

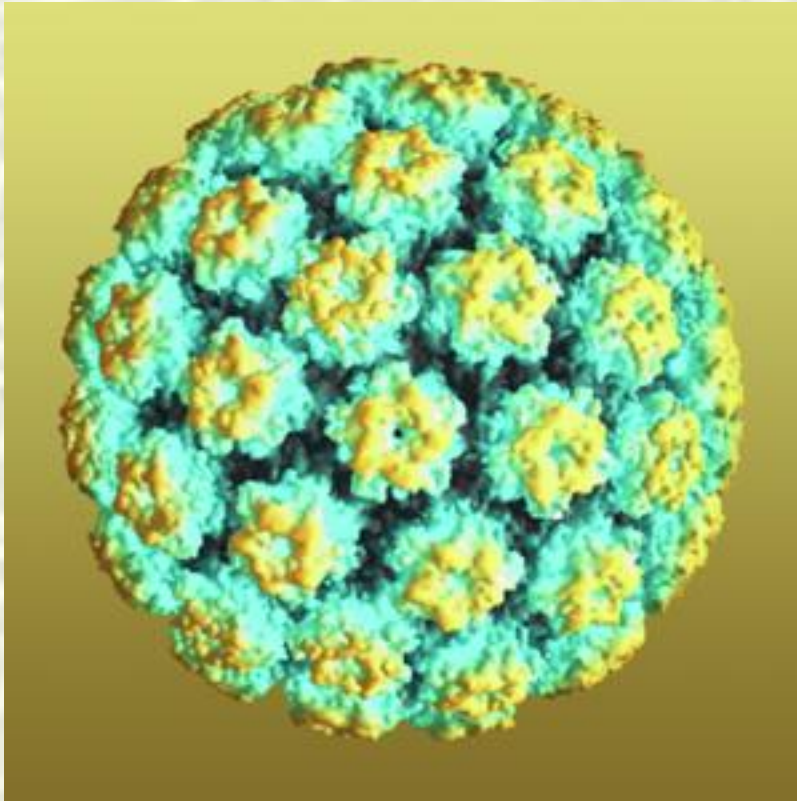
Папилломавирусы человека (HPV)

