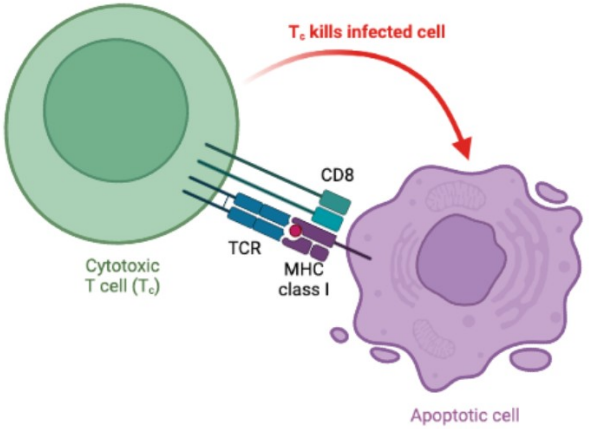
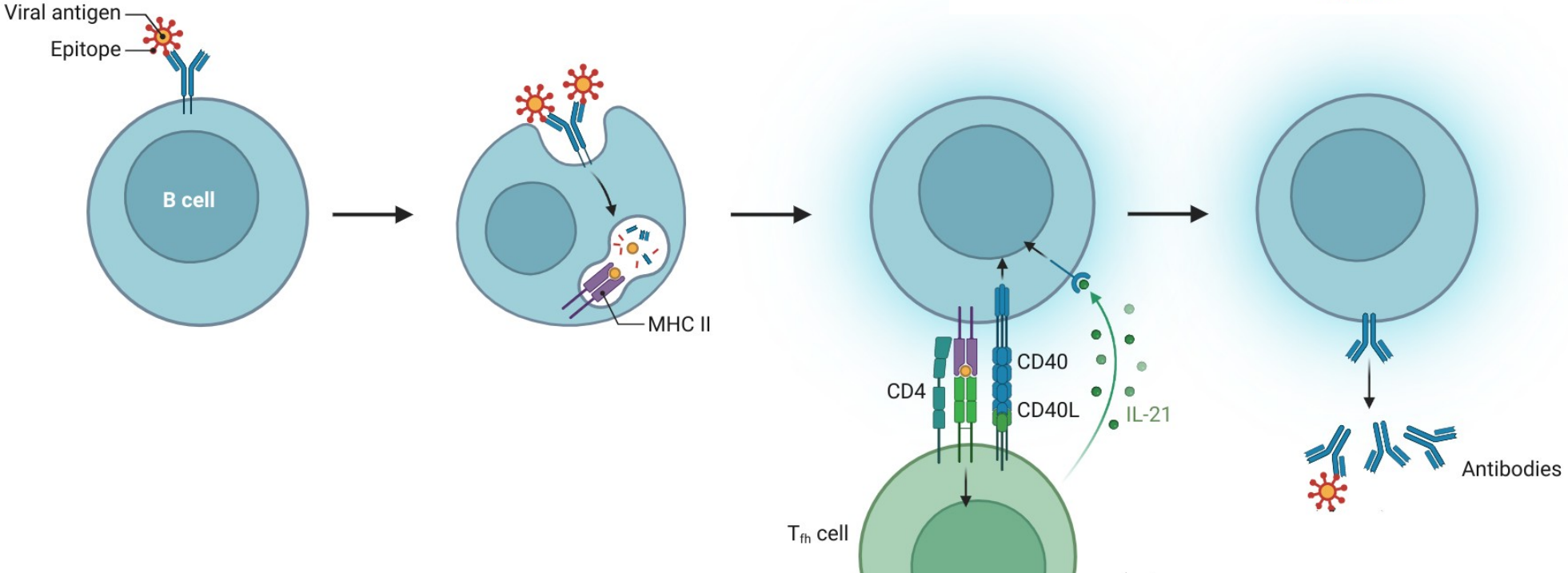
Фонд интеллект

Машинное обучение в иммунологии и медицине

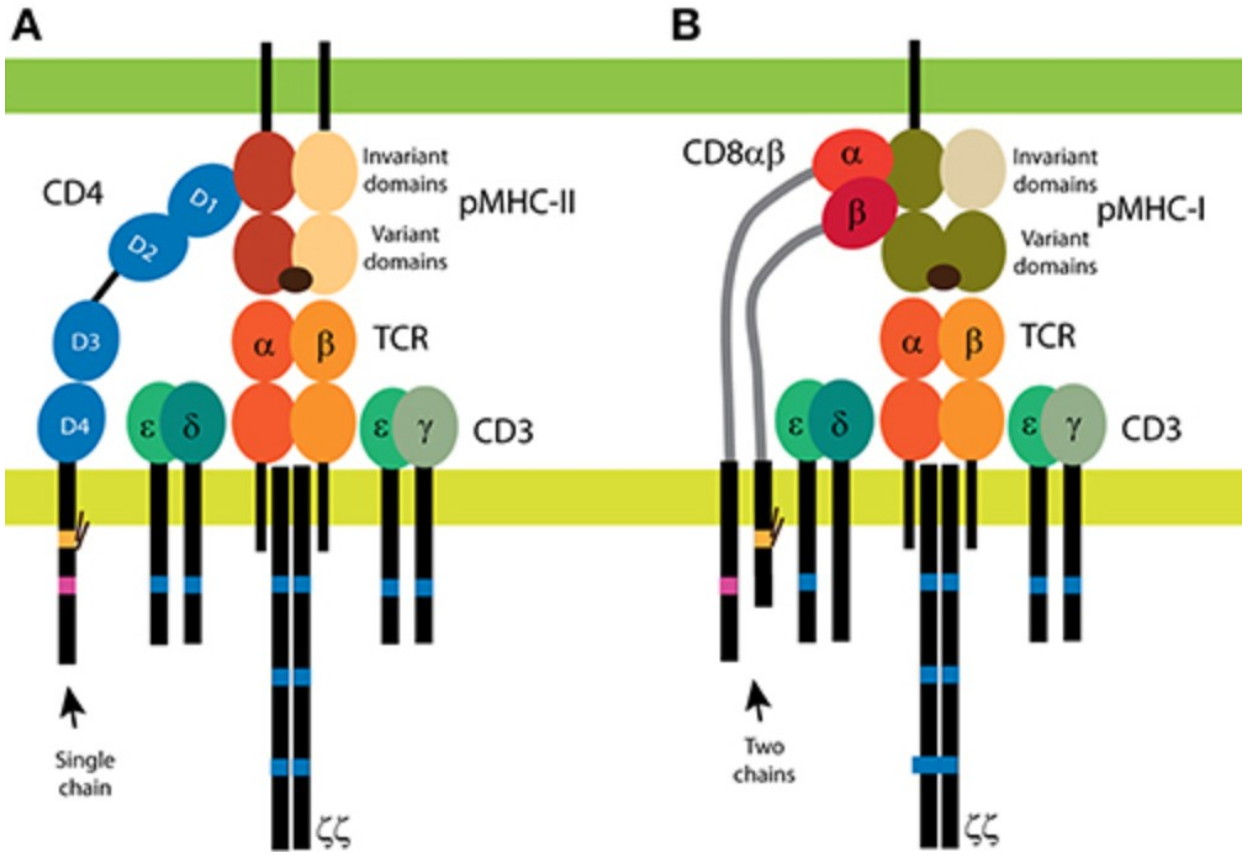
Генерация разнообразия TCR, BCR. Созревание T и B-клеток. Распознавание антигенов TCR, BCR.

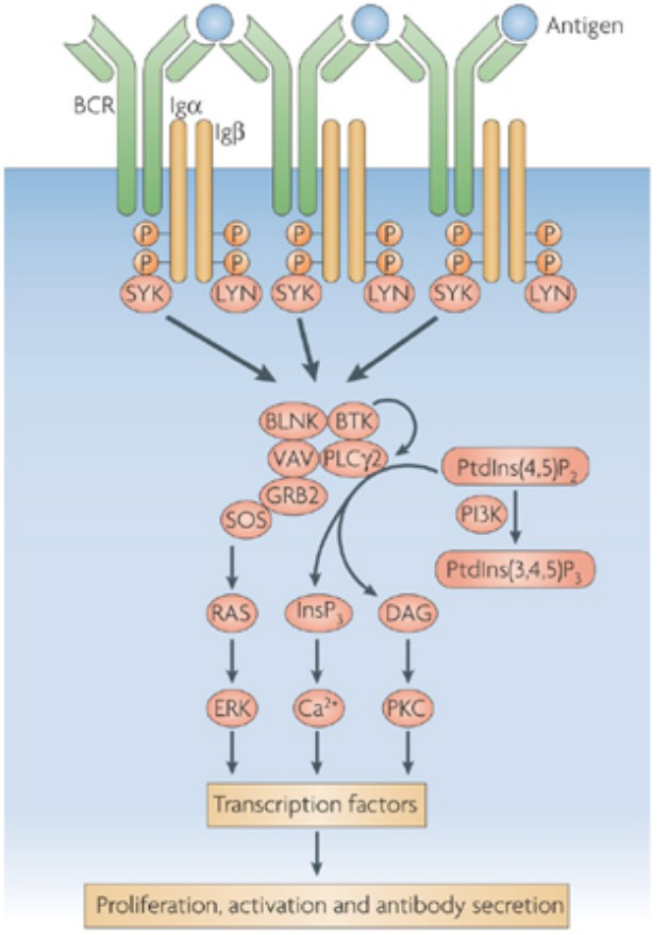
Распознавание антигенов



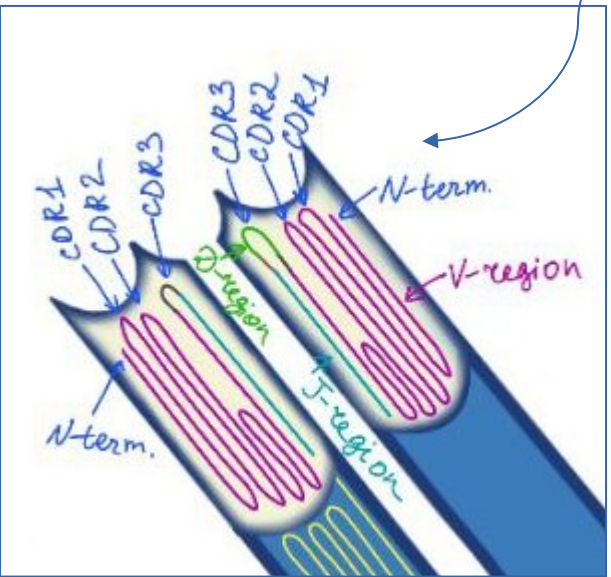


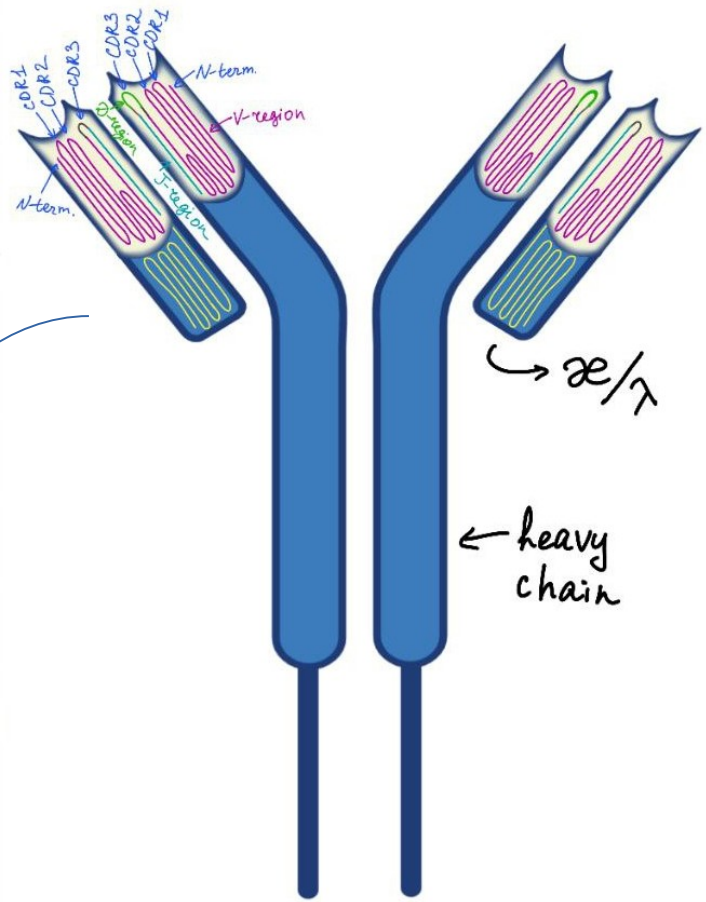
Корецепторы

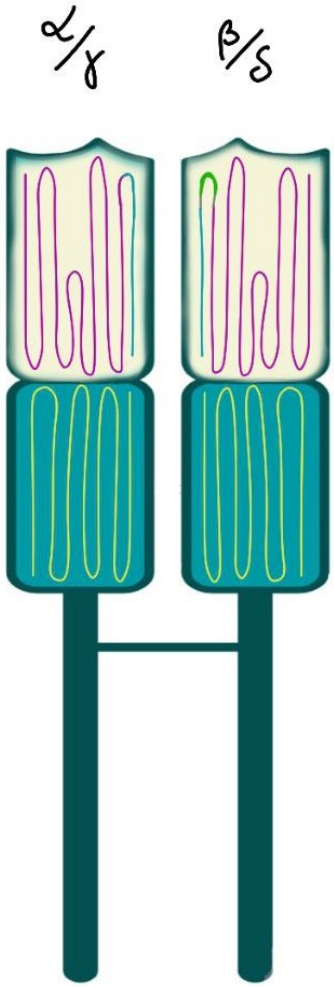




Строение BCR и TCR

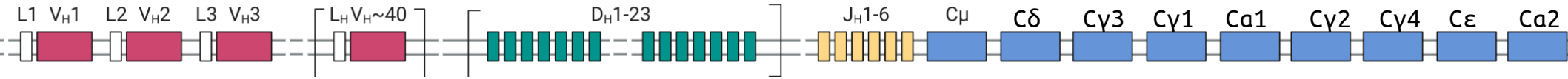




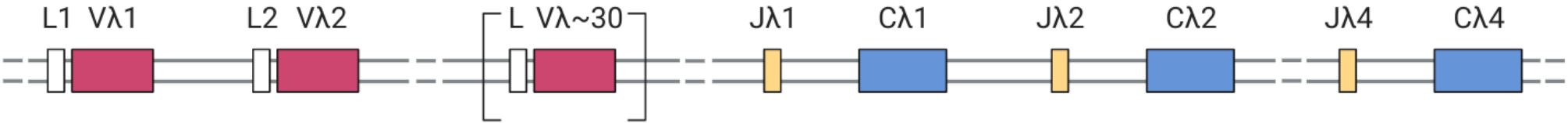


Строение генов BCR

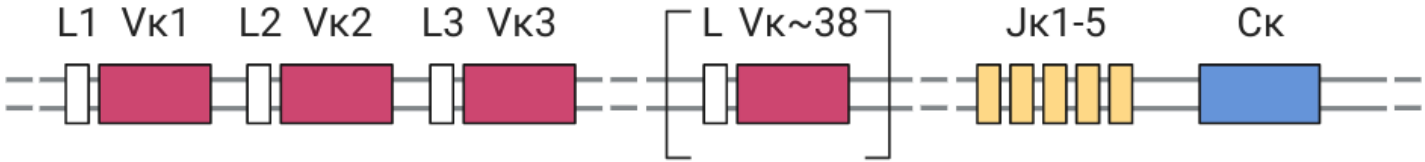
Тяжелая цепь — 14 хромосома



Легкая лямбда цепь — 22 хромосома

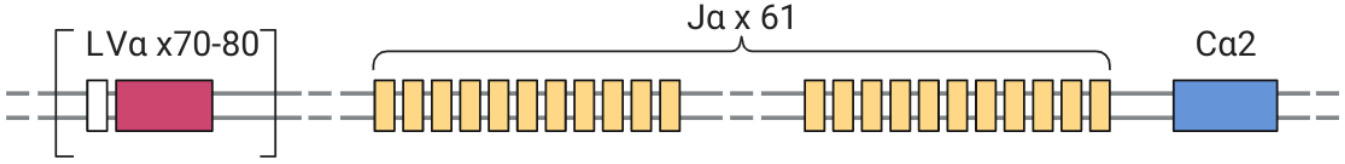


Легкая каппа цепь — 2 хромосома

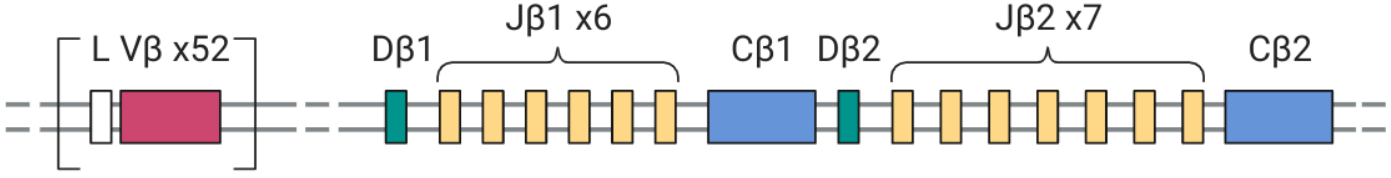


Строение генов TCR человека

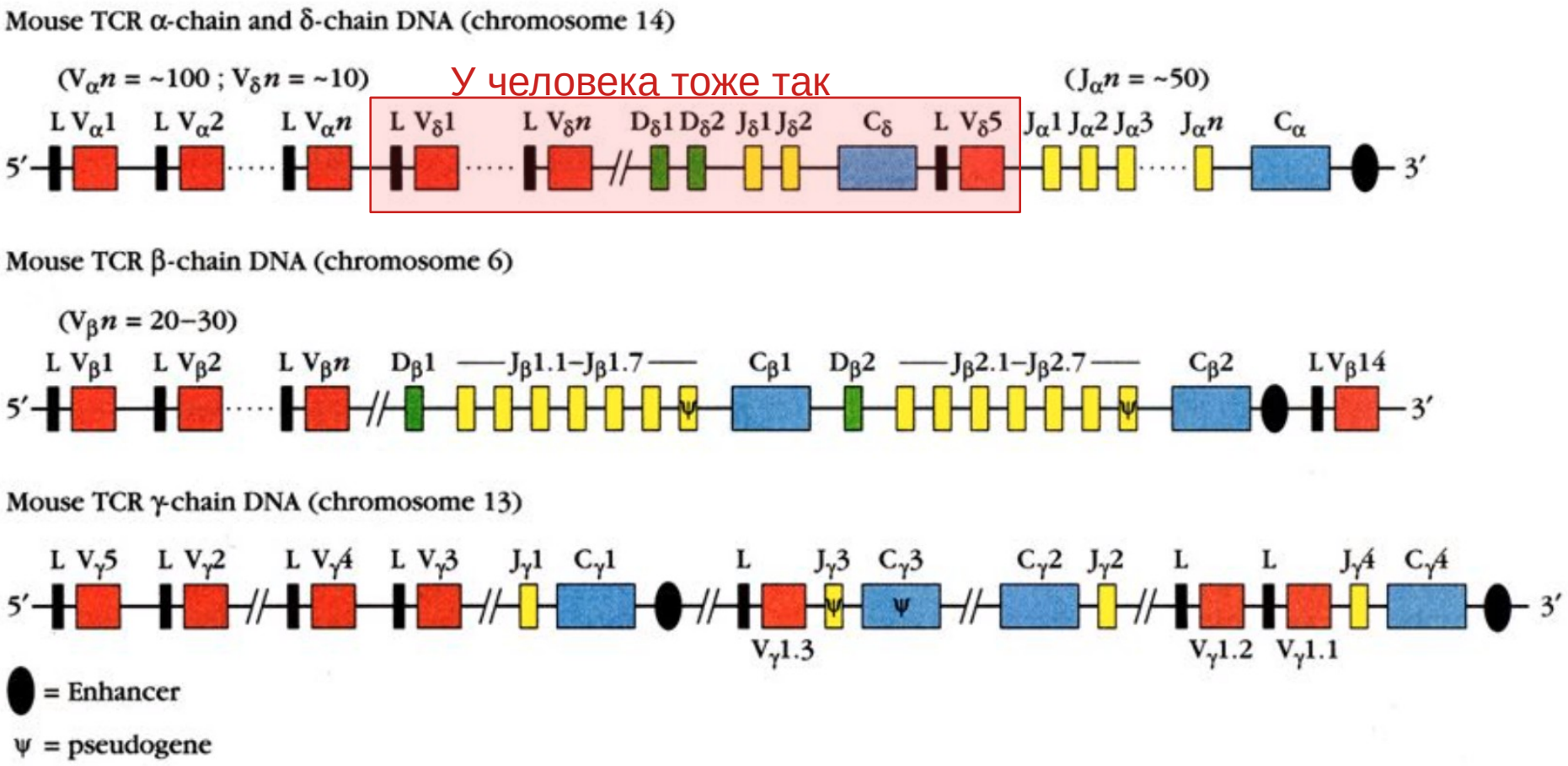
альфа цепь — 14 хромосома



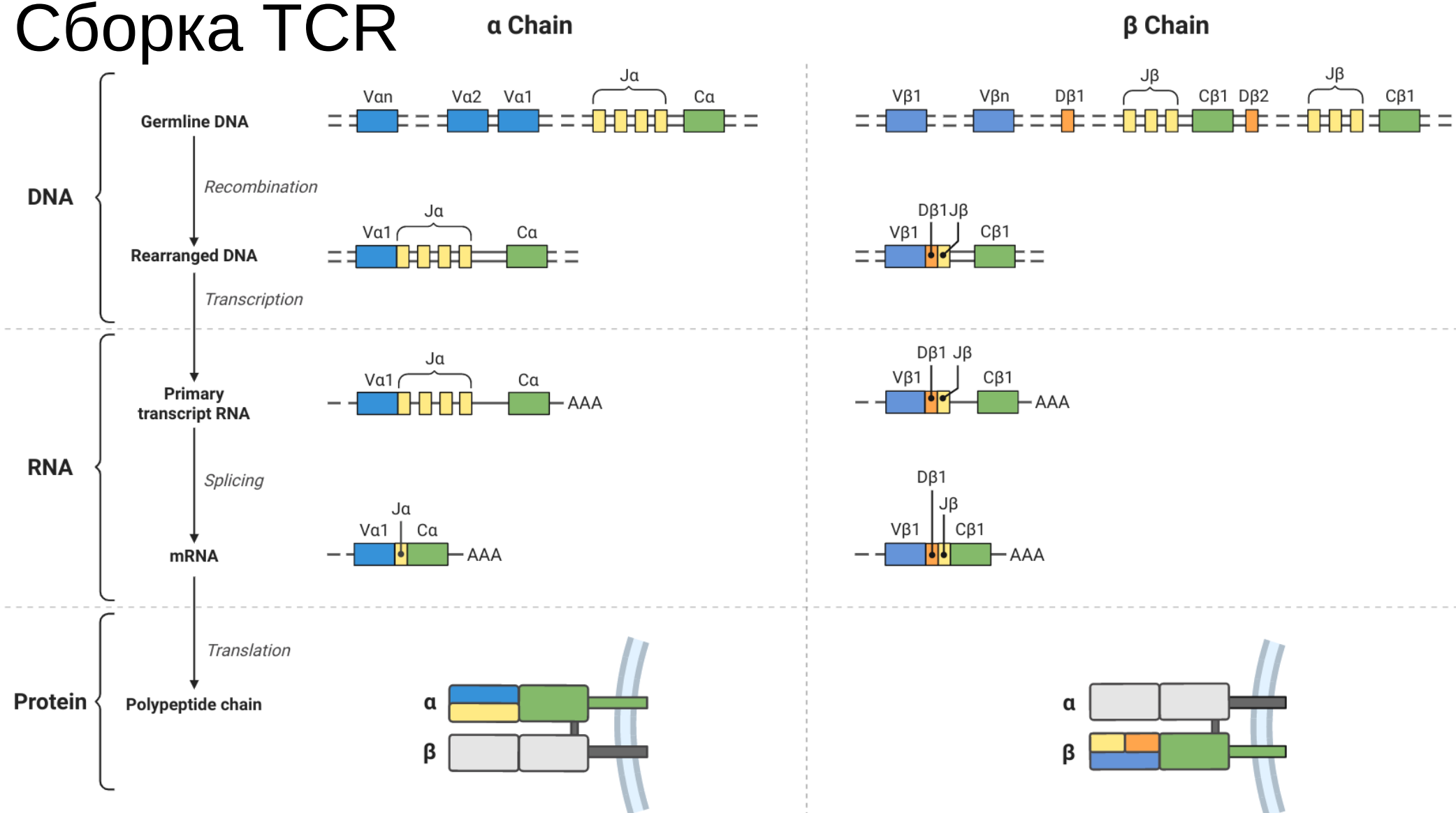
бета цепь — 7 хромосома



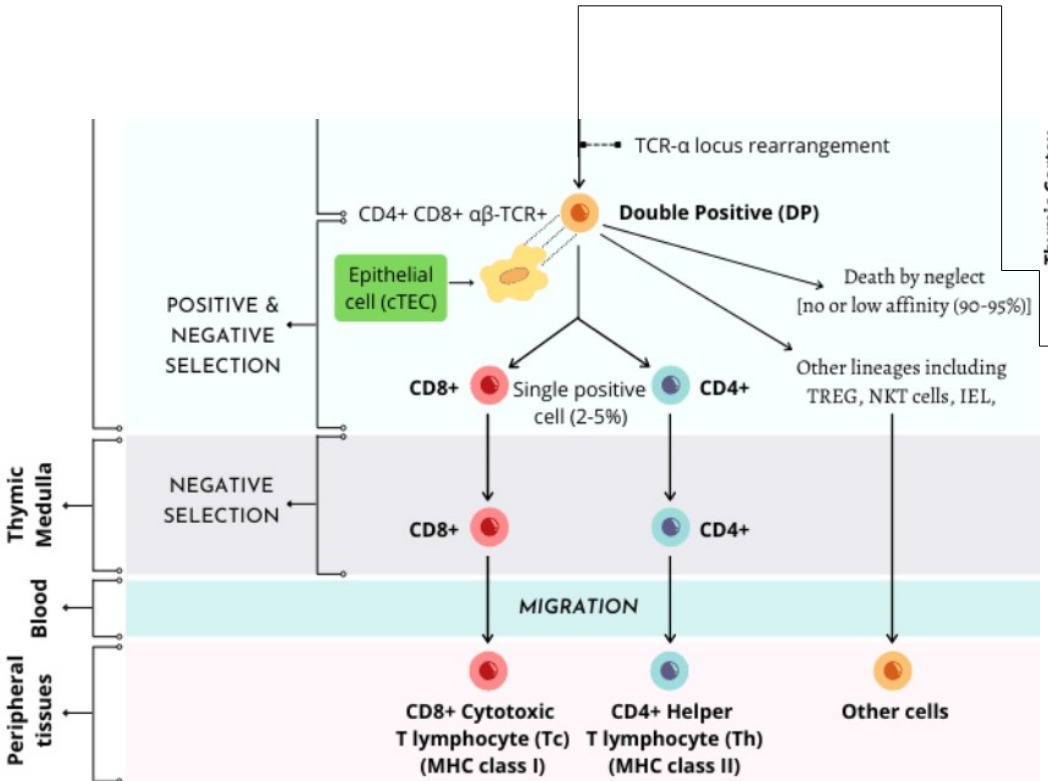
Строение генов TCR мыши

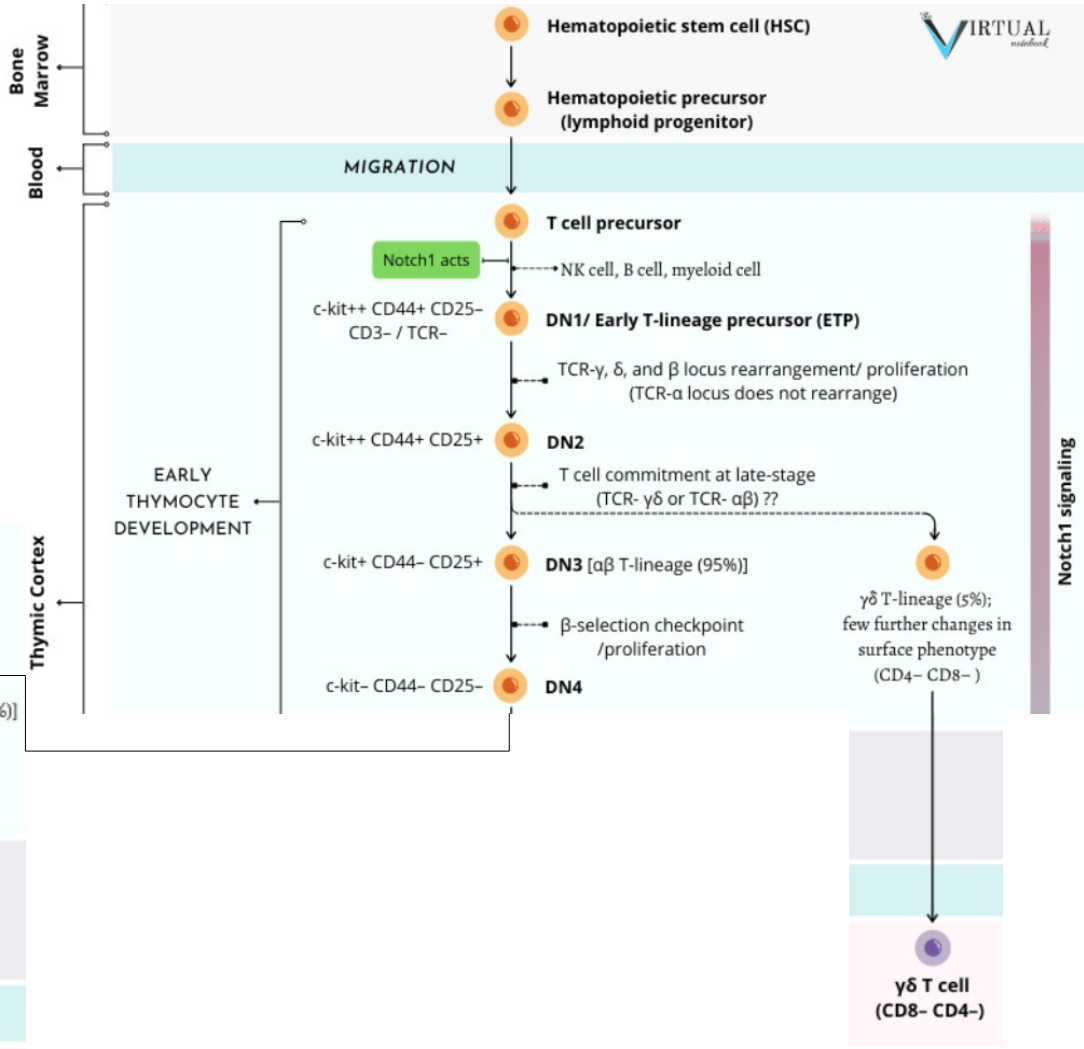


Сборка TCR

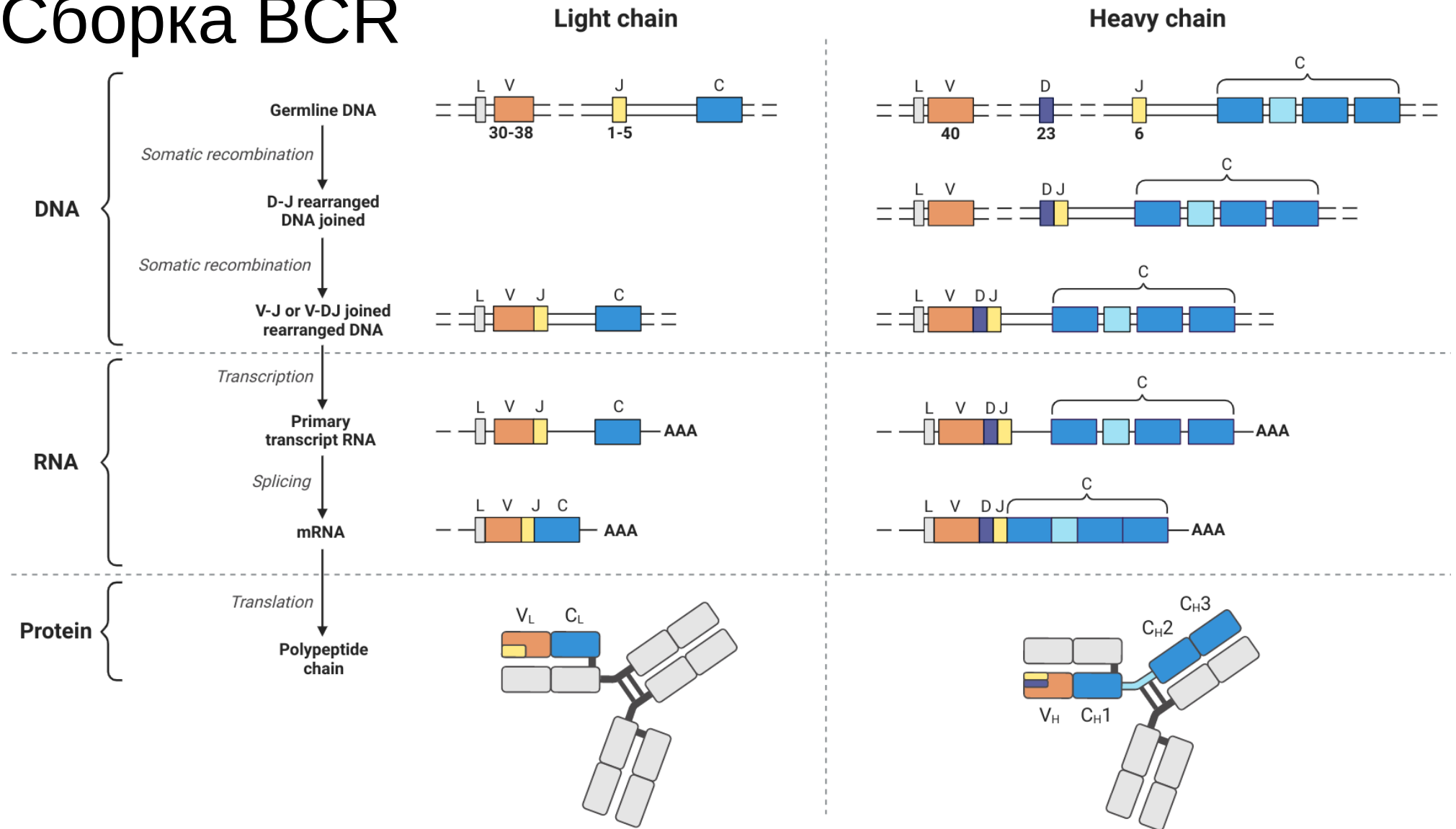

α Chain
β Chain
DNA
Germline DNA
Vαn
Vα2
Vα1
Jα
Cα
Vβ1
Vβn
Dβ1
Jβ
Cβ1
Dβ2
Recombination
Rearranged DNA
Dβ1Jβ
Transcription
RNA
Primary transcript RNA
AAA
Splicing
mRNA
Protein
Translation
Polypeptide chain
α
β

Созревание Т клеток

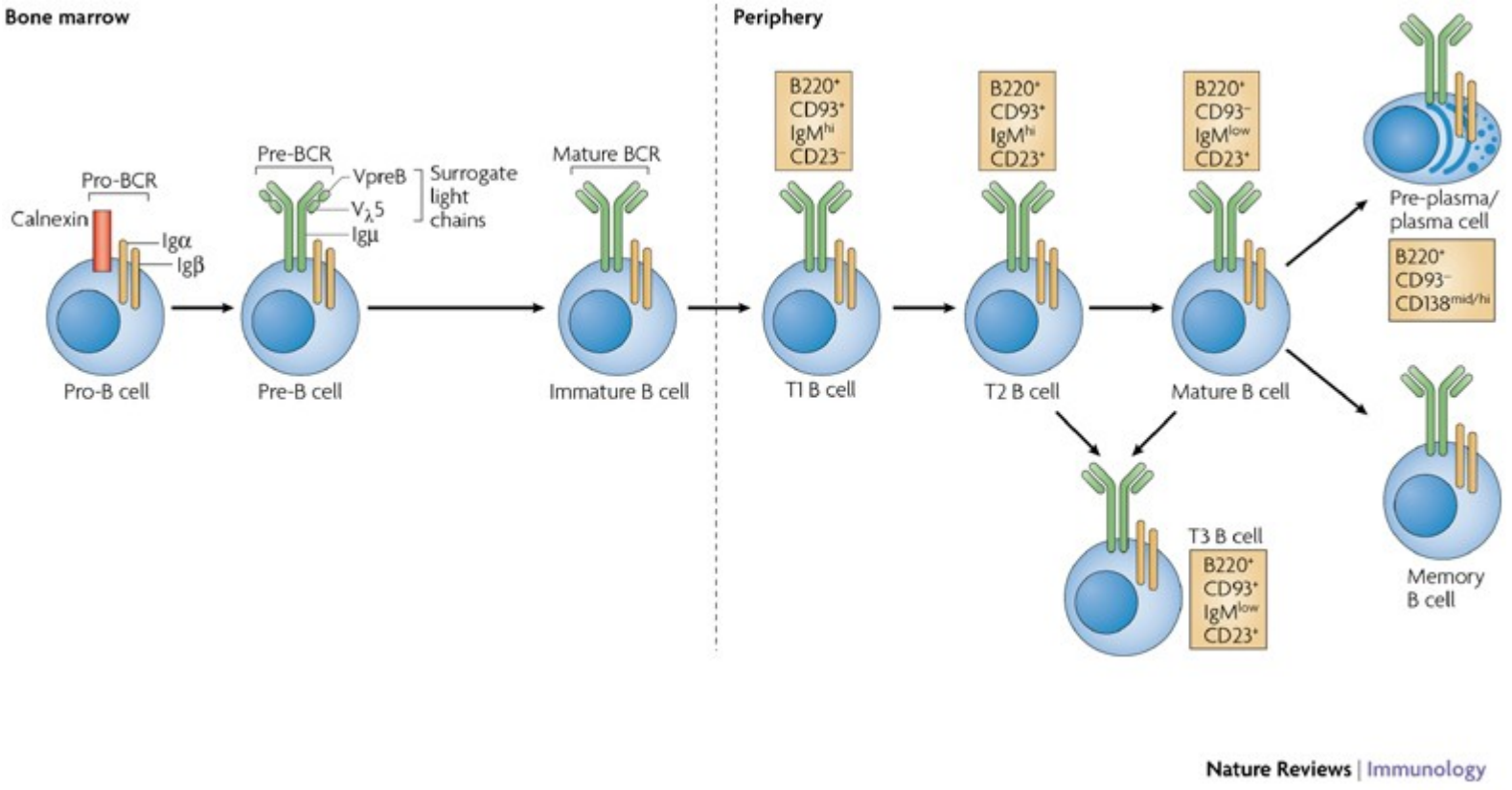




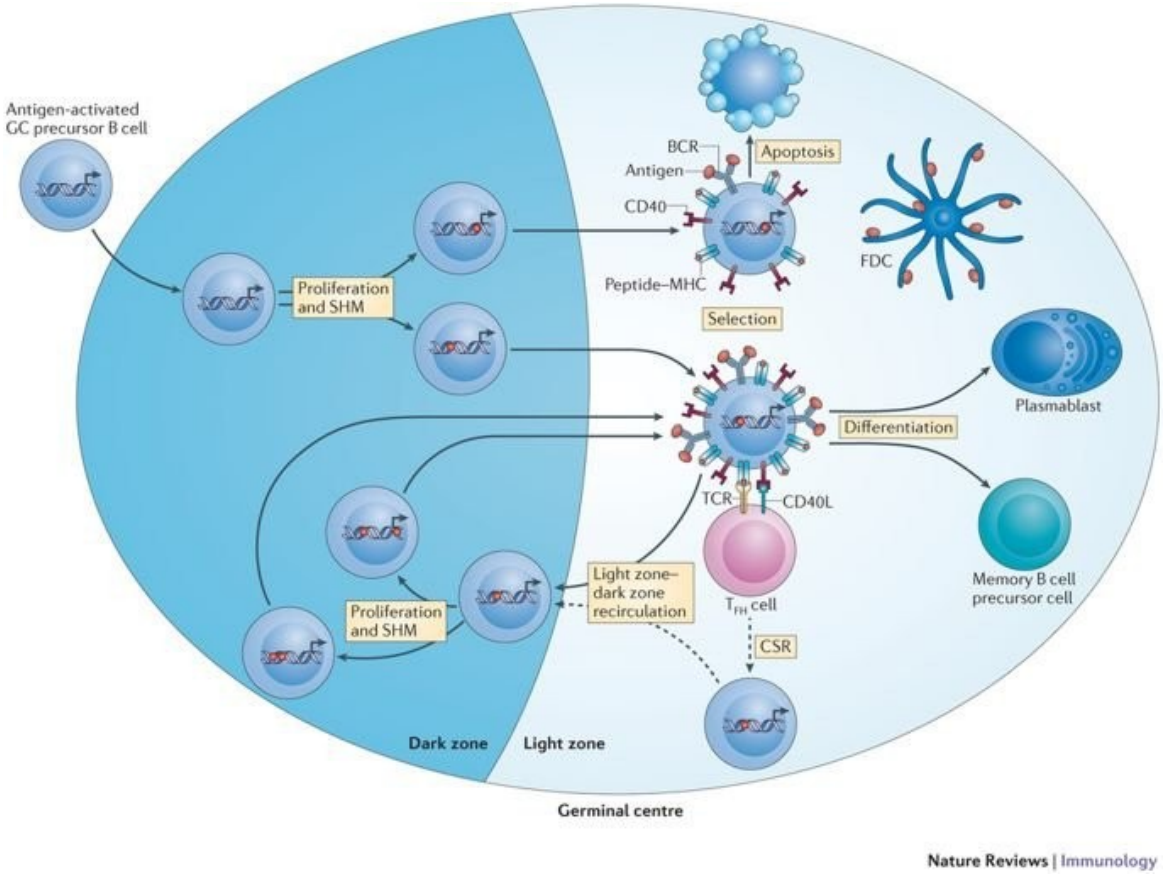
Сборка BCR


Light chain
Heavy chain
DNA
RNA
Protein
Germline DNA
Somatic recombination
D-J rearranged DNA joined
Somatic recombination
V-J or V-DJ joined rearranged DNA
Transcription
Primary transcript RNA
Splicing
mRNA
Translation
Polypeptide chain
L V J C
30-38
1-5
L V D J C
40
23
6
L V D J
L V D J
AAA
V_L C_L
V_H C_H1
C_H2
C_H3

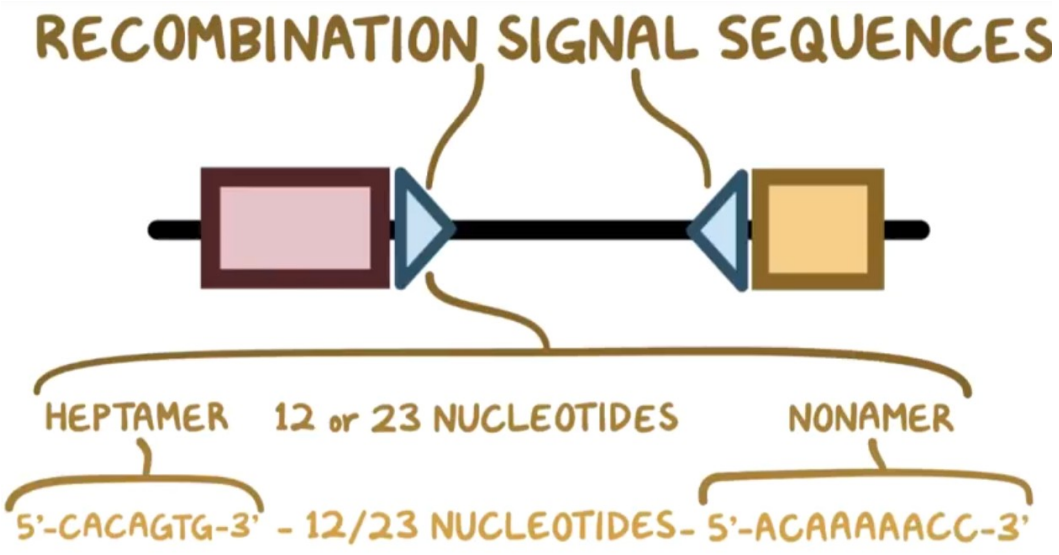
Созревание В клеток

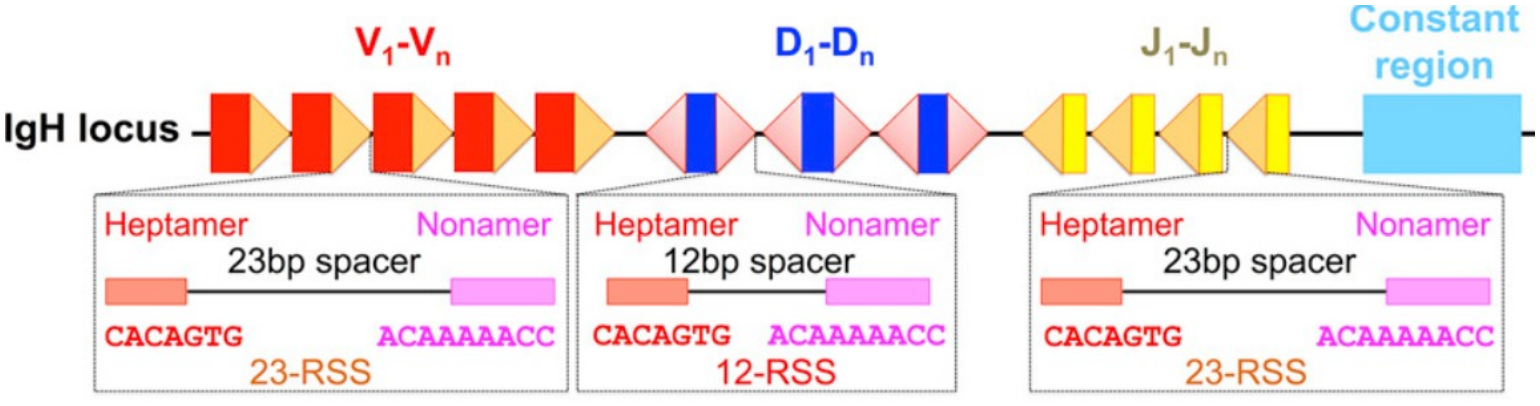


Гипермутации

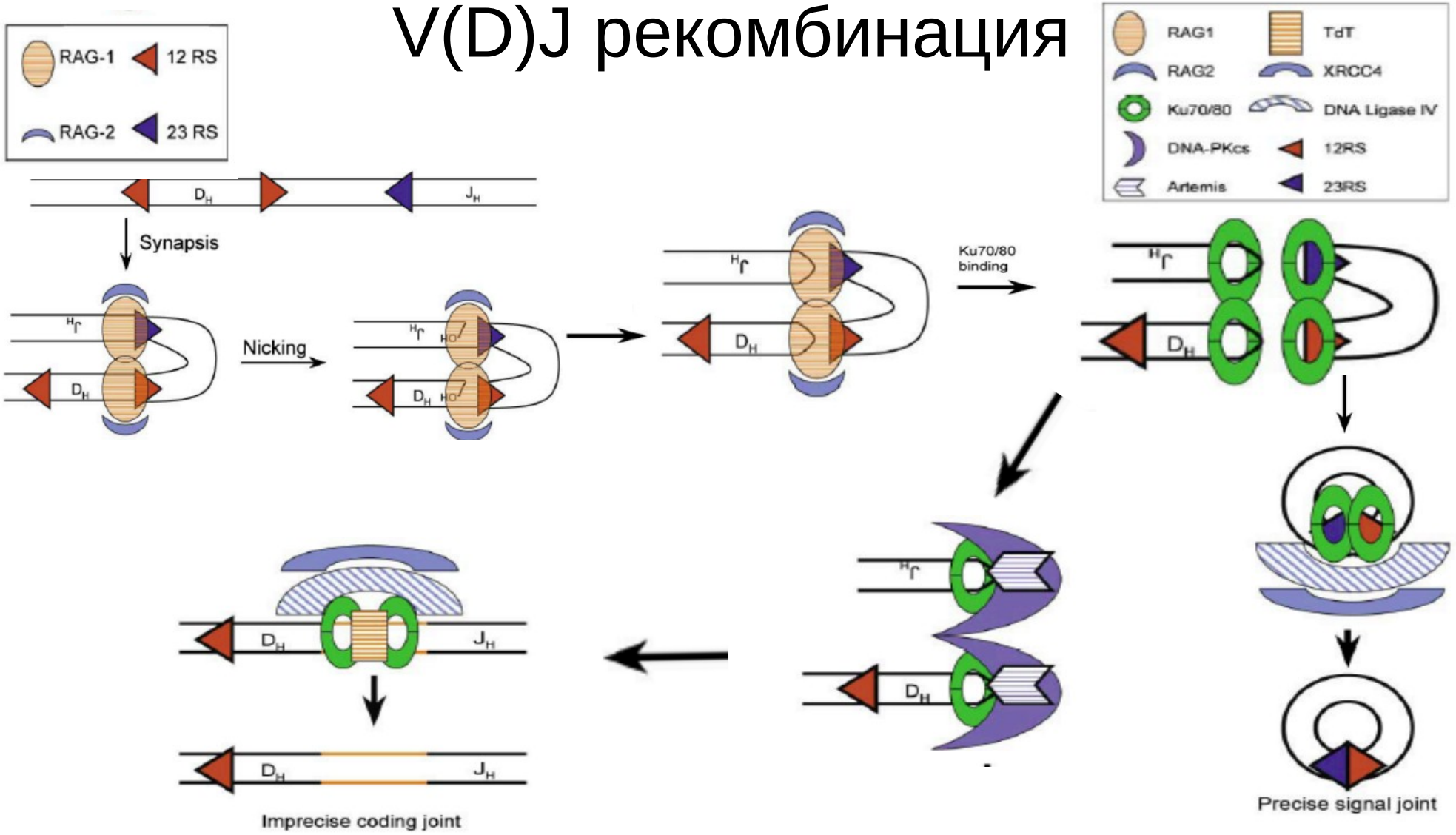


V(D)J рекомбинация

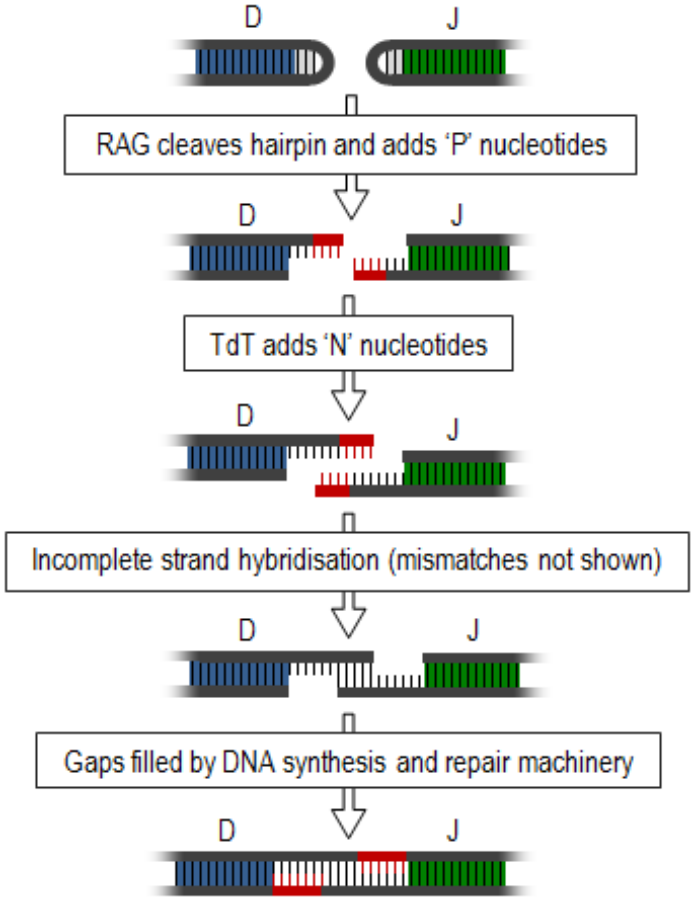




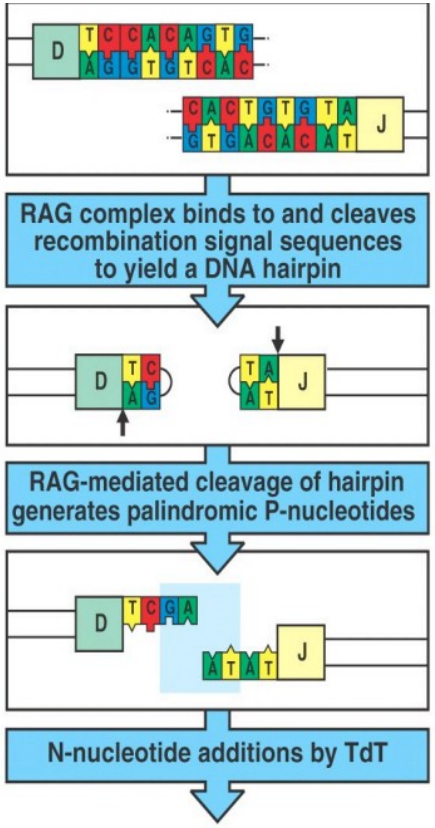
V(D)J рекомбинация

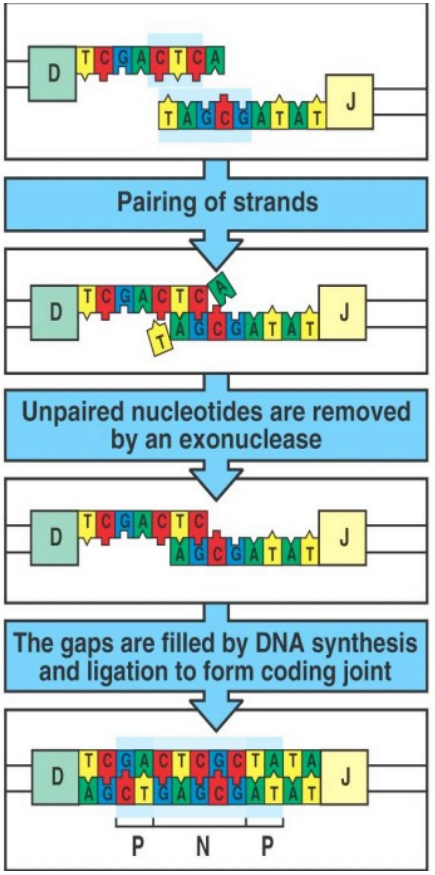


V(D)J рекомбинация



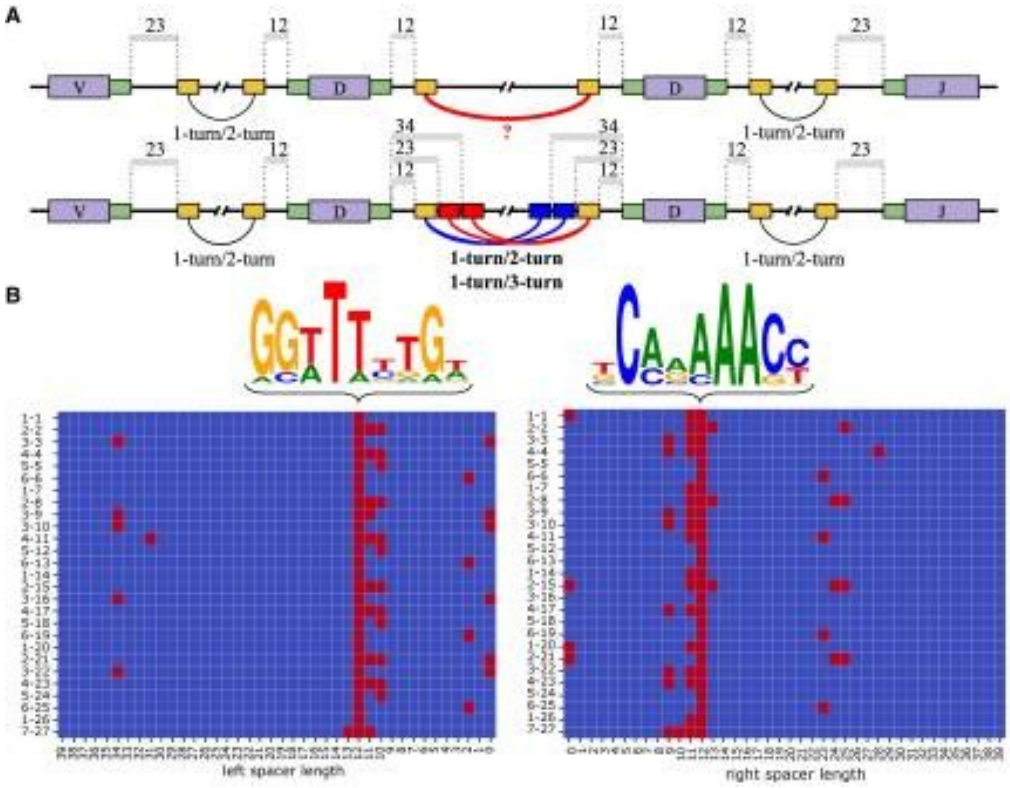
"P" addition





"N" addition

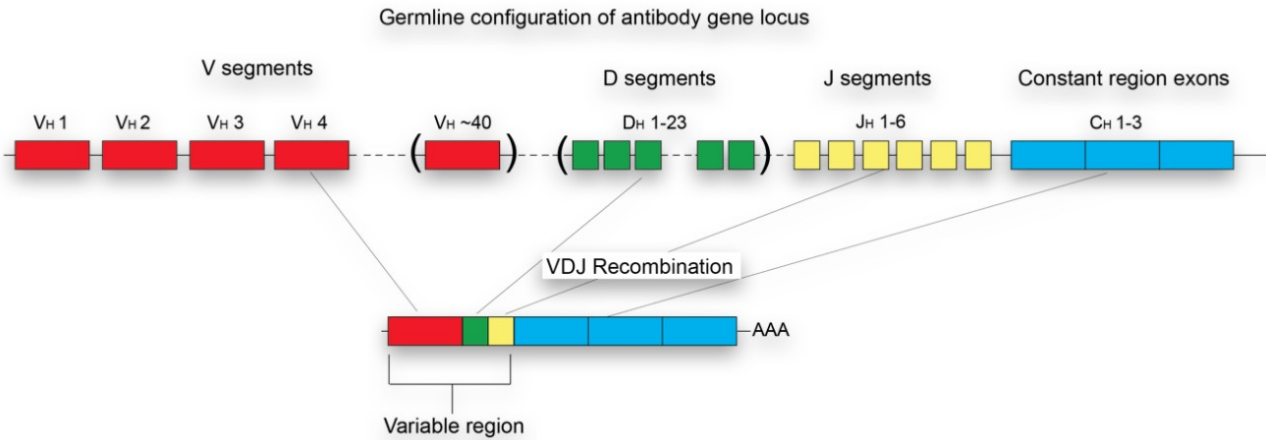
V(DD)J рекомбинация

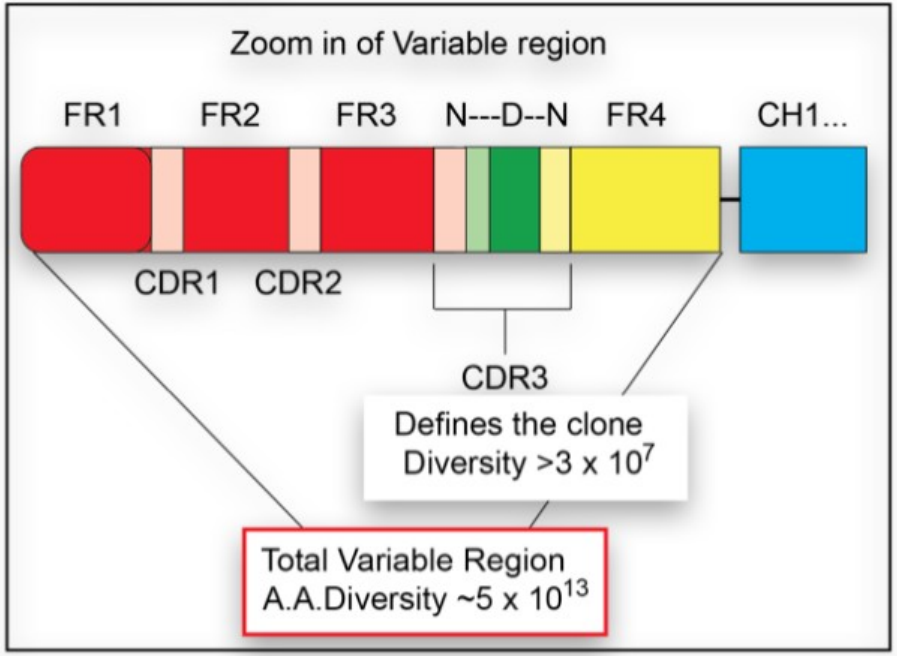


The 12/23 rule (1-turn/2-turn) explains the V-D and D-J recombination but fails to explain the D-D recombination using canonical nonamers (upper row). Cryptic nonamers (shown as red and blue rectangles) enable both the canonical **12/23** rule and the alternative **12/34** mechanism (1-turn/3-turn) and explain the V(DD)J recombination (lower row).

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7605257/

Строение вариабельного региона

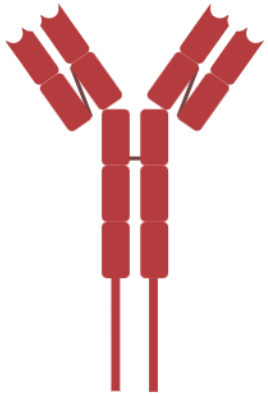




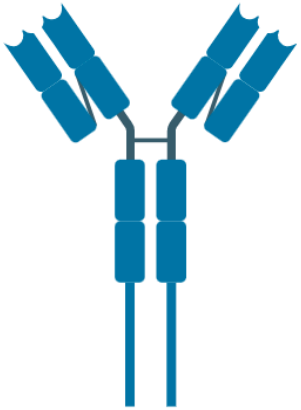
Изотипы антител

IgM pentamer

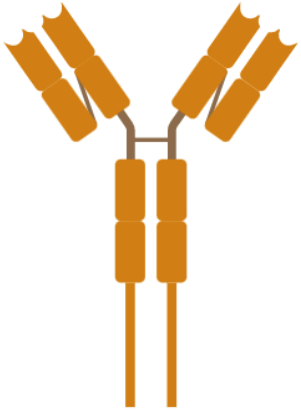
IgA dimer



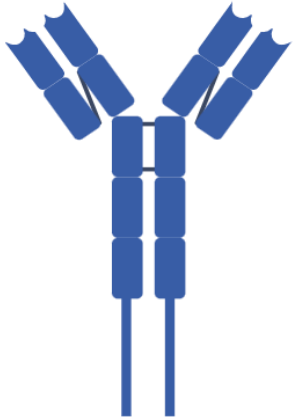
IgM



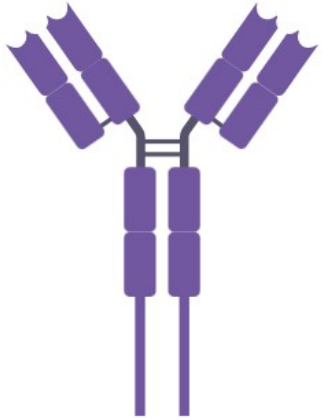
IgD



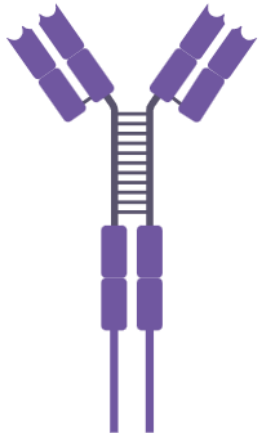
IgA



IgE

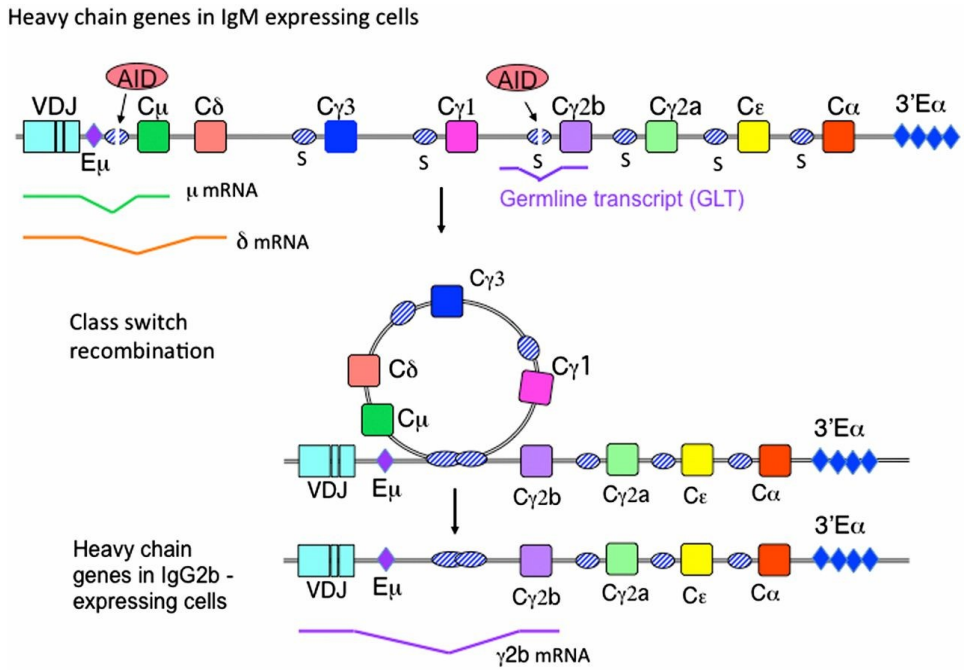


IgG1/IgG4

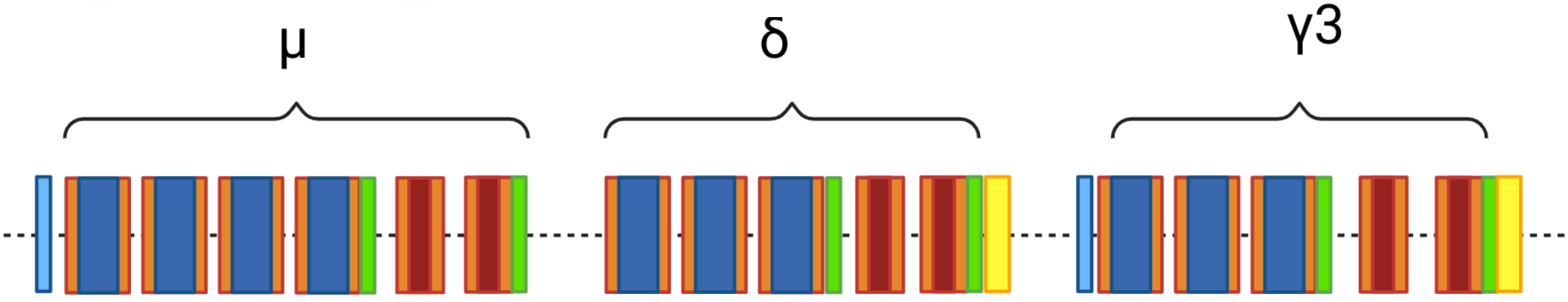


IgG3

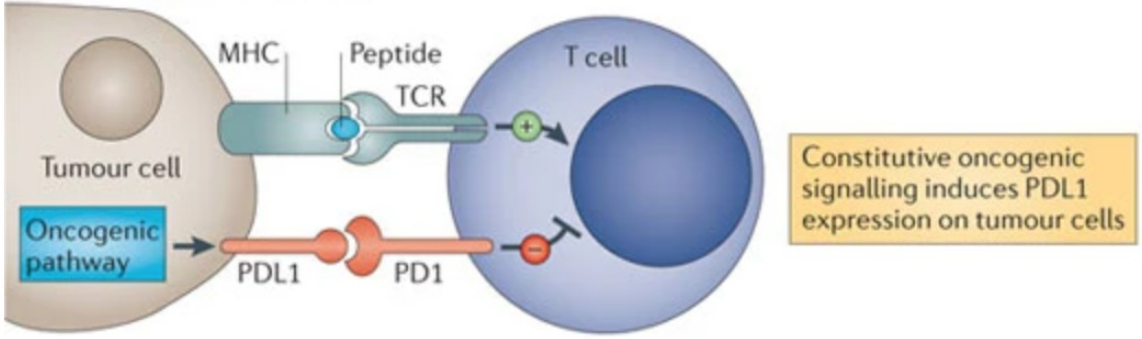
Смена изотипа IgH

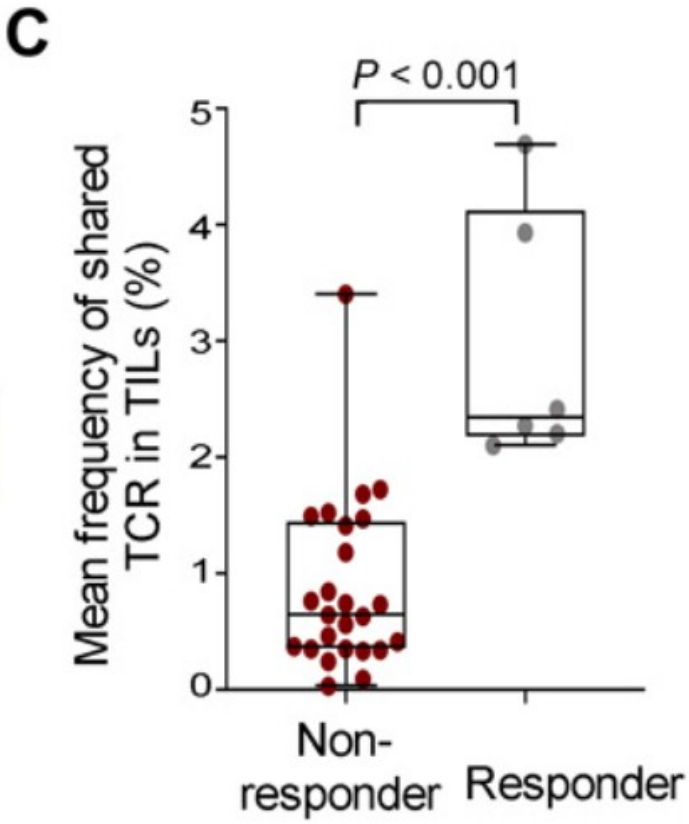


- Class switch signals
- Poly A tail signals
- Constant Ig domains
- membrane–span domains
- Splicing signals
- transcription stops signals



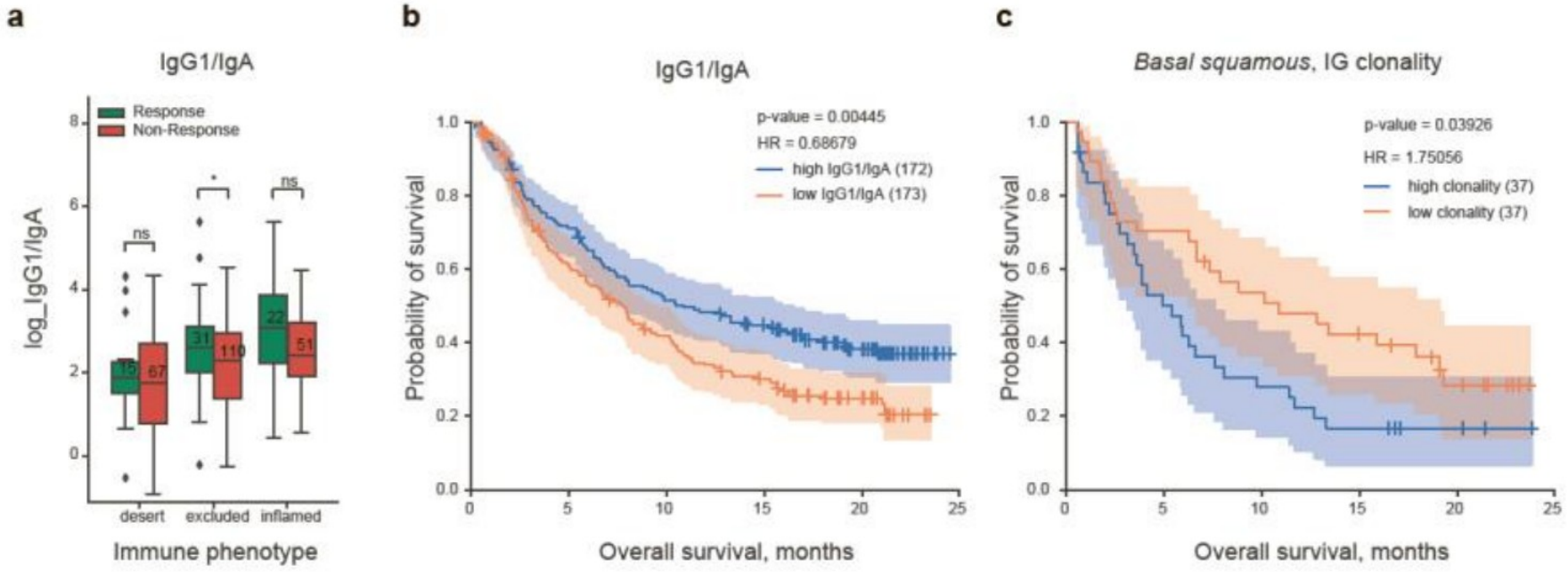
Предсказание успешности anti-PD-L1 терапии при раке легкого





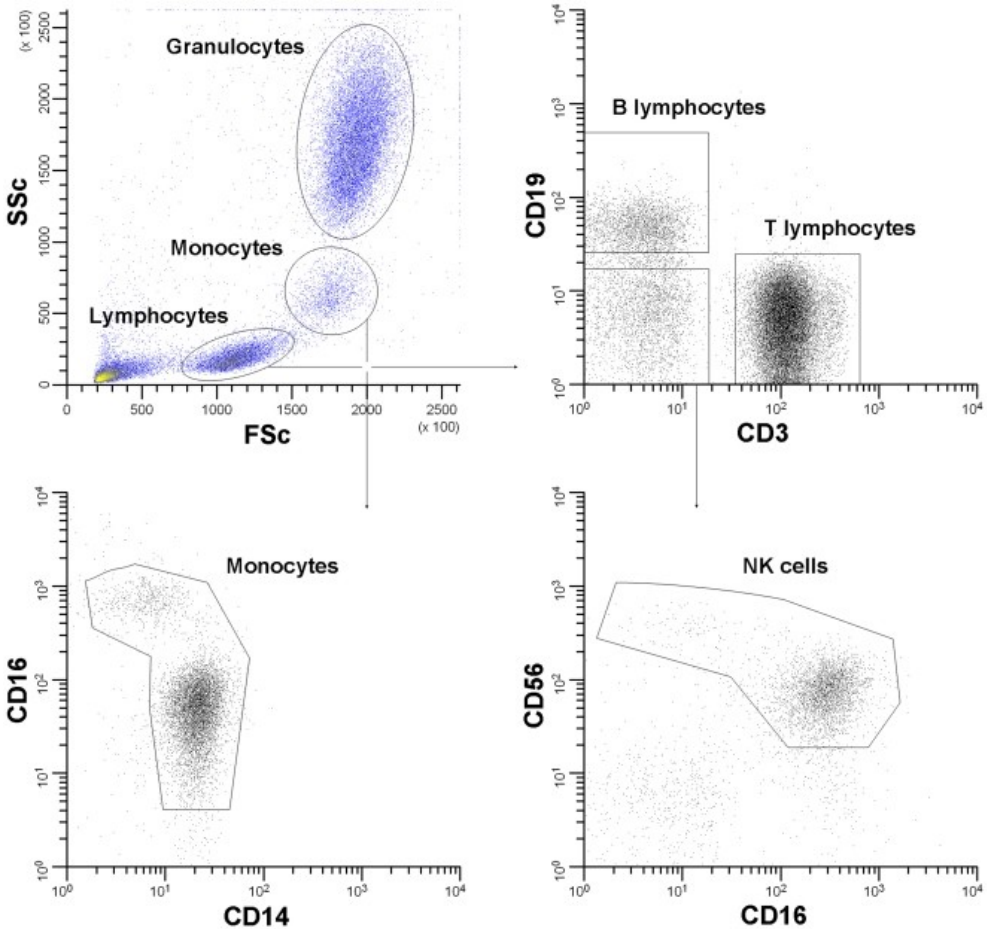
https://www.science.org/doi/10.1126/sciadv.abd6971

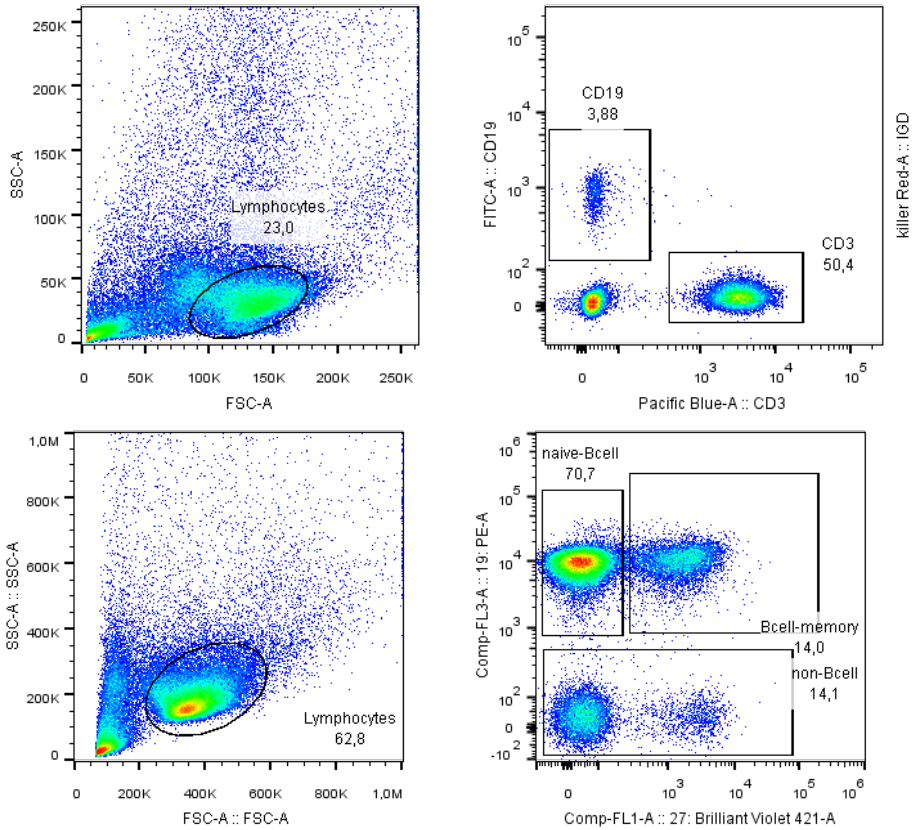
Предсказание успешности anti-PD-L1 терапии при раке мочевого пузыря



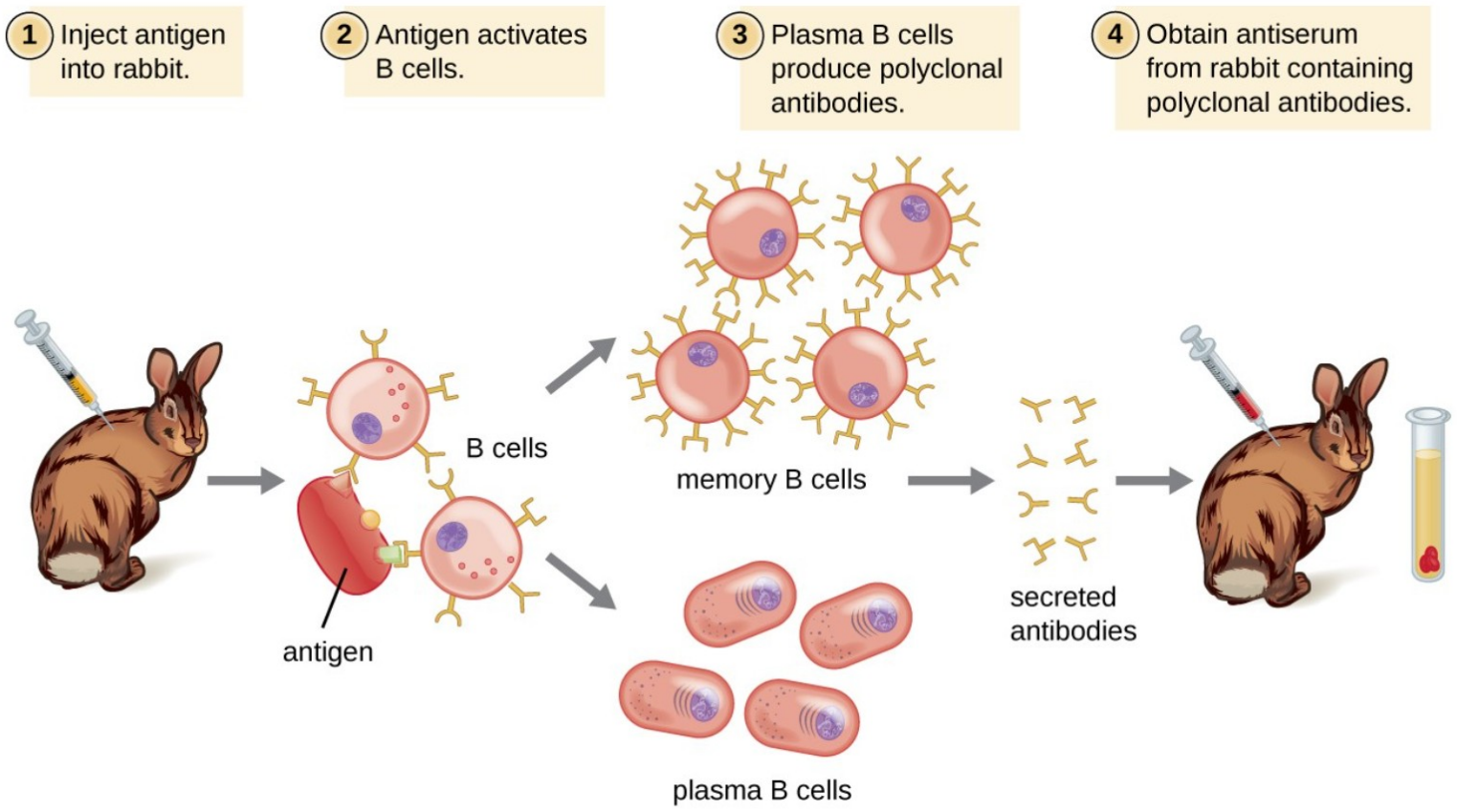
https://pubmed.ncbi.nlm.nih.gov/35013004/

Сортировка клеток иммунной сиситемы



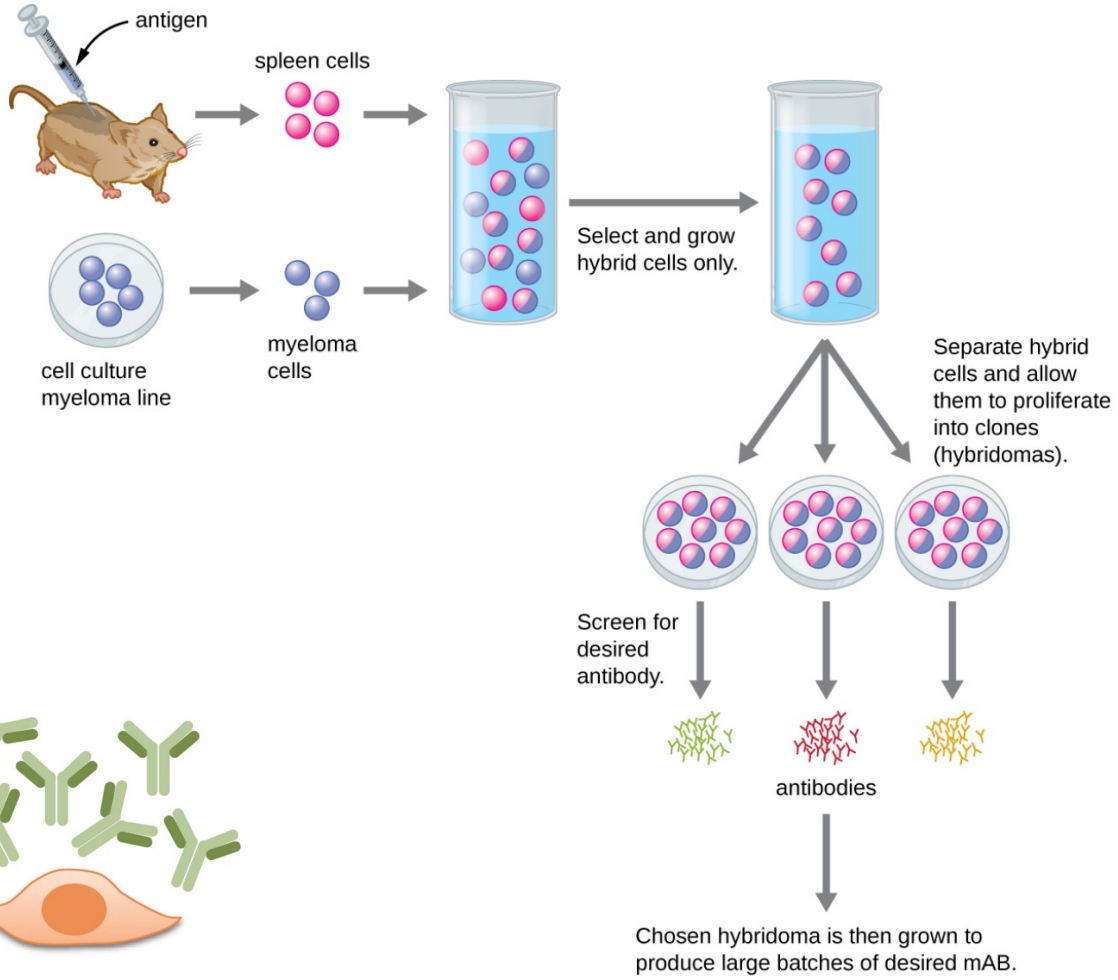


Получение поликлональных антител

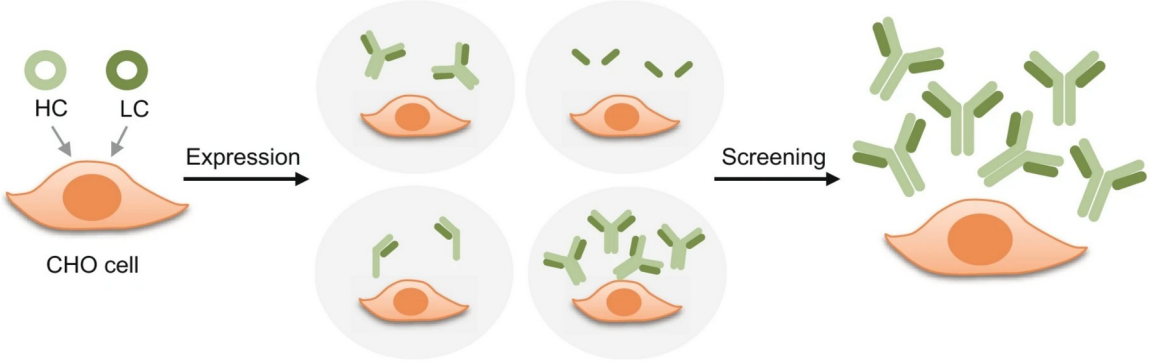


Получение моноклональных антител

Гибридома



Клеточные линии



Базы данных антител

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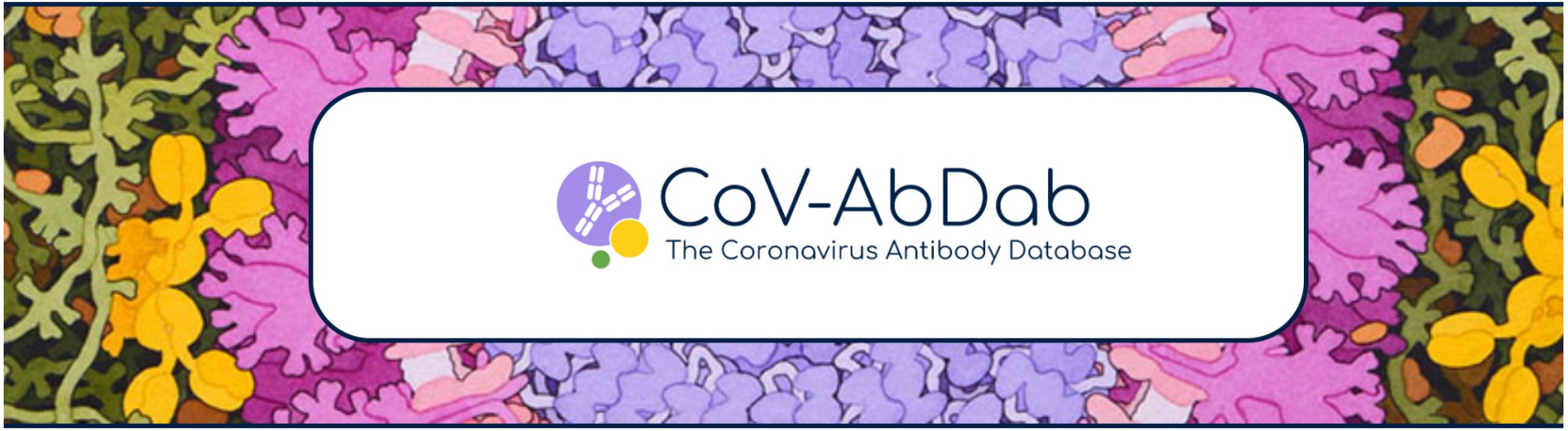

IMGT Repertoire (IG and TR, MH and RPI)
IMGT Scientific chart (Sequence and 3D structure identification and description, Numbering, Nomenclature, Representation rules)
IMGT Index (FactsBook,IMGT-NC reports,IUIS-NC,IMGT-ONTOLOGY, Sequence submission,Taxonomy...)
IMGT Bloc-notes (Interesting links, NCBI Genome, PubMed, Meeting announcements, Postdoctoral positions and jobs, Messages, Search engine
IMGT Education (IMGT Lexique, Aide-mémoire, Tutorials, Questions and answers, Enseignements...)
IMGT Posters and diaporama
The IMGT Medical page
The IMGT Veterinary page
The IMGT Biotechnology page
The IMGT Immunoinformatics page

Here you are: IMGT Web resources > IMGT Repertoire (IG and TR)

IMGT Repertoire (IG and TR)

The global ImMunoGeneTics Web Resource for immunoglobulins (IG),
T cell receptors (TR), major histocompatibility (MH) and related proteins of the immune system (RPI).
Editor: Marie-Paule Lefranc (LIGM, Université de Montpellier, CNRS, Montpellier, France).

1 / 2 / 3 / 4 / 5 / 6 / 7

IMGT Repertoire (MH)
IMGT Repertoire (RPI)

IMGT Repertoire comprises LIGM expertized data on immunoglobulins (IG), T cell receptors (TR), major histocompatibility (MH) and related proteins of the immune sys

1. Locus and genes

1. Chromosomal localizations
2. Locus representations
3. Locus descriptions
4. Gene positions
5. Gene exon/intron organization
6. Gene exon/intron splicing sites
7. Gene tables
8. Potential germline repertoires
9. Lists of human IG and TR genes, groups, loci and orphons
10. Lists of Mouse *(Mus musculus)* IG and TR genes, groups and loci
11. Clans
12. Correspondence between chain types and C genes : IG and TR (all vertebrate species)
13. Correspondence between nomenclatures
14. Correspondence between species

2. Proteins and alleles

1. Protein displays
2. Alignments of alleles
3. Tables of alleles
4. Allotypes
5. Isotypes
6. Particularities in protein designations
7. IMGT reference directory in FASTA format

2. Alignments of alleles

- IGHV:
  - Mammalia: human (*Homo sapiens*), Mouse (*Mus musculus*), Crab-eating macaque (*Macaca fascicularis*), Arabian camel (*Camelus dromedarius*), llama (*Lama glama*), Alpaca (*Vicugna pacos*), sheep (*Ovis aries*), pig (*Sus scrofa*), Norway rat (*Rattus norvegicus*), rabbit (*Oryctolagus cuniculus*), platypus (*Ornithorhynchus anatinus*), bovine (*Bos taurus*), dog (*Canis lupus familiaris*), horse (*Equus caballus*), Rhesus monkey (*Macaca mulatta*), Western lowland gorilla (*Gorilla gorilla gorilla*) NEW!, Ring-tailed lemur (*Lemur catta*) NEW!
  - Sauropsida: spectacled caiman (*Caiman crocodilus*), chicken (*Gallus gallus*)
  - Amphibia: African clawed frog (*Xenopus laevis*),
  - Teleostei: Atlantic cod (*Gadus morhua*), Atlantic salmon (*Salmo salar*), Bastard halibut (*Paralichtys olivaceus*), Blackfin icefish (*Chaenocephalus aceratus*), channel catfish (*Ictalurus punctatus*), charr (*Salvelinus alpinus*), emerald rockcod (*Trematomus bernacchii*), goldfish (*Carassius auratus*), ladyfish (*Elops saurus*), rainbow trout (*Oncorhynchus mykiss*), spotted wolffish (*Anarhichas minor*), torafugu (*Takifugu rubripes*), turbot (*Scophthalmus maximus*), black rockcod (*Notothenia coriiceps*), Zebrafish (*Danio rerio*)
  - Chondrichthyes: bull shark (*Carcharhinus leucas*), sandbar shark (*Carcharhinus plumbeus*), nurse shark (*Ginglymostoma cirratum*), horn shark (*Heterodontus francisci*), Spotted ratfish (*Hydrolagus colliei*), Spotted wobbegong shark (*Orectolobus maculatus*), clearnose skate (*Raja eglanteria*), Little skate (*Leucoraja erinacea*)
  - Other: African lungfish (*Protopterus aethiopicus*)
- IGHD:
  - Mammalia: human (*Homo sapiens*), house mouse (*Mus musculus*), Crab-eating macaque (*Macaca fascicularis*), Alpaca (*Vicugna pacos*), Sheep (*Ovis aries*), pig (*Sus scrofa*), Norway rat (*Rattus norvegicus*), rabbit (*Oryctolagus cuniculus*), platypus (*Ornithorhynchus anatinus*), bovine (*Bos taurus*), dog (*Canis lupus familiaris*), horse (*Equus caballus*), Rhesus monkey (*Macaca mulatta*) Western lowland gorilla (*Gorilla gorilla gorilla*) NEW!, Ring-tailed lemur (*Lemur catta*) NEW!
  - Sauropsida: chicken (*Gallus gallus*)
  - Teleostei: channel catfish (*Ictalurus punctatus*), rainbow trout (*Oncorhynchus mykiss*), Zebrafish (*Danio rerio*), Atlantic salmon (*Salmo salar*)
  - Chondrichthyes: bull shark (*Carcharhinus leucas*), sandbar shark (*Carcharhinus plumbeus*), nurse shark (*Ginglymostoma cirratum*), horn shark (*Heterodontus francisci*), Spotted ratfish (*Hydrolagus colliei*), Spotted wobbegong shark (*Orectolobus maculatus*), clearnose skate (*Raja eglanteria*), Little skate (*Leucoraja erinacea*)
- IGHJ:

Alignment of alleles: human (*Homo sapiens*) IGHV

- IGHV1-2
- IGHV1-3
- IGHV1-8
- IGHV1-18
- IGHV1-24
- IGHV1-38-4
- IGHV1-45
- IGHV1-46
- IGHV1-58
- IGHV1-68 and IGHV1-68D
- IGHV1-69 and IGHV1-69D
- IGHV1-69-2
- IGHV2-5
- IGHV2-26
- IGHV2-70 and IGHV2-70D
- IGHV3-7
- IGHV3-9
- IGHV3-11
- IGHV3-13
- IGHV3-15
- IGHV3-16
- IGHV3-19
- IGHV3-20
- IGHV3-21
- IGHV3-22
- IGHV3-23 and IGHV3-23D


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                                                 1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16  17  18  19  20
                                                 E   V   Q   L   V   E   S   G   G       G   L   V   Q   P   G   G   S   L   R
X92217     IGHV3-13*01 F V-REGION gDNA          gag gtg cag ctg gtg gag tct ggg gga ... ggc ttg gta cag cct ggg ggg tcc ctg aga

AB019440   IGHV3-13*01 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---

U29479     IGHV3-13*01 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---

Z12348     IGHV3-13*01 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---

                                                         H                                                               A
M99653     IGHV3-13*02 F V-REGION gDNA          --- --- --t --- --- --- --- --- --- ... --- --- --- --- --- --- --- g-- --- ---

U29582     IGHV3-13*03 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---

HM855616   IGHV3-13*04 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---

KC713939   IGHV3-13*05 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---

IMGT000035 IGHV3-13*05 F V-REGION gDNA          --- --- --- --- --- --- --- --- --- ... --- --- --- --- --- --- --- --- --- ---
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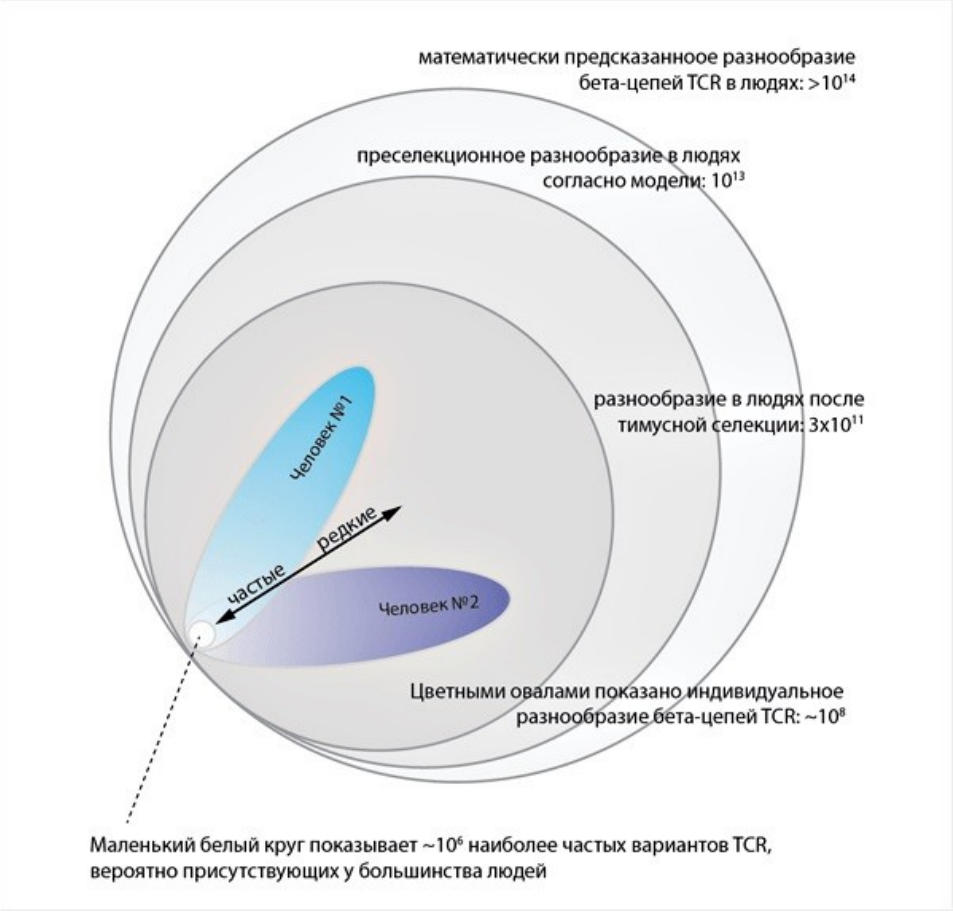
IMGT Repertoire (IG and TR)

Protein displays: human (*Homo sapiens*) IGHV

Species	Gene	Allele	AccNum	Domain label	Functionality	FR1-IMGT (1-26) A (1-15)	B (16-26)	CDR1-IMGT (27-38) BC (27-38)	C (39-46)	C' (47-55)	CDR2-IMGT (56-65) C'C" (56-65)	C" (66-74)	FR3-IMGT (66-104) D (75-84)	E (85-96)	F (97-104)	CDR3-IMGT (105-117) FG
						1 10 15	16 23 26	27 38	39 41 46	47 55	56 65	66 74	75 84	85 89 96	97 104	105
Homsap	IGHV1-2	IGHV1-2*01	X07448	VH	F	QVQLVQSGA.EVKKP	GASVKVSCKAS	GYTF....TGYY	MHWVRQAP	GQGLEWMGR	INPN..SGGT	NYAQKFQ.G	RVTSTRDTSI	STAYMELSRLRS	DDTVVYYC	AR
Homsap	IGHV1-3	IGHV1-3*01	X62109	VH	F	QVQLVQSGA.EVKKP	GASVKVSCKAS	GYTF....TSYA	MHWVRQAP	GQRLEWMGW	INAG..NGNT	KYSQKFQ.G	RVTITRDTSA	STAYMELSSLRS	EDTAVYYC	AR
Homsap	IGHV1-8	IGHV1-8*01	M99637	VH	F	QVQLVQSGA.EVKKP	GASVKVSCKAS	GYTF....TSYD	INWVRQAT	GQGLEWMGW	MNPN..SGNT	GYAQKFQ.G	RVTMTRNTSI	STAYMELSSLRS	EDTAVYYC	AR
Homsap	IGHV1-18	IGHV1-18*01	M99641	VH	F	QVQLVQSGA.EVKKP	GASVKVSCKAS	GYTF....TSYG	ISWVRQAP	GQGLEWMGW	ISAY..NGNT	NYAQKLQ.G	RVTMTTDTST	STAYMELRSLRS	DDTAVYYC	AR
Homsap	IGHV1-24	IGHV1-24*01	M99642	VH	F	QVQLVQSGA.EVKKP	GASVKVSCKVS	GYTL....TELS	MHWVRQAP	GKGLEWMGG	FDPE..DGET	IYAQKFQ.G	RVTMTEDTST	DTAYMELSSLRS	EDTAVYYC	AT
Homsap	IGHV3-33-2	IGHV3-33-2*01	AB019439	VH	P	EVQLVESGE.DPRQP	GGSLRLSCADS	GLTF....SSY*	MSSVSQAP	GKGLE*VVD	IQCD..GSQI	CYAQSVK.S	KFTISKENAK	NSLYLQMNSLRA	EGTAVCYC	M*G
Homsap	IGHV3-35	IGHV3-35*01	M99666	VH	ORF	EVQLVESGG.GLVQP	GGSLRLSCAAS	GFTF....SNSD	MNWVHQAP	GKGLEWVSG	VSWN..GSRT	HYADSVK.G	RFIISRDNSR	NTLYLQTNSLRA	EDTAVYYC	VR
Homsap	IGHV3-38	IGHV3-38*01	M99669	VH	ORF	EVQLVESGG.GLVQP	RGSLRLSCAAS	GFTV....SSNE	MSWIRQAP	GKGLEWVSS	ISG....GST	YYADSRK.G	RFTISRDNSK	NTLYLQMNNLRA	EGTAAYYC	ARY
Homsap	IGHV3-38-3	IGHV3-38-3*01	KF698732	VH	ORF	EVQLVESRG.VLVQP	GGSLRLSCAAS	GFTV....SSNE	MSWVRQAP	GKGLEWVSS	ISG....GST	YYADSRK.G	RFTISRDNSK	NTLHLQMNSLRA	EDTAVYYC	KK
Homsap	IGHV3-43	IGHV3-43*01	M99672	VH	F	EVQLVESGG.VVVQP	GGSLRLSCAAS	GFTF....DDYT	MHWVRQAP	GKGLEWVSL	ISWD..GGST	YYADSVK.G	RFTISRDNSK	NSLYLQMNSLRT	EDTALYYC	AKD

Разнообразие TCR