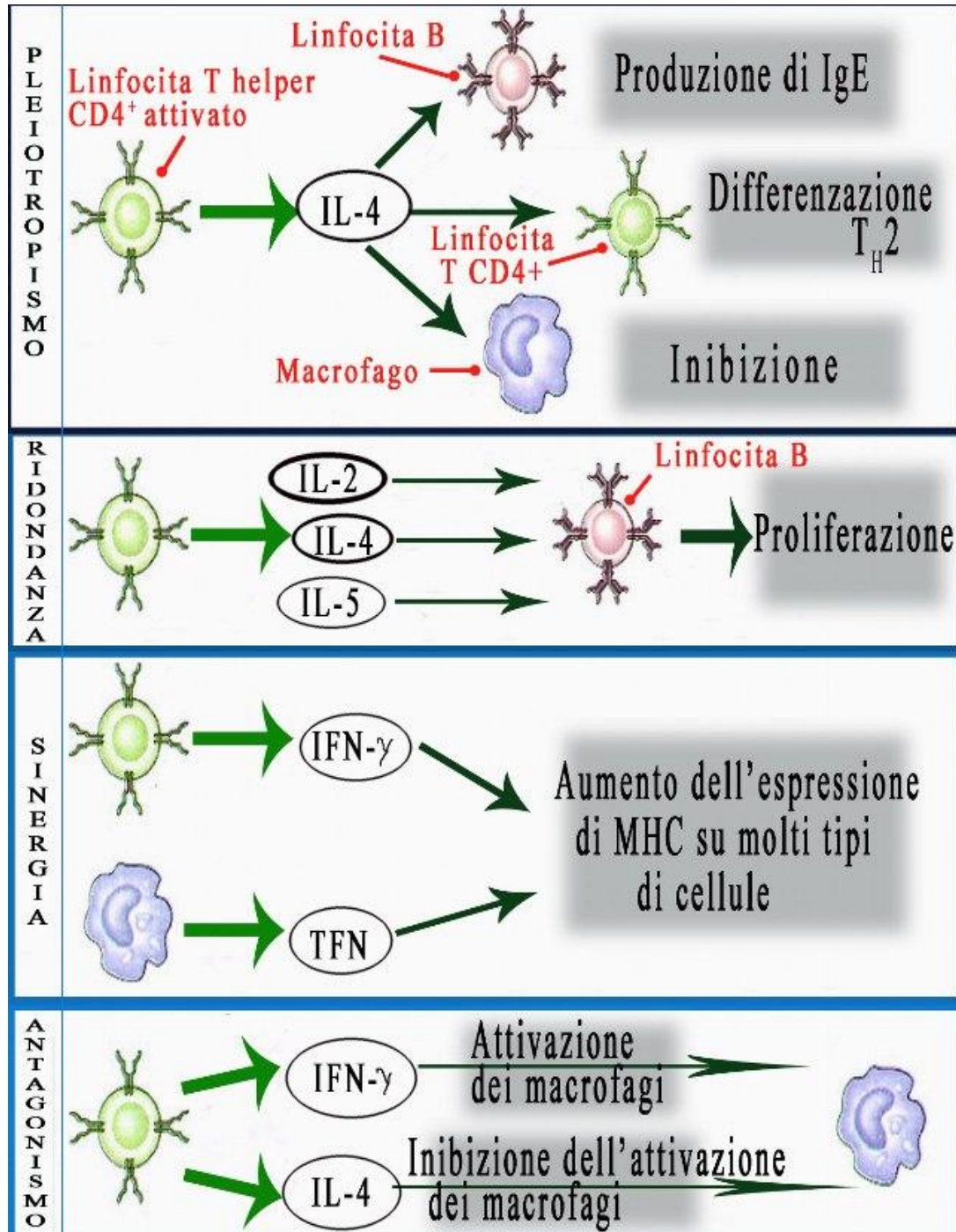


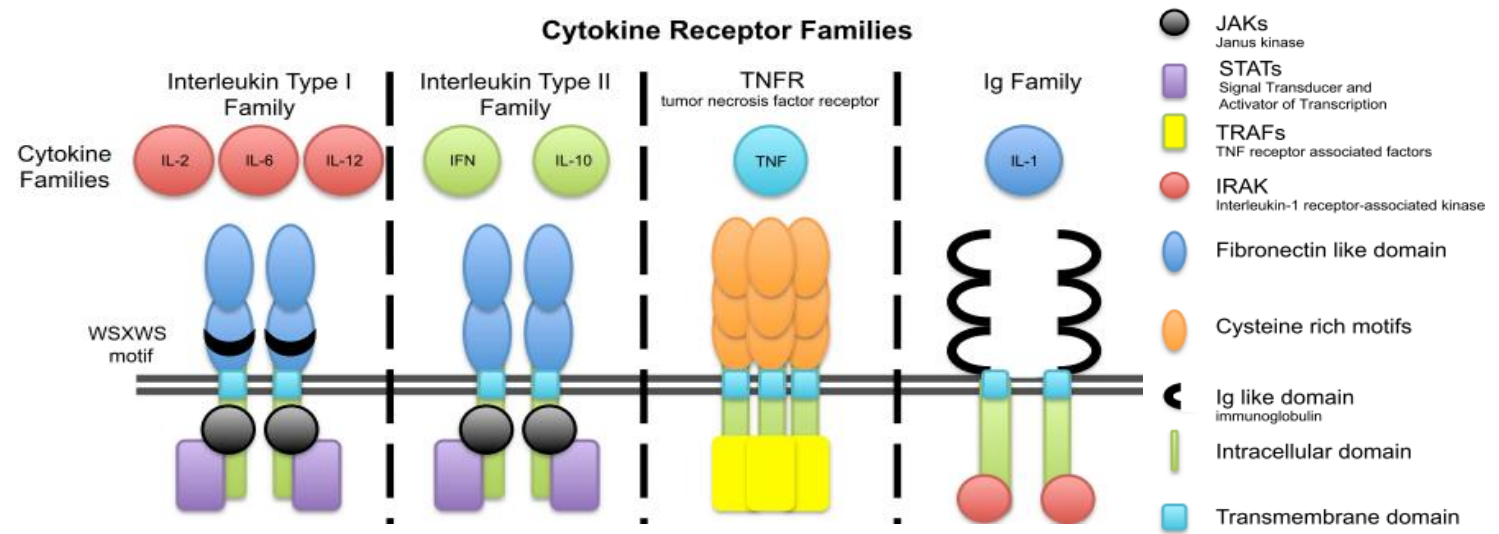
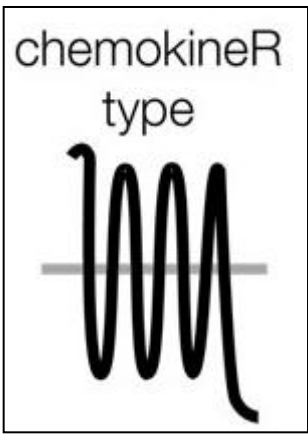
CYTOKINES: GENERAL FEATURES

- FUNCTION: SIGNALING
- PRODUCED FOR SHORT PERIODS, AT LOW CONCENTRATIONS, AFTER STIMULI
- HUMORAL OR MEMBRANE MEDIATORS
- AUTOCRINE, IJXTACRINE/PARACRINE
- SPECIFIC RECEPTORS
- CASCADE

BIOLOGIC EFFECTS:
DIFFERENTIATION
PROLIFERATION
DEATH
ACTIVATION

STRUCTURAL
SUPERFAMILIES
(CYTOKINES AND
RECEPTORS)





Hanel et al., 2013 (modified)

Structural classification of cytokines and receptors

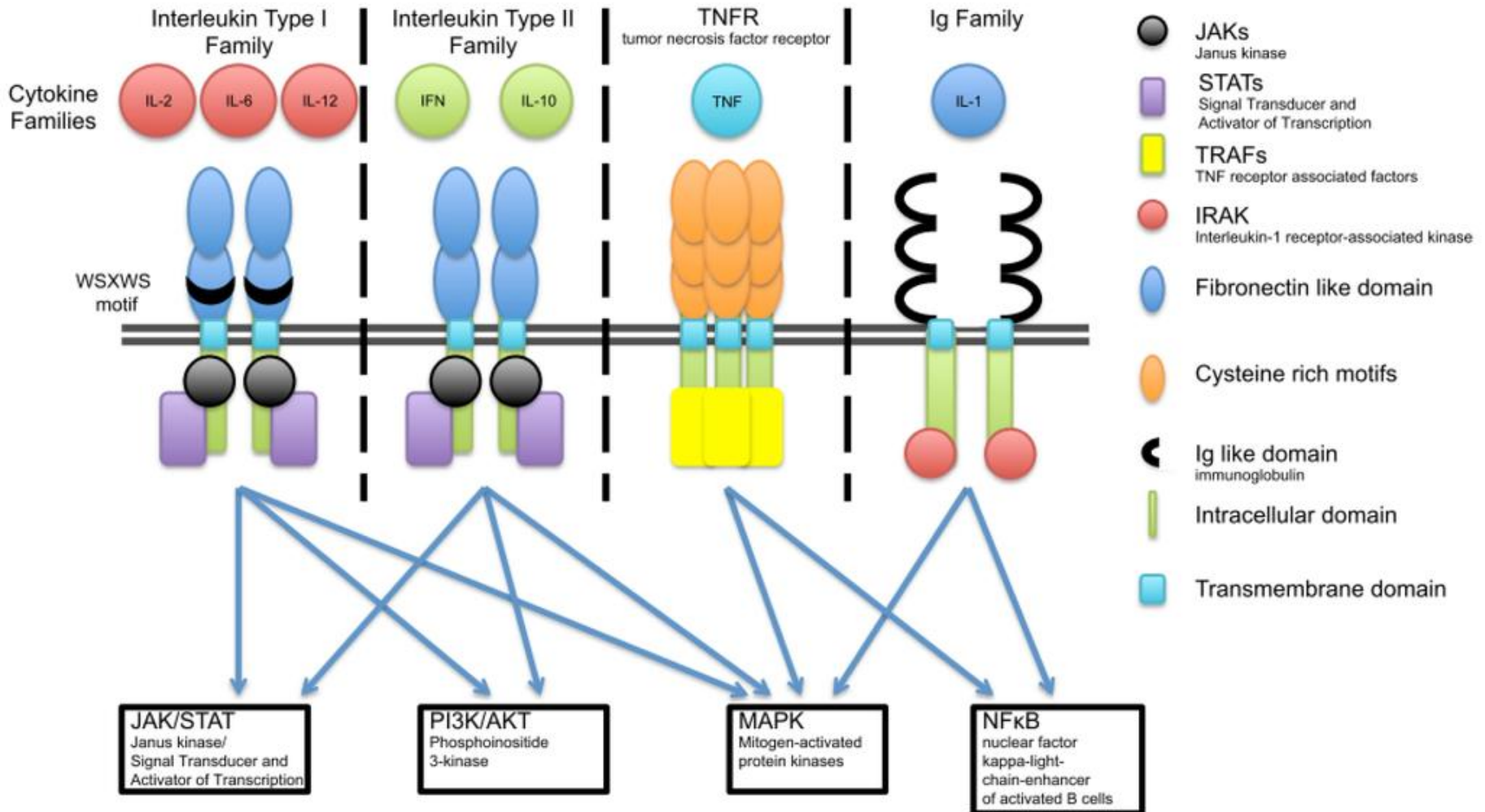
receptor	lg-type	TNFR-type	cytokine R type I	cytokine R type II	chemokine R
b-trefoil	IL1a, ILb, IL18				
TNF-like (jelly roll)		TNFa, TNFb, CD40L, OX40L, TRAIL, RANKL			
four-helical bundle (long/short chains)			IL6, G-CSF, GH, LIF, IL12p35, GM-CSF, M-CSF, IL3, IL4, IL5, IL2, IL7, IL9, IL11, IL13, IL15, IL21, IL23p19, IL27p28,		
four-helical bundle (IFN/IL10)				IL10, IL19, IL20, IL22, IL24, IL28A, IL28B, IFNa, IFNb, IFNg, IFNI,	

IL8l, chemokines

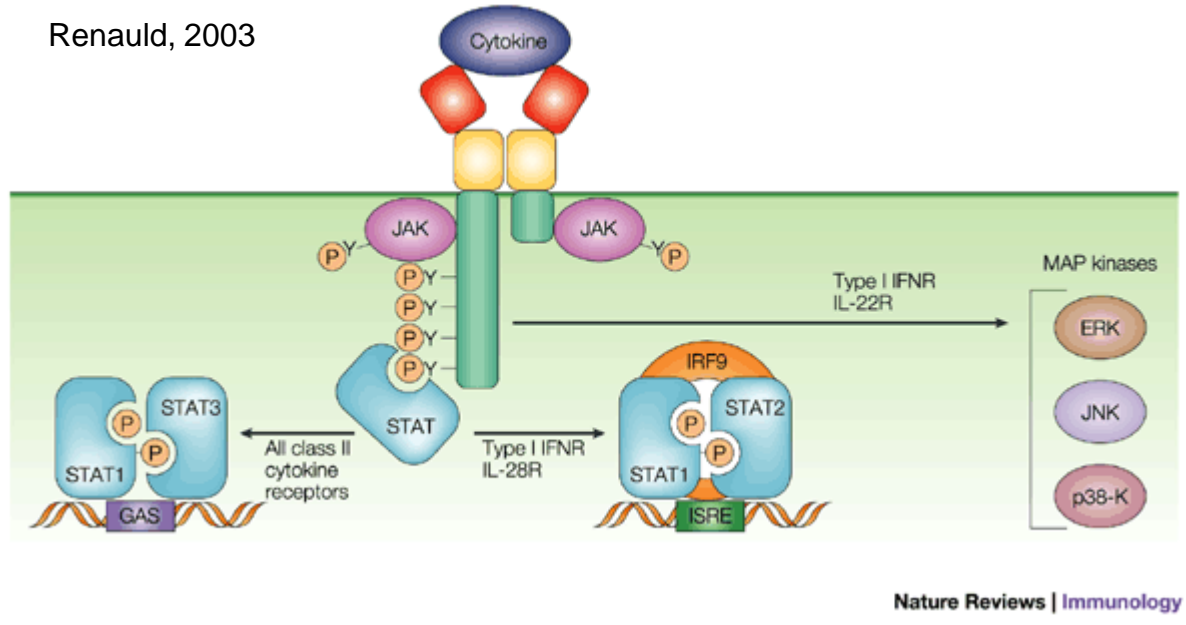
all known chemokines

SIGNAL TRANSDUCTION

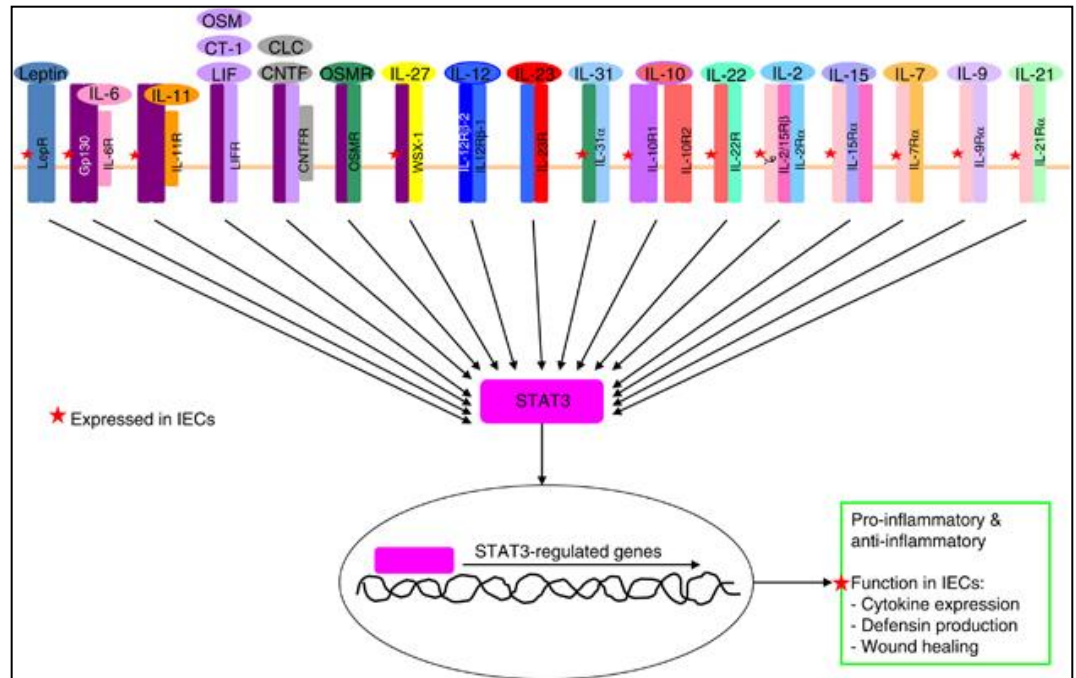
Cytokine Receptor Families



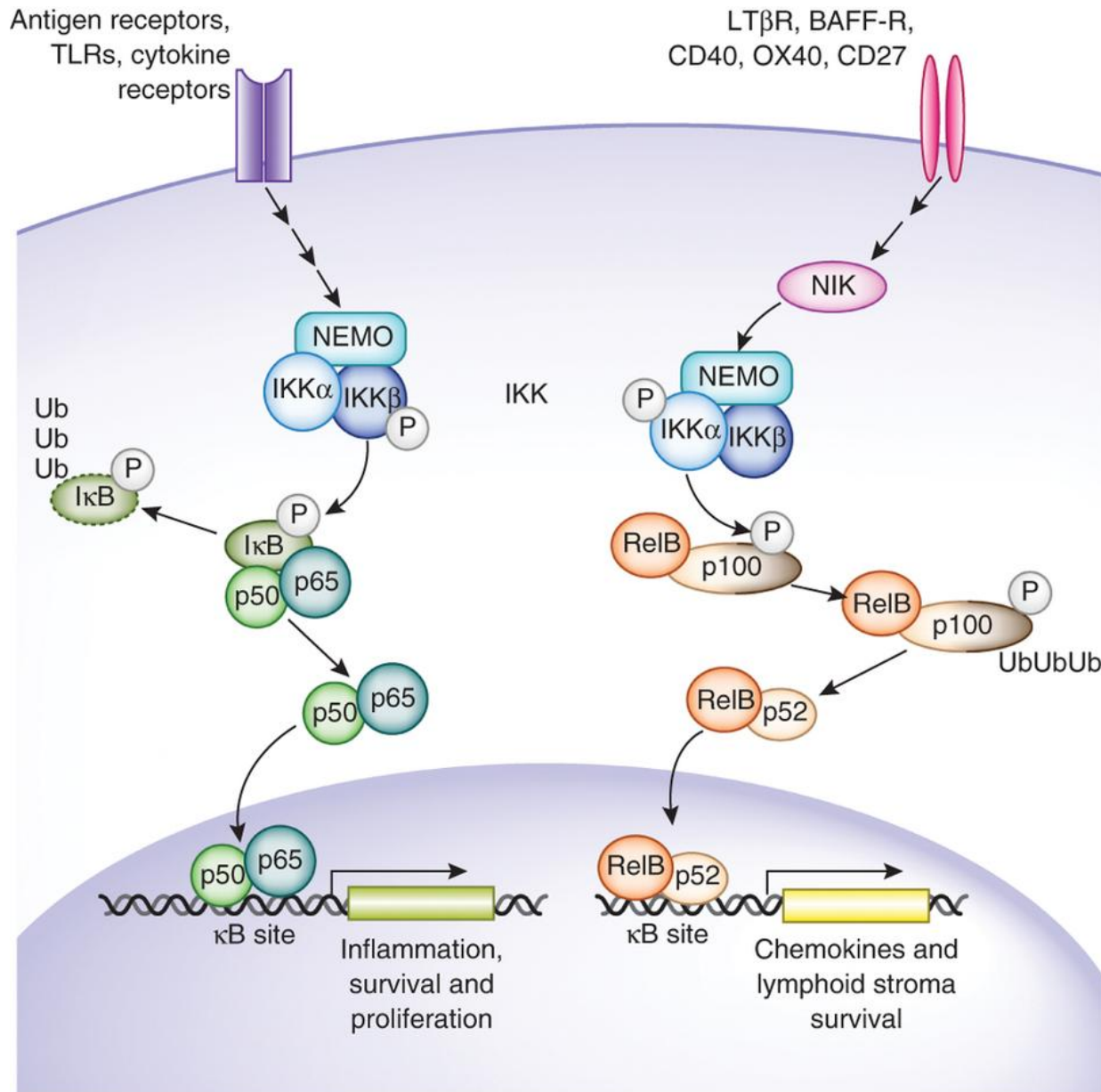
Renauld, 2003



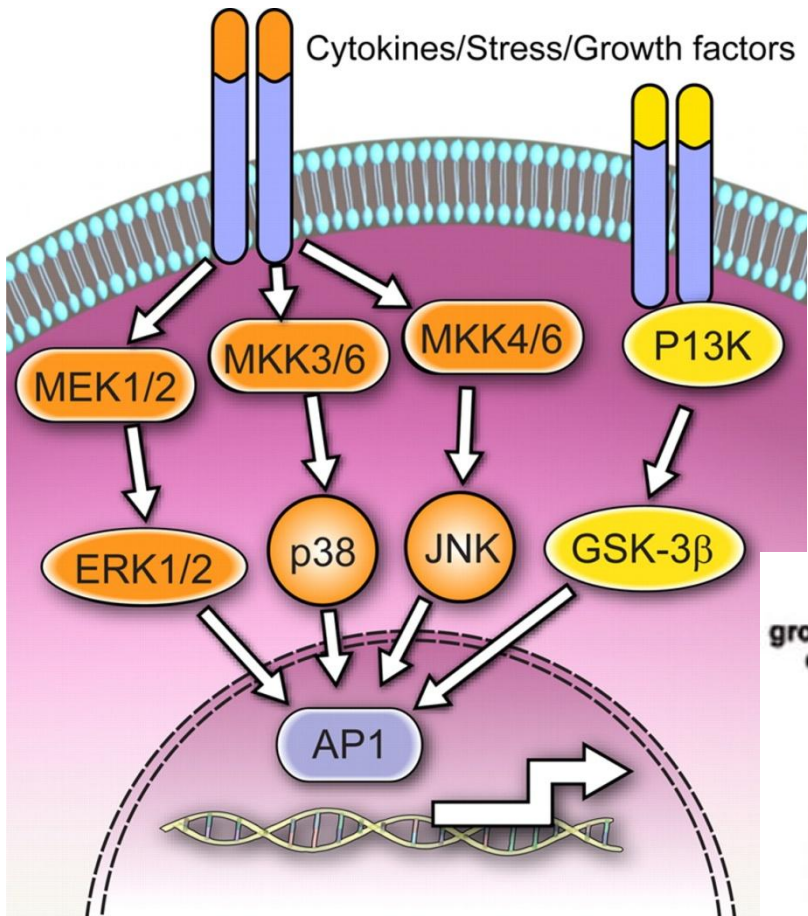
STAT FACTORS



Mackey-Lawrence & Petri, 2012; IEC = Intestinal Epithelial Cells

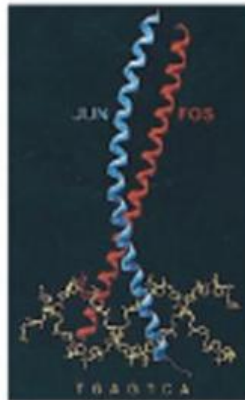
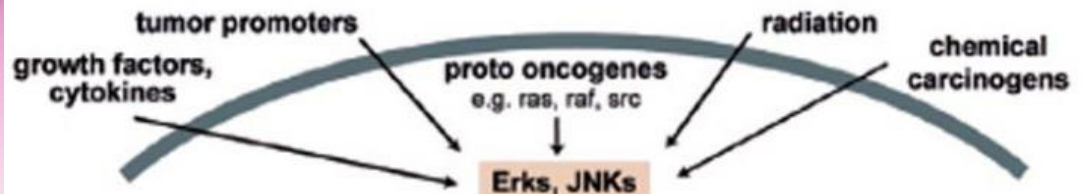


NF-κB

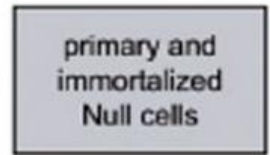
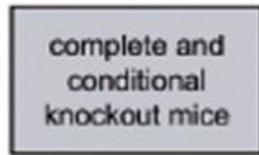


Alberini, 2009

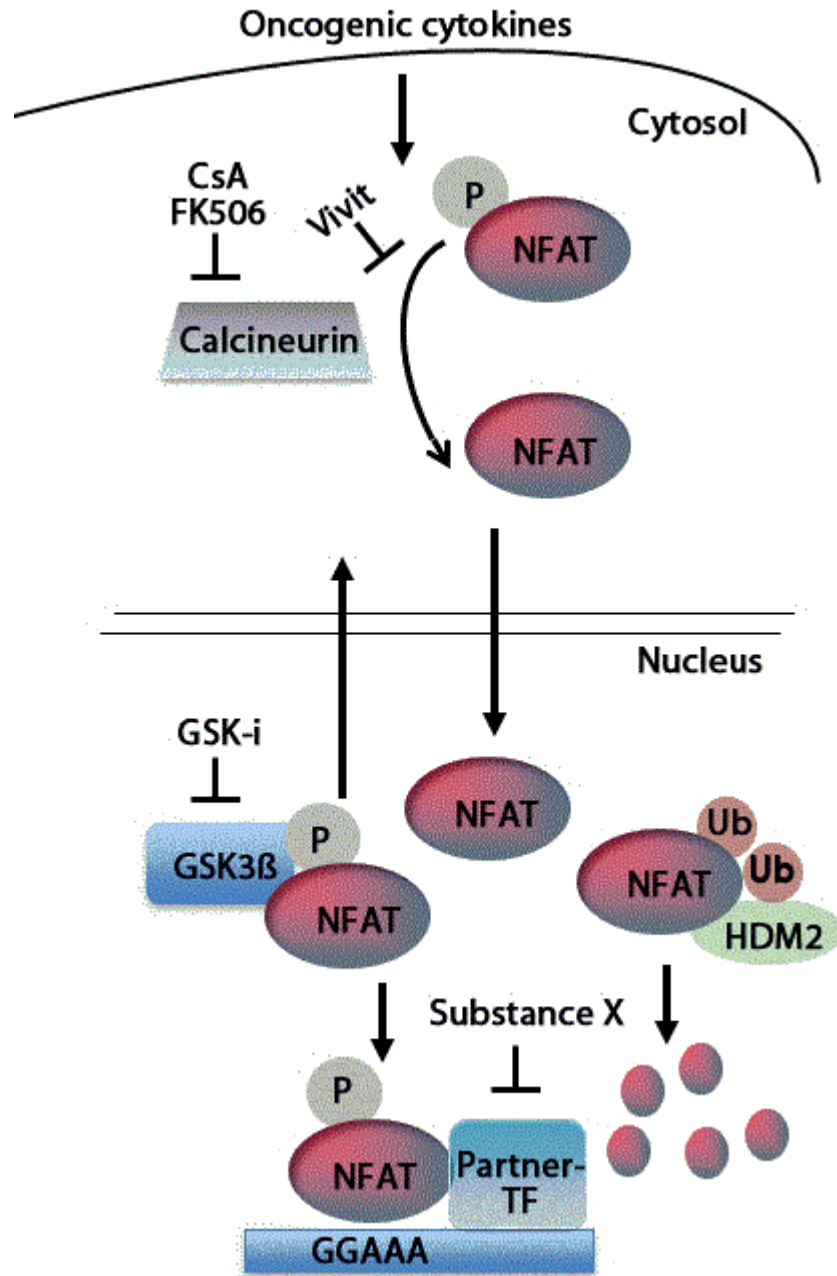
AP-1



AP-1

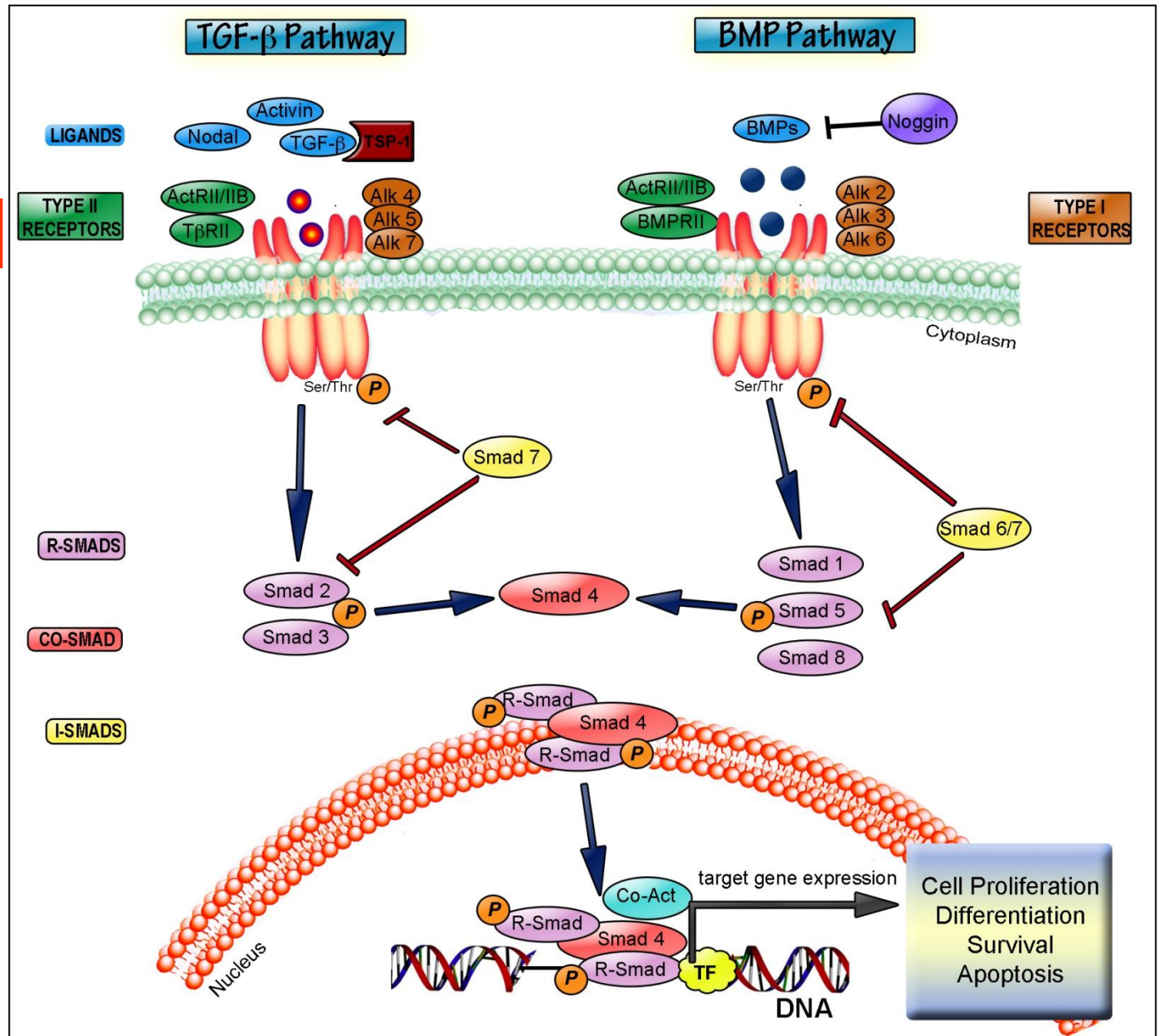


proliferation, transformation, differentiation, apoptosis, survival

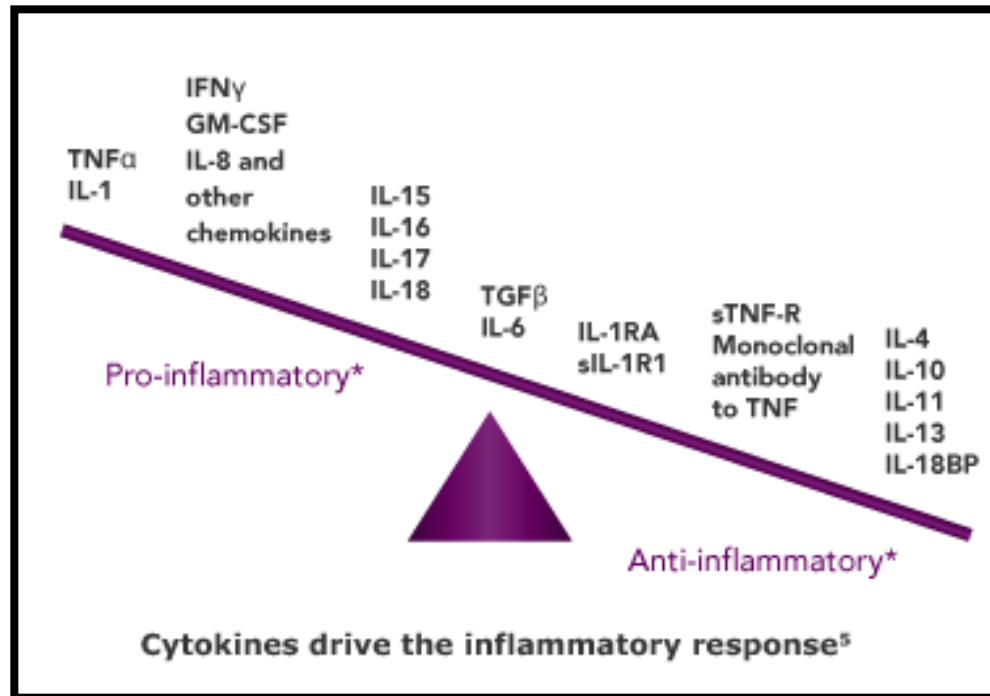


NFAT FACTORS

SMAD FACTORS



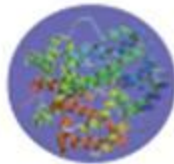
CYTOKINES IN INFLAMMATION



CYTOKINES IN THE IMMUNE RESPONSE

Pro-inflammatory Cytokines : stimulate the immune system

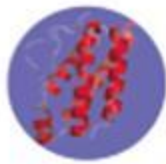
Th1



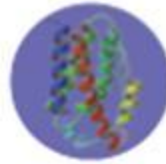
INF- γ



TNF- α



IL-2



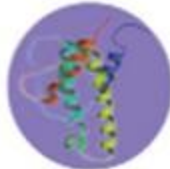
IL-6



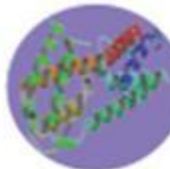
IL-12

Anti-inflammatory Cytokines : suppress the immune system

Th2



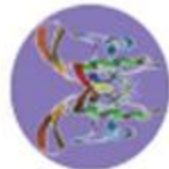
IL-4



IL-5



IL-10



TGF- β

Crystallography derived from RCSB Protein Data Bank.¹

CYTOKINES IN APOPTOTIC DEATH

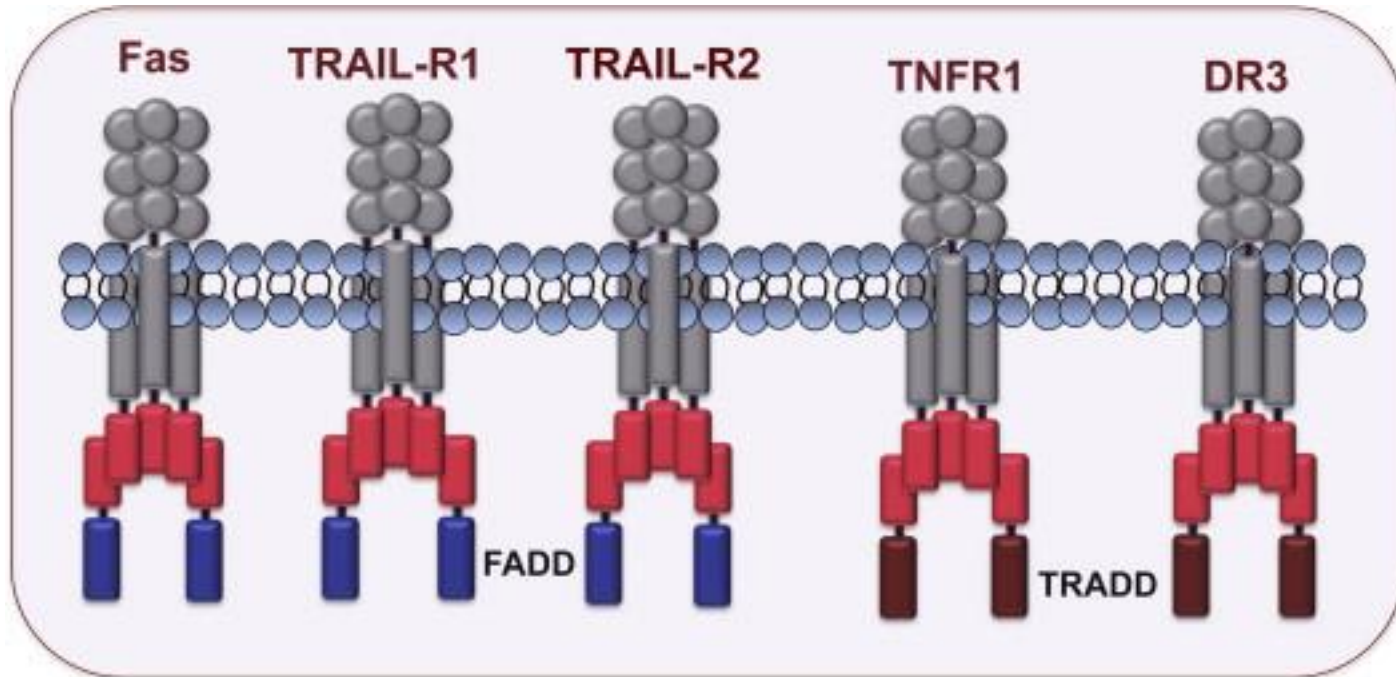


Fig. 1 Members of the 'death receptor' subfamily of the TNF superfamily. Note that Fas is also called CD95 or APO-1, TRAIL-R1 is also called DR4 and TRAIL-R2 is also called DR5.

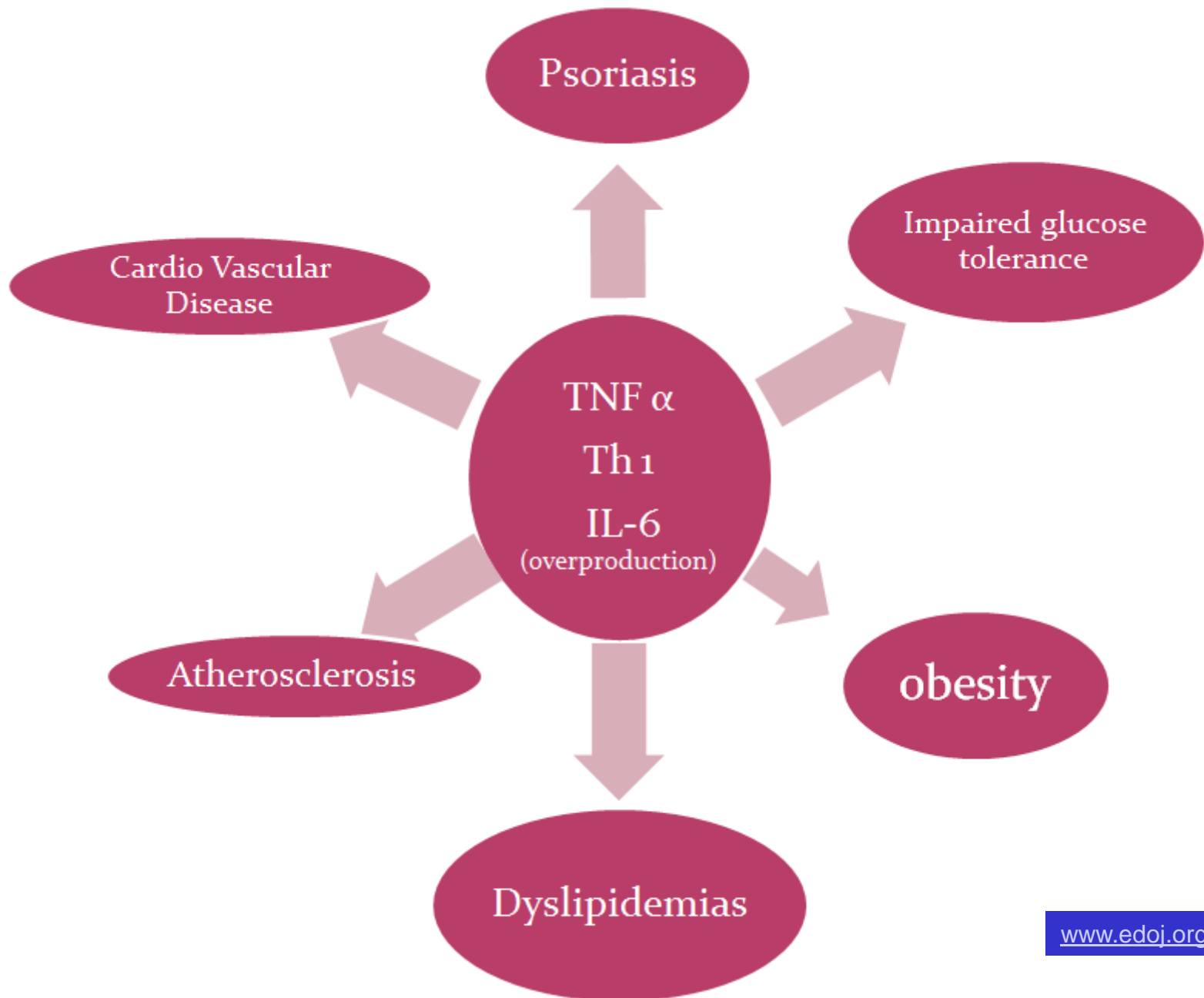
Sean P. Cullen , Seamus J. Martin

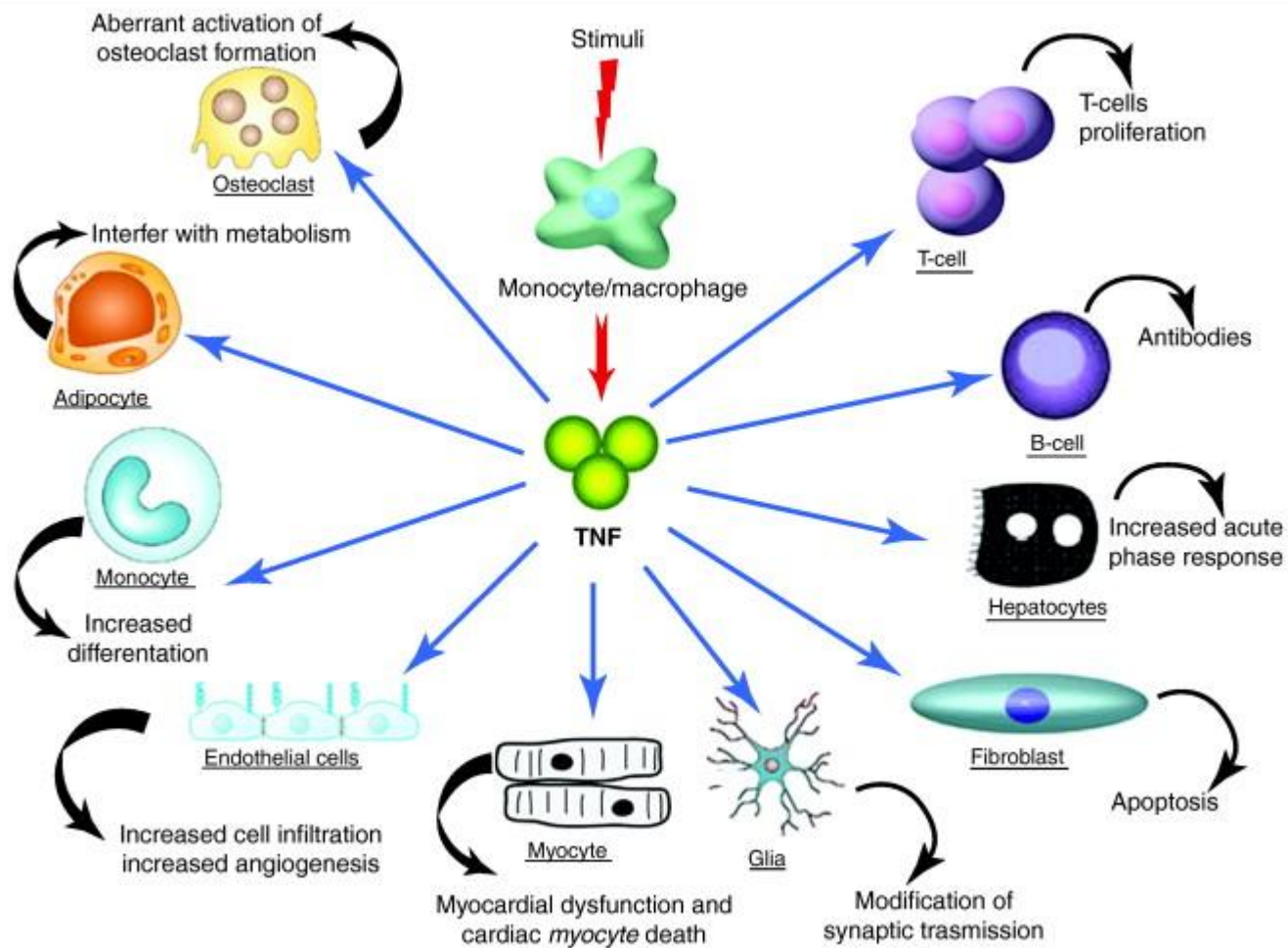
Fas and TRAIL 'death receptors' as initiators of inflammation: Implications for cancer

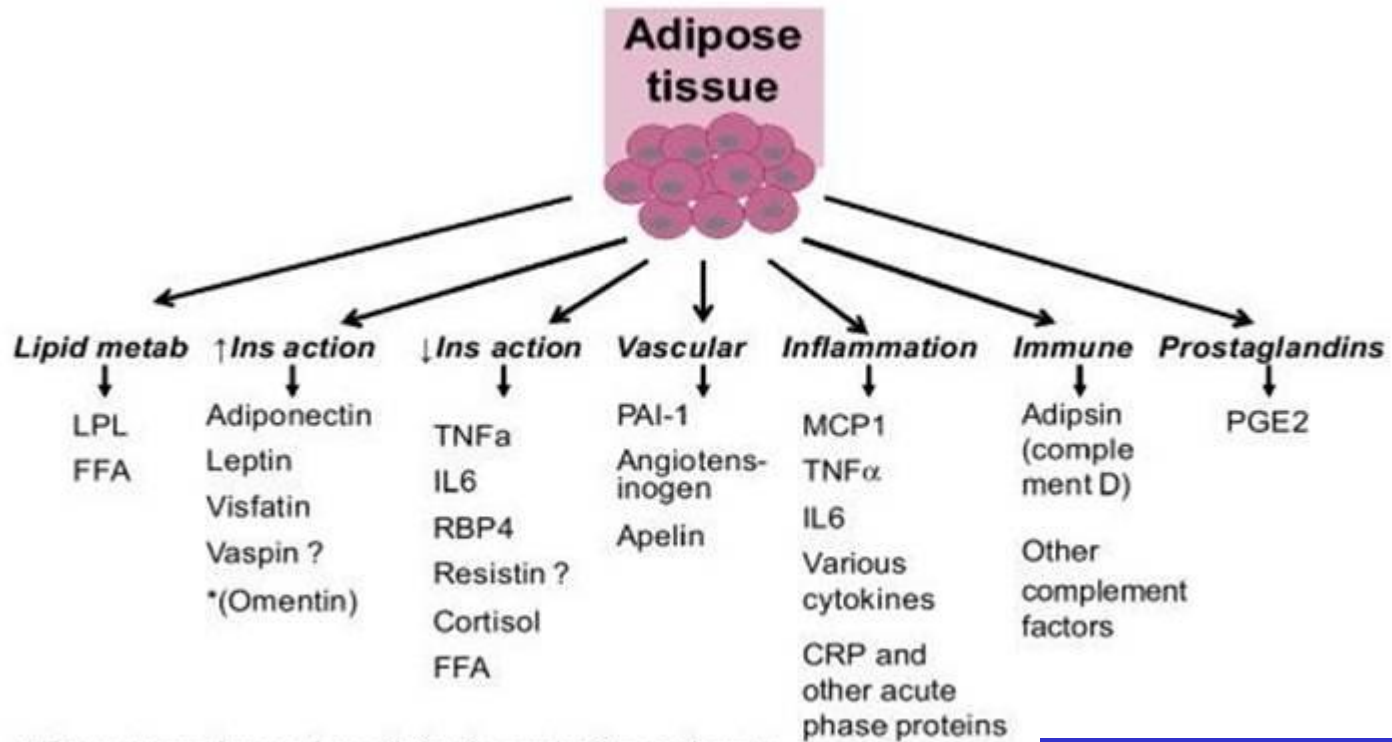
Seminars in Cell & Developmental Biology, Volume 39, 2015, 26 - 34

<http://dx.doi.org/10.1016/j.semcdb.2015.01.012>

PATHOGENETIC ROLE OF CYTOKINES







* From stromal vascular cells in visceral adipose depots