Доклад
по с/к «Генетика МО»
студентки гр. БГ-51
Рудневой Юлии

Проявление поражений НРV



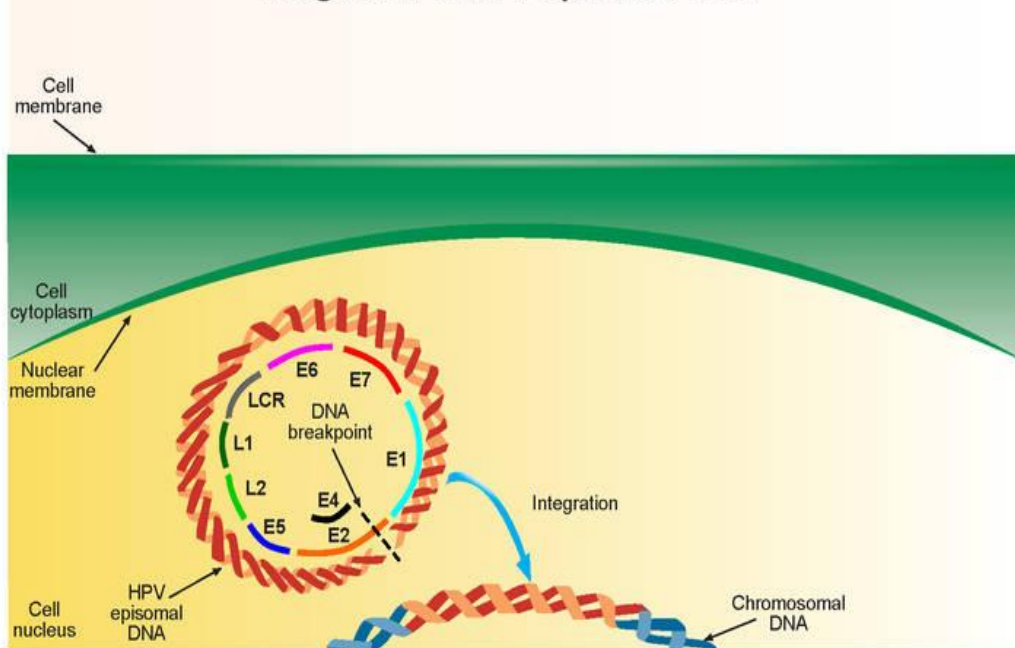
Вирион НРV



- . Вирус лишен внешней оболочки. Капсид диаметром 50-55 нм имеет форму икосаэдра и состоит из 72 капсомеров. Капсомер состоит из 2-х структурных белков: 57 кД позднего протеина L1, на долю которого приходится 80% всей вирусной частицы, и 43–53 кД белка капсида L2.

Наследственный аппарат

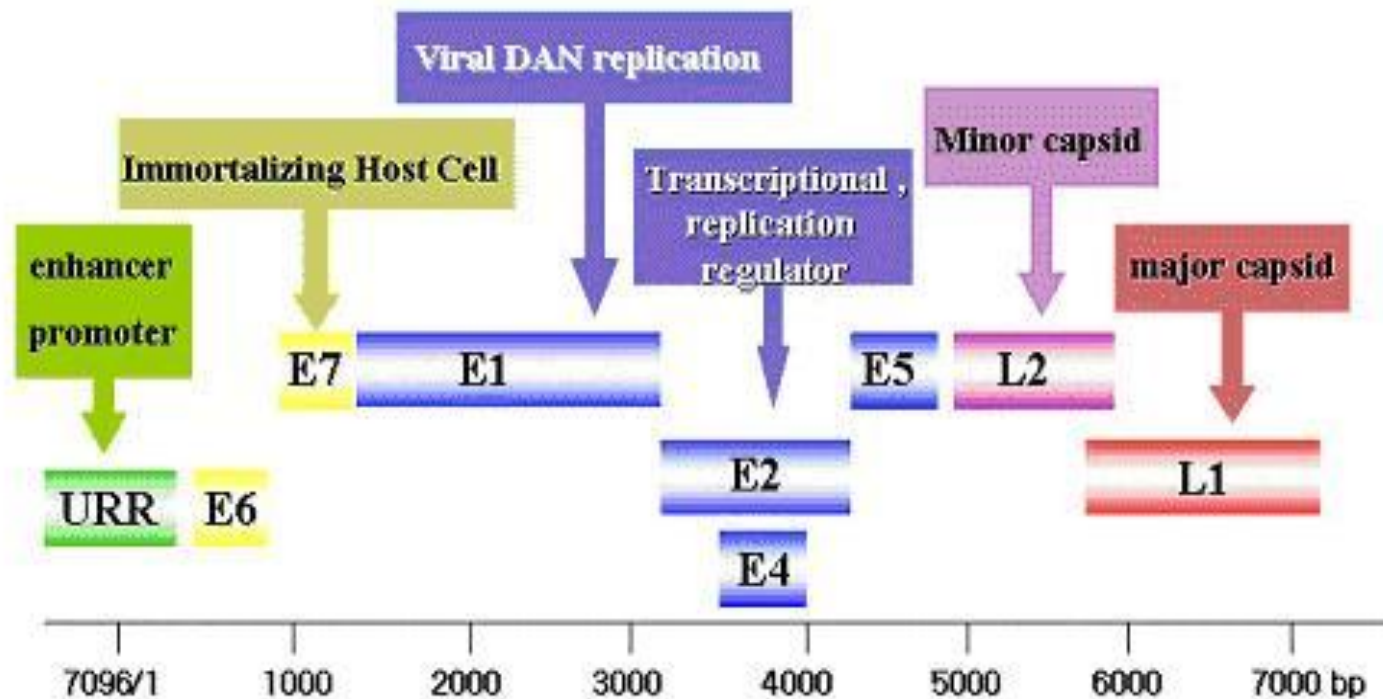
Integration of HPV episomal DNA



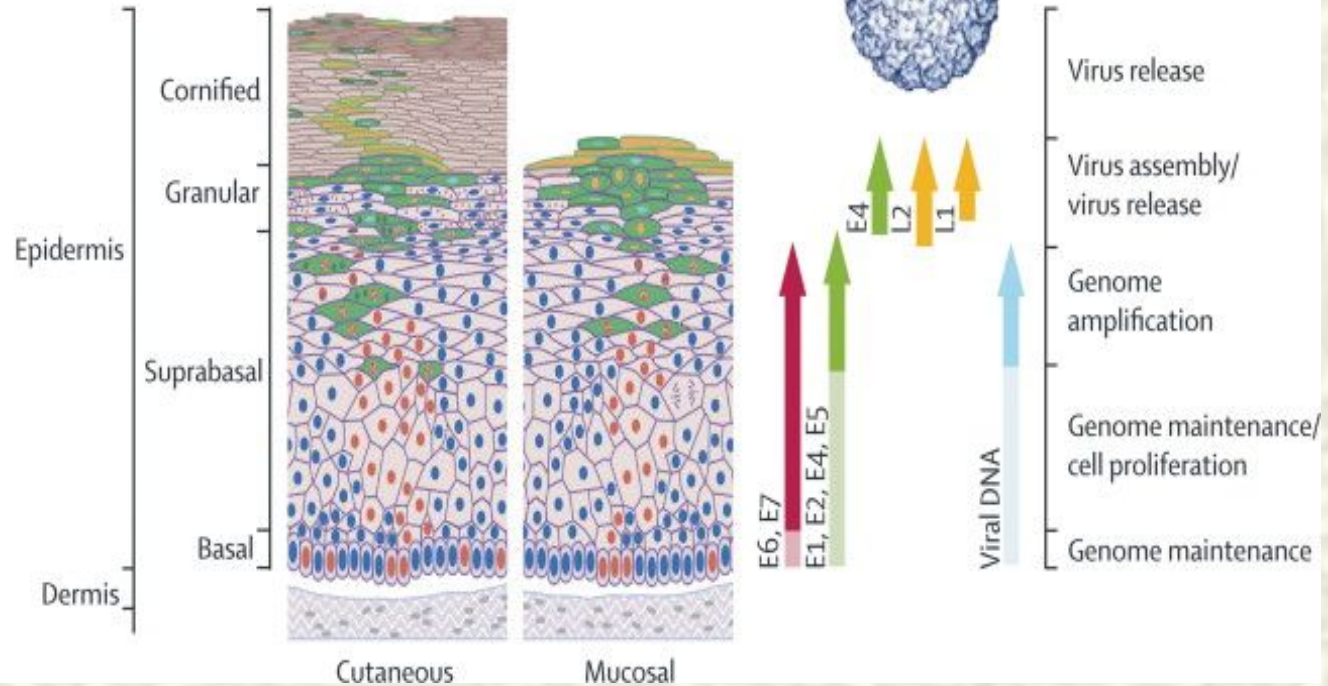
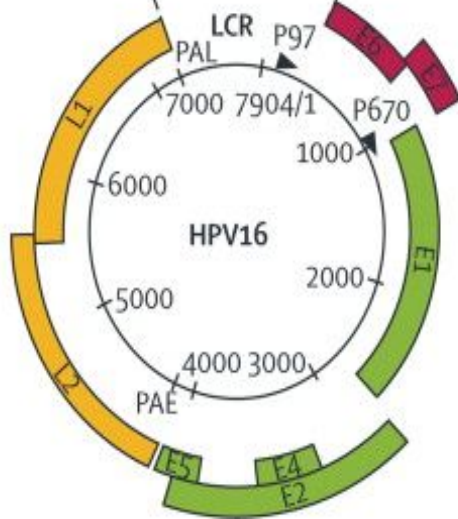
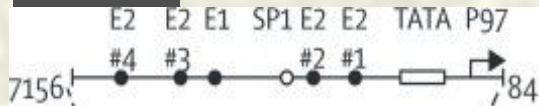
In certain instances during the replication cycle of HPV, the episomal DNA can be linearised and integrated into chromosomal DNA. A breakpoint that disrupts the HPV E2 gene will prevent the synthesis of E2 proteins that normally regulate the transcription of E6 and E7 oncoproteins. An increase in the production of E6 and E7 is associated with the risk of development of carcinoma due to the inactivation of cellular tumour suppressor proteins p53 and Retinoblastoma protein (pRb) that normally function to prevent cells with DNA damages from proliferating.

- Кольцевая молекула ДНК, попадая в базальные клетки эпителия реплицируются.
- Затем встраивается в хромосому хозяина. Активная репликация

Геном вируса



Экспрессия вирусного генома



Гены HPV

TABLE 1

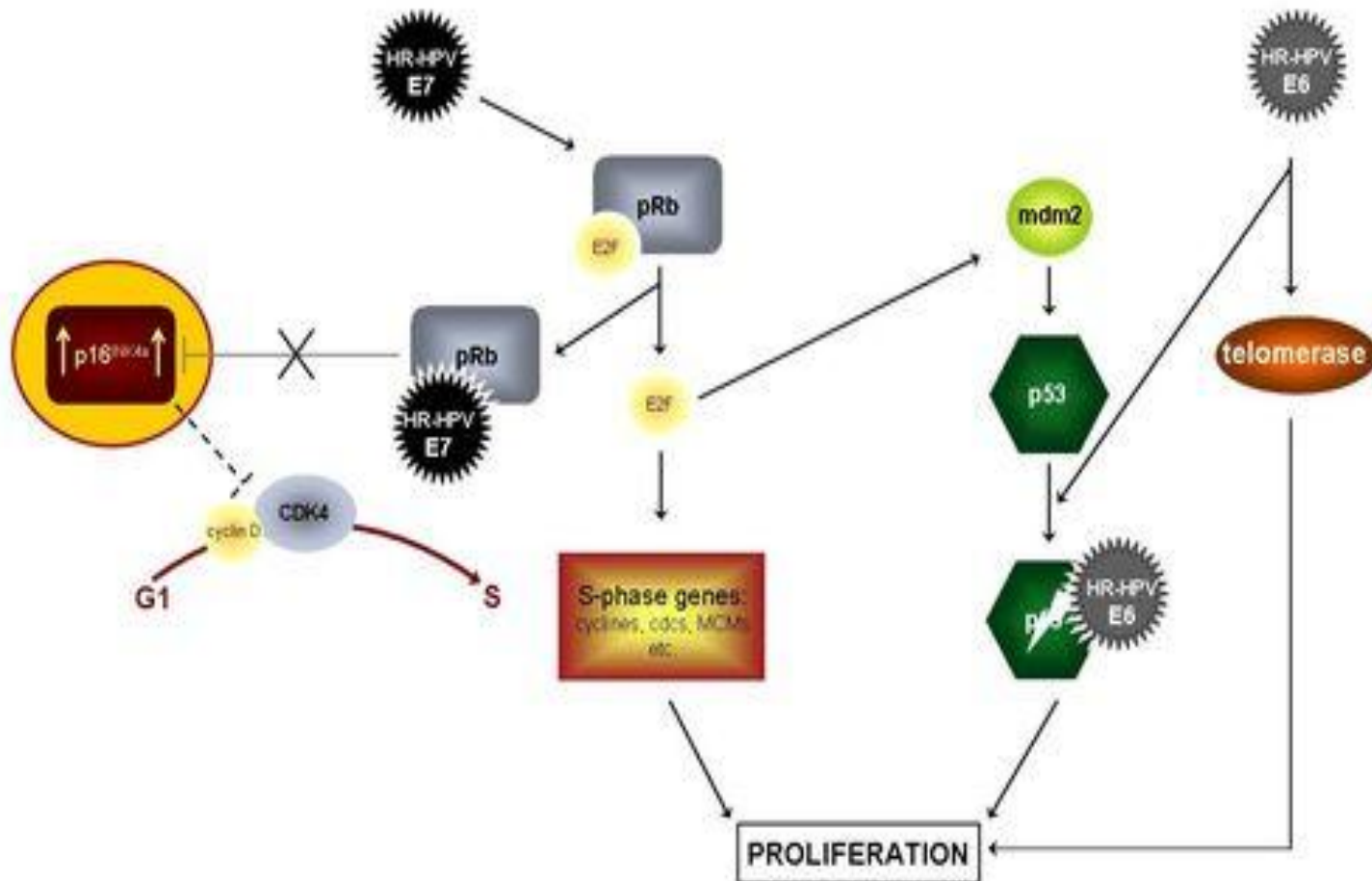
Open reading frame	First nucleotide	Potential ATG start codon	Nucleotide preceding stop codon	Size from ATG in bp	Amino acid coding capacity in daltons
E6	65	83	556	474	19191
E7	544	562	855	294	11024
E1	859	865	1167	303	11116
	1104	—	2810	1707*	64145
E2	2725	2755	3849	1095	41831
E4	3332	—	3616	285*	10413
E5	3863	—	4096	234*	8543
L2	4133	4235	5653	1418	50694
L1	5526	5559	7151	1593	59563
Cat-box region:		TAATACTAAACTACAATA			Position 7896
TATAAA boxes:		TATAAAA			17
		TATAAAA			65
		TATAAAA			4289
Polyadenylation signals:		AATAAA			4213
		AATAAA			7200

10 20 30 40 50 60 70 80 90 100
ACTACAATAA TCCATGTATA AACCTAAAGG OGTAAACCGA ATCGGTGGAA CCGAAACCGG TTAGTATAAA AGCAGACATF AACGAGAACT
100 GCAATGTTTC AGGACCCACA GTTACTGGGA GGAAGGTTAC CACAGGTTATG CACAGAGCTG CAACAACAATA TACATGATAT
200 GGAAGGAAAC GTTACTGGGA TTAGTGAGTA ATGACTTTGC TTTTGCGGAT TTATGCTATG TATATAGAGTA TGGGAATCCA
300 TTAATAAATF TTAGTGAGTA TTAGTGAGTA TTAGTGAGTA TTAGTGAGTA TTAGTGAGTA TTAGTGAGTA TTAGTGAGTA
400 TTAATTAAGT GTATTAAGTGT TCGAAGGCCA CTGTGTCTCT GAGAAGAACCA AACAGACTCTG GACAAAAAGC AARGATTCOA
500 CCGGTGATGT TATGTCTTGT TCCAGATCAT CAGAAGACAG TTAGAGAAAGC CAGCTGTATG CATGCTAGGA GATACACCTA
600 TTAGTAAACT CCATTAACAAT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT
700 CCGACAGACG CCATTAACAAT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT
800 AGACCTGTAT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT
900 ACCGGATGTA ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT ATGTGAACCT
1000 AAGATTTGGT AGATTTTATA GTAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA
1100 TTAGTATAAA AAAACAAGAT AGAGCTGCCA AAAGAGGATT ATTTGAAAGC ATTTGAAAGC ATTTGAAAGC ATTTGAAAGC
1200 TATGATAAGA CCCCATAAGA CTGAAACACG CTGAAACACG CTGAAACACG CTGAAACACG CTGAAACACG CTGAAACACG
1300 GATAGAAAAG GGCACACTAT ATGCCAAACA TCGAAGATAG TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT
1400 AGTTATACGG TCGTAAAGAA TCGAAGATAG TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT
1500 TATGATTAAG TCGTAAAGAA TCGAAGATAG TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT
1600 AGATATAAAT GTGGAAAGAA TCGAAGATAG TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT TAAGACACTT
1700 GTAGTACAGC AGCAGACTTA TATTGGTATA GTACACTTGA ATATACACAG ACTTCCCTTC TTAGTAAAGT
1800 ACAGACTAAG TTTAATGATF TACTAATGCA ATCTACTGCA ATCTACTGCA ATCTACTGCA ATCTACTGCA ATCTACTGCA
2000 GCACAAATGG CAGACACTAA ATGACTATGA ATGACTATGA ATGACTATGA ATGACTATGA ATGACTATGA ATGACTATGA
2100 CAGACAGAAA GTTGTAGAGT TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA
2200 AAGCATAACA AATCATTATT TGGTATGAGT TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA TTAGTGTGCA
2300 TAGCAGATGC CAATAAGCCT CATTTAGATG ATGCTAGAGT AACTACAGAT AACTACAGAT AACTACAGAT AACTACAGAT
2400 TATGGAATGA AAGCATAAGC CATTTAGATG ATGCTAGAGT AACTACAGAT AACTACAGAT AACTACAGAT AACTACAGAT
2500 CATAAATAGT TGGTGGTGT TACTTTGCT ACATGAGTGC ACATGAGTGC ACATGAGTGC ACATGAGTGC ACATGAGTGC
2600 TCTCAAGAAC GTGGTCCGAA TTAGCTTTGC ACAGAAAGCA TTAGCTAGAGT AACTACAGAT AACTACAGAT AACTACAGAT
2800 TAACACATTA TGAANAATGA AGTACAGAGC TAACTGTGCA TAACTGTGCA TAACTGTGCA TAACTGTGCA TAACTGTGCA
2900 GGGATTTAAA CAYATTAAGC ACCAAGTGGT GCCAACACTG ACCAACACTG ACCAACACTG ACCAACACTG ACCAACACTG
3000 TATAACTCAC ACATATAGTA TGAAGAATGG ACATATAGAGT ACCTATAGCT ACCTATAGCT ACCTATAGCT ACCTATAGCT
3100 CAGTGGAAAG GCAATTTGAT GGAGACATAT GCAATATGAT GCAATATGAT GCAATATGAT GCAATATGAT GCAATATGAT
3200 GGGTCAAGTT GACTTATTATG TTTTATATTA TTTTATATTA TTTTATATTA TTTTATATTA TTTTATATTA TTTTATATTA
3300 STATGGGAAG TTCATGCGGG TGGTCAAGTA ATATATATGC ATATATATGC ATATATATGC ATATATATGC ATATATATGC
3400 CCAACCCACG CCGCCGCAAC CATAACCAAG CCGTGGCTTT GCGCACAGAG GCGCACAGAG GCGCACAGAG GCGCACAGAG
3500 CCCCCTGACC ACCCAAGAT GTTTGCAAGG AGACTGATGT GACTGATGTA GACTGATGTA GACTGATGTA GACTGATGTA
3600 AGTAAAGACT CACCCATAGT ACATTTAAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA
3700 GGGTCAAGTT GCAATTAAGT GCAATTAAGT GCAATTAAGT GCAATTAAGT GCAATTAAGT GCAATTAAGT GCAATTAAGT
3800 AGTTAAATAA CCATAAAGT TTAGAGTGTG TTAGAGTGTG TTAGAGTGTG TTAGAGTGTG TTAGAGTGTG TTAGAGTGTG
3900 GCTTTGTTGG CTTTTGTGTT TCTGGCTATT TCTGGCTATT TCTGGCTATT TCTGGCTATT TCTGGCTATT TCTGGCTATT
4000 ACAGCAGCCT CTGGGTTTAG TGCTTTTATF GATATATATA GATATATATA GATATATATA GATATATATA GATATATATA
4100 GTATATGTAC ATAATGTAAT TGTTACATAT GATATATATA GATATATATA GATATATATA GATATATATA GATATATATA
4200 TCTTTGTTFF TAAATAAACT CTATTTACTT AACAAAGTGC AACAAAGTGC AACAAAGTGC AACAAAGTGC AACAAAGTGC
4300 AAACAGGCAG GTACATGTGC ACCTGACATG ATACCTAAGG ATACCTAAGG ATACCTAAGG ATACCTAAGG ATACCTAAGG
4400 TGGGTTAGG AATGGGAACA GGGTGGGTA CAGGCGGAGT CAGGCGGAGT CAGGCGGAGT CAGGCGGAGT CAGGCGGAGT
4500 AAGACCCCTT TTAACAGTAG ATCTGTGGG CCGTCTGATG CCGTCTGATG CCGTCTGATG CCGTCTGATG CCGTCTGATG
4600 GTACCTTCCA TTTCCCGTAG TGTATGAGGA CTACTTCAAG CTACTTCAAG CTACTTCAAG CTACTTCAAG CTACTTCAAG
4700 CTACACATAA EAATGCCACT TCCACTGAGC CATCTGTAAT CATCTGTAAT CATCTGTAAT CATCTGTAAT CATCTGTAAT
4800 TACACATAAT TATGAAGAAA TTTACTATGA TACATTTATF TACATTTATF TACATTTATF TACATTTATF TACATTTATF
4900 GCACGCTAG GATTAATAG TGGCACAACA CAACAGGTTA CAACAGGTTA CAACAGGTTA CAACAGGTTA CAACAGGTTA
5000 CATATGAAGG GATAATACAT TATATTTTTC TATATTTTTC TATATTTTTC TATATTTTTC TATATTTTTC TATATTTTTC
5100 ACATAGGCCA GCATTAAGCT CTAGGGGTAC TGGCATTAGG TGGCATTAGG TGGCATTAGG TGGCATTAGG TGGCATTAGG
5200 AAGSTACATT ATTATATGA TTTAAGTACT ATTTGATCTG ATTTGATCTG ATTTGATCTG ATTTGATCTG ATTTGATCTG
5300 CCTGCTAC TCTATTAAAT AATGATATA AATGATATA AATGATATA AATGATATA AATGATATA AATGATATA
5400 TTTATCAGGT TATATTCGCT CAATATCAAC AATTOCTTTT AATTOCTTTT AATTOCTTTT AATTOCTTTT AATTOCTTTT
5500 CAAGCTCCTT CATTAATTCG TATATTCGCT GGGTCTCCAC GGGTCTCCAC GGGTCTCCAC GGGTCTCCAC GGGTCTCCAC
5600 GAAAGGAGAG TAAAGGTTA GGAATTTTTC TTTGAGAGGT TTTGAGAGGT TTTGAGAGGT TTTGAGAGGT TTTGAGAGGT
5700 TAAGCAGGGA TGAATATGTT GCGCGACAAA ACATATATTA ACATATATTA ACATATATTA ACATATATTA ACATATATTA
5800 TAAAGTAAA ATCCAGTAC ACAGCGGCTG TTTGGGCTCT TTTGGGCTCT TTTGGGCTCT TTTGGGCTCT TTTGGGCTCT
5900 TATTAAATA ATTTGATGAC ATTTGATGCA TTAGGCAAT TTAGGCAAT TTAGGCAAT TTAGGCAAT TTAGGCAAT
6000 TTTGTTGTTA ATTTGTTGCA ANCCACTAT ANCCACTAT ANCCACTAT ANCCACTAT ANCCACTAT ANCCACTAT
6100 GAGTTAATA ACACAGTAT TCGAGATGCT TCGAGATGCT TCGAGATGCT TCGAGATGCT TCGAGATGCT TCGAGATGCT
6200 TGGTATTTTC TACATTTATF TCGAAATