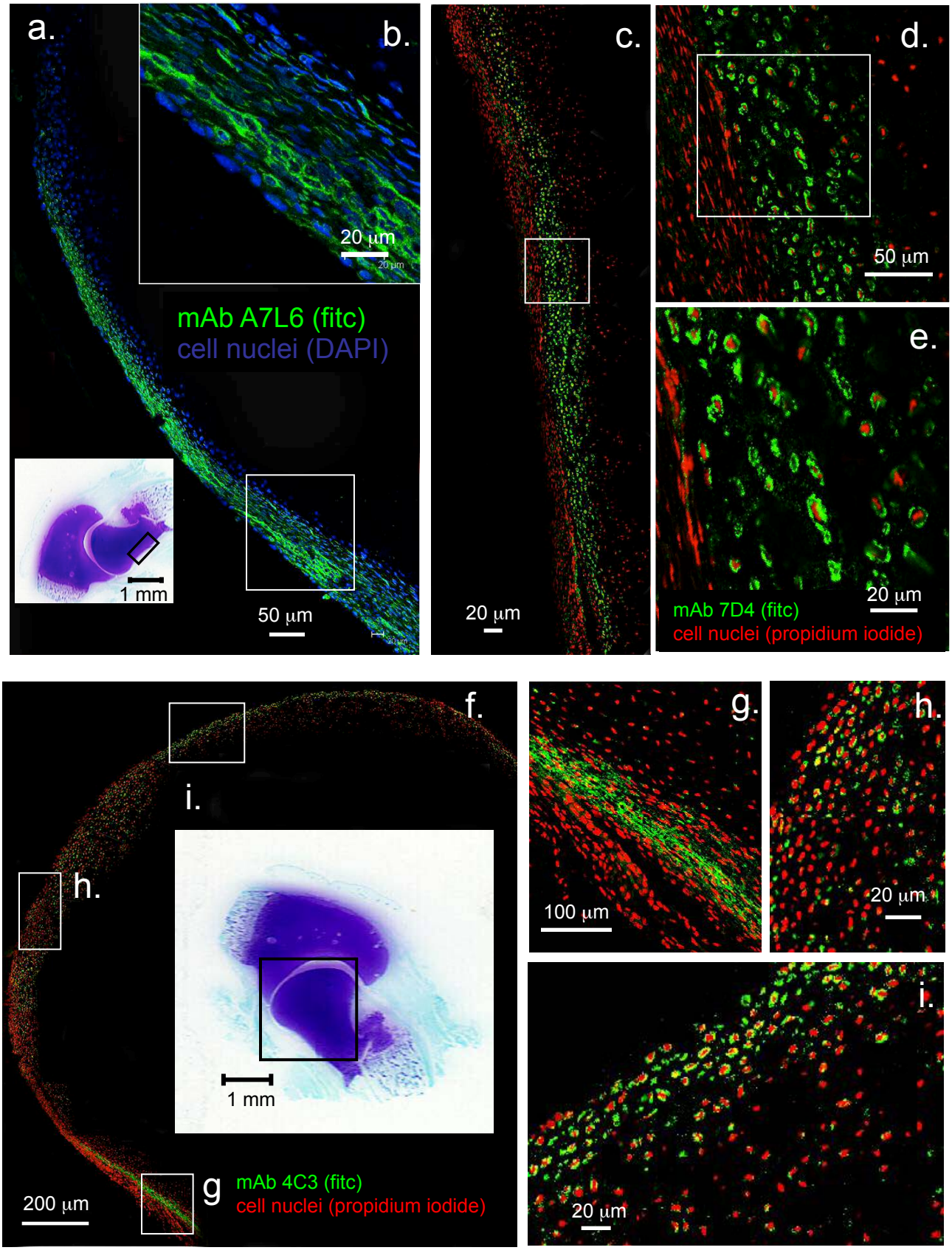
EC — Ca binding domain

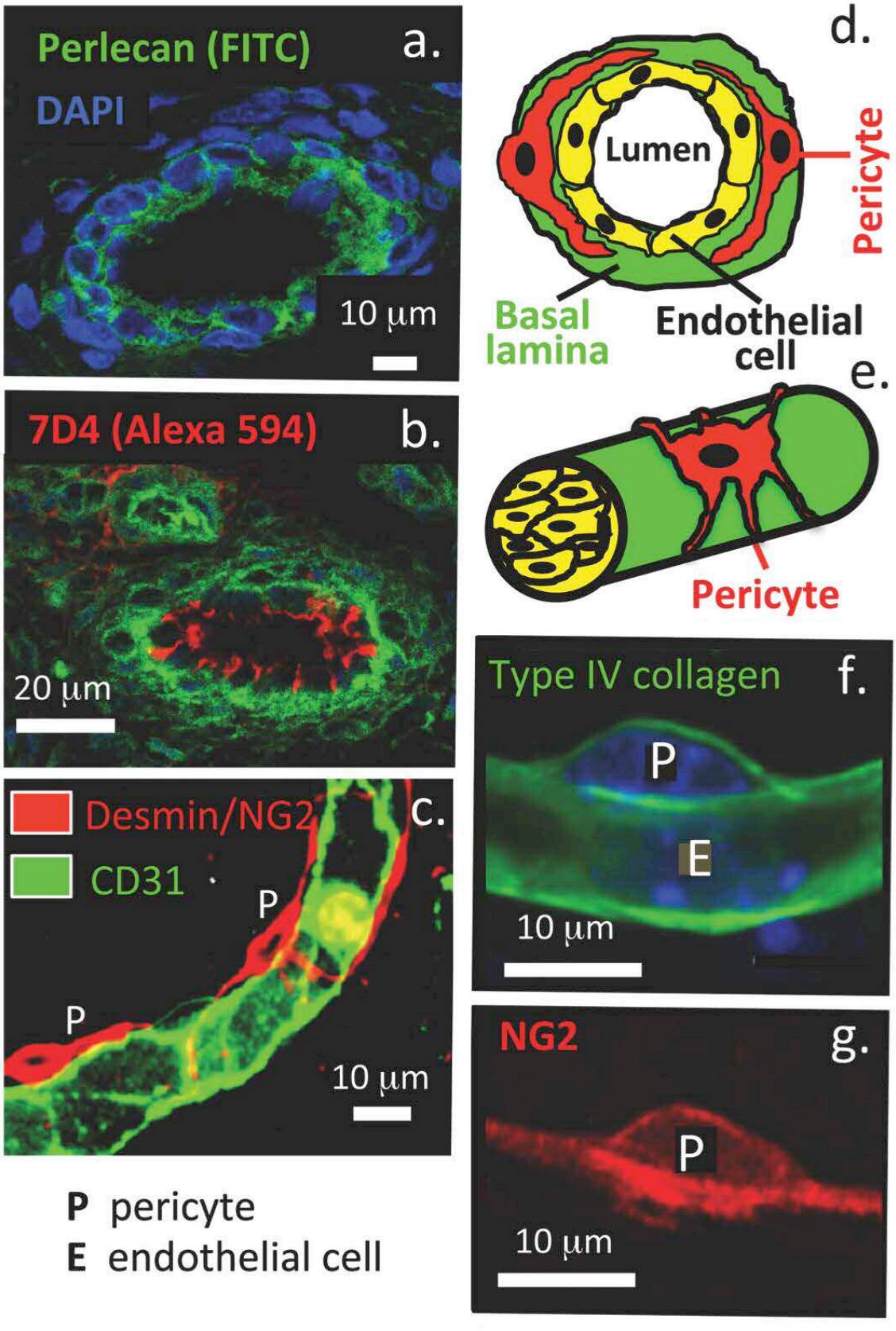
TY — Thyroglobulin domain

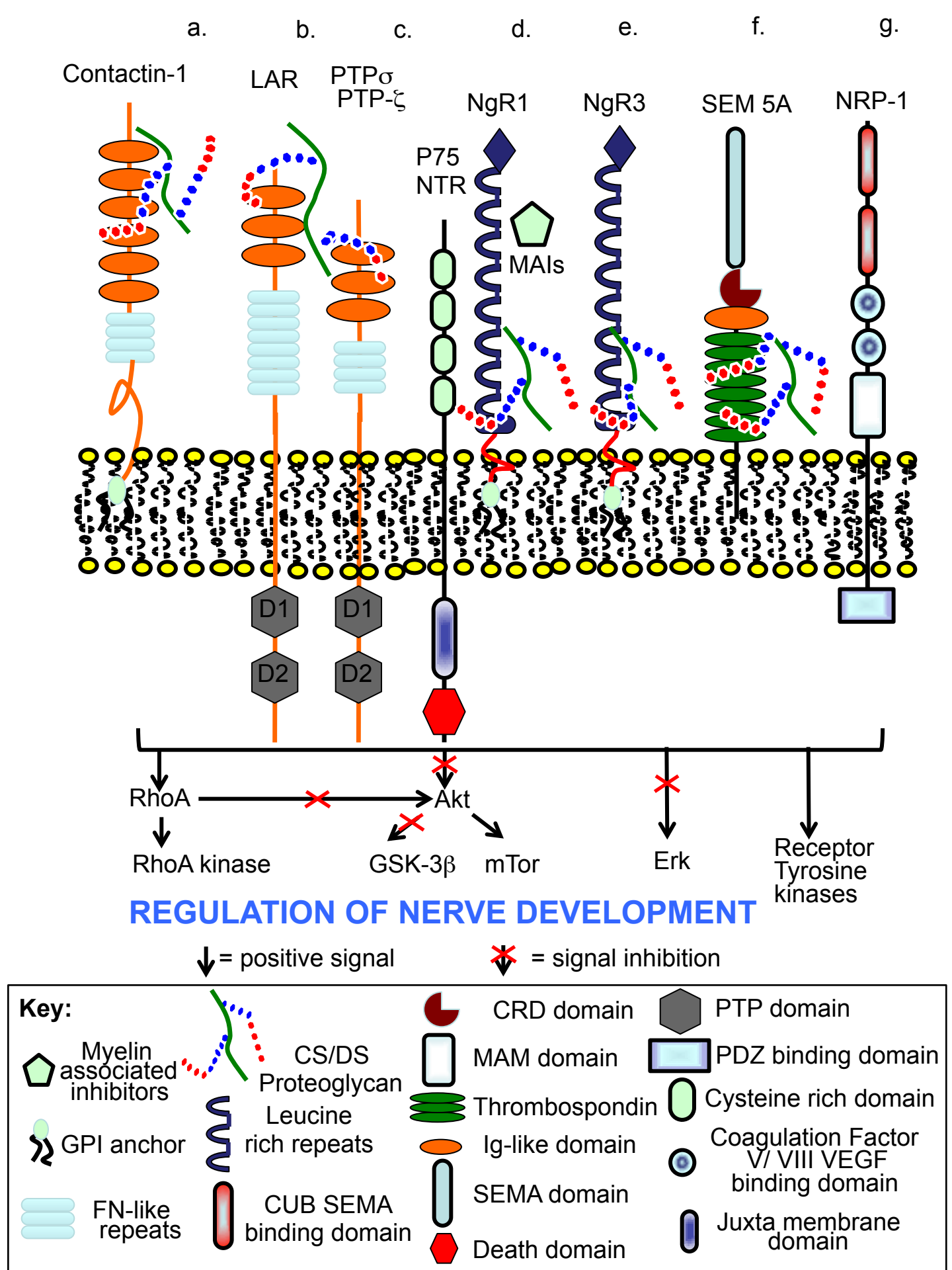
Testican GAG (**CS**) attachment domain

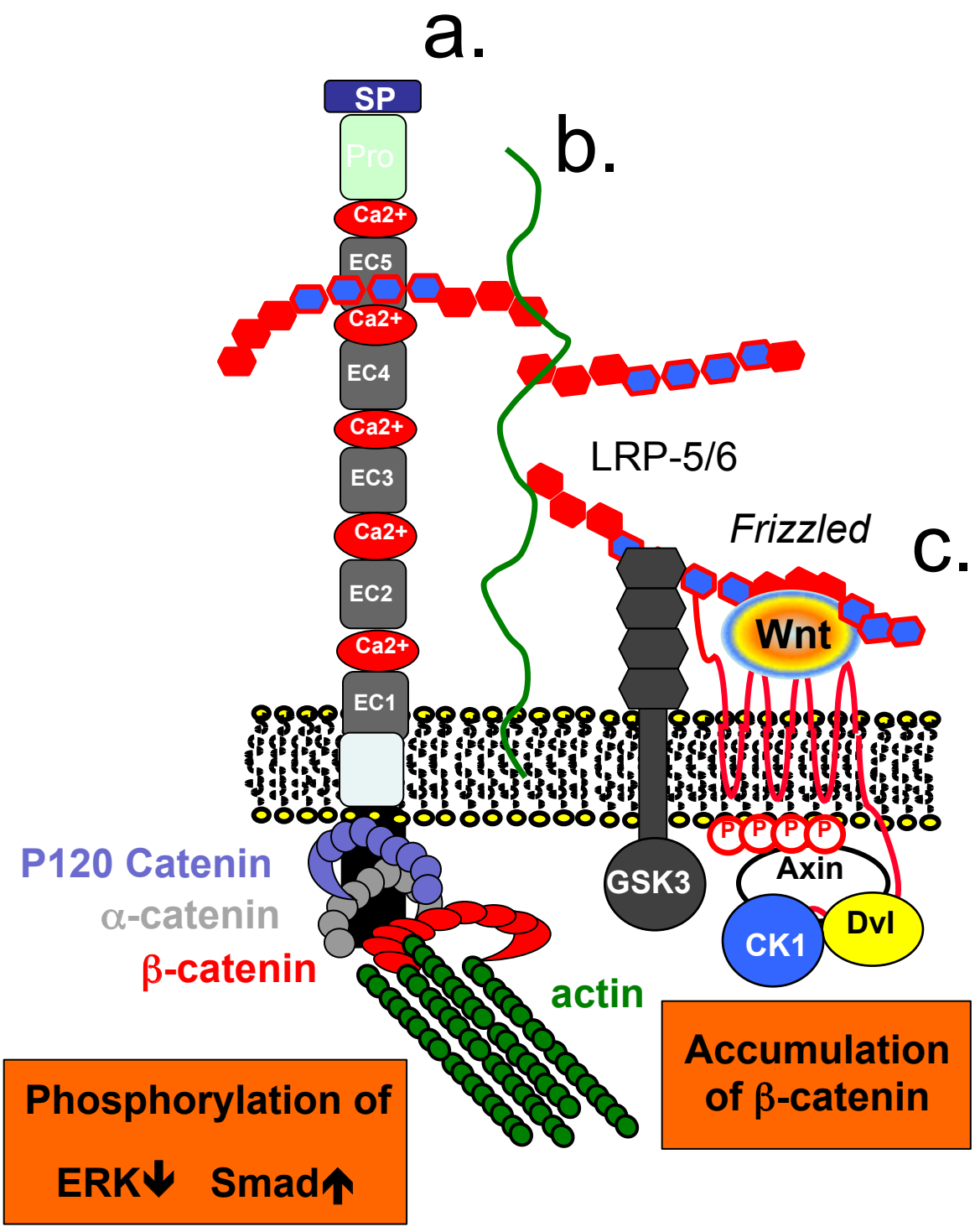

a.
neuron
Key:
Tenascin-R
HNK-1
N-terminal domain
FN III repeats
EGF-like repeats
Fibrinogen globe
100nm
hexabrachion
COL II
HA
Link
G1
G2
Aggrecan
G3
IX collagen
NC4
NC1NC2
NC3
VI collagen
Matrilin-3
COMP
Biglycan
b.


4C3
a.
100 μm
7D4
b.
100 μm
A7L6
c.
100 μm

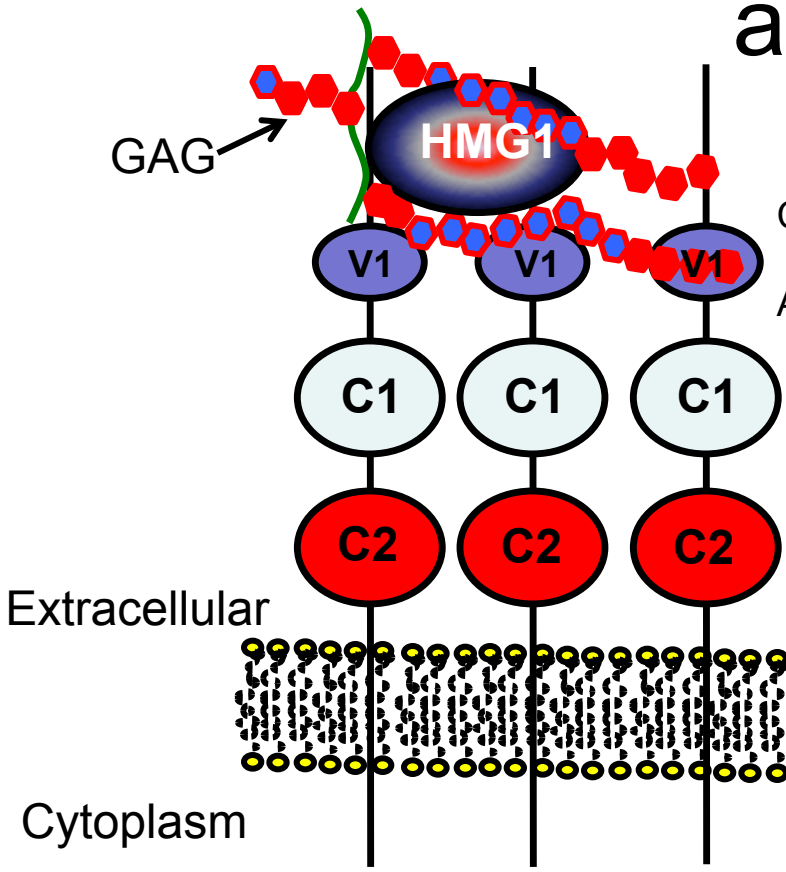

a.
b.
20 μm
mAb A7L6 (fitc)
cell nuclei (DAPI)
1 mm
50 μm
c.
20 μm
d.
50 μm
e.
20 μm
mAb 7D4 (fitc)
cell nuclei (propidium iodide)
f.
i.
h.
1 mm
200 μm
g
mAb 4C3 (fitc)
cell nuclei (propidium iodide)
g.
100 μm
h.
20 μm
i.
20 μm


Perlecan (FITC)
a.
DAPI
10 μm
7D4 (Alexa 594)
b.
20 μm
Desmin/NG2
CD31
c.
P
P
10 μm
d.
Lumen
Pericyte
Basal lamina
Endothelial cell
e.
Pericyte
Type IV collagen
f.
P
E
10 μm
NG2
g.
P
10 μm
P pericyte
E endothelial cell


a.
b.
c.
d.
e.
f.
g.
Contactin-1
LAR
PTPσ
PTP-ζ
NgR1
NgR3
SEM 5A
NRP-1
P75
NTR
MAIs
D1
D2
D1
D2
RhoA
Akt
RhoA kinase
GSK-3β
mTor
Erk
Receptor
Tyrosine
kinases
REGULATION OF NERVE DEVELOPMENT
= positive signal
= signal inhibition
Key:
Myelin associated inhibitors
GPI anchor
FN-like repeats
CS/DS Proteoglycan
Leucine rich repeats
CUB SEMA binding domain
CRD domain
MAM domain
Thrombospondin
Ig-like domain
SEMA domain
Death domain
PTP domain
PDZ binding domain
Cysteine rich domain
Coagulation Factor V/ VIII VEGF binding domain
Juxta membrane domain


a.
SP
Pro
Ca2+
EC5
Ca2+
EC4
Ca2+
EC3
Ca2+
EC2
Ca2+
EC1
b.
LRP-5/6
Frizzled
c.
Wnt
P
P
P
P
Axin
GSK3
CK1
Dvl
P120 Catenin
α-catenin
β-catenin
actin
Phosphorylation of
ERK↓ Smad↑
Accumulation
of β-catenin

RAGE

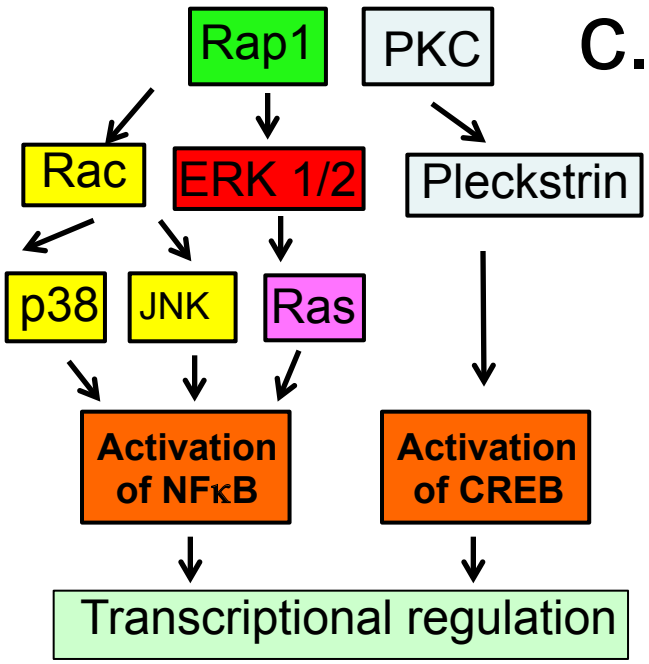


b.

RAGE ligands

CS-DS GAG chains containing CS-E disaccharides, HMBG1, AGEs,S100s, amyloid β-peptides

Insoluble amyloid β-peptide aggregates

S100A6

Phosphlipid bilayer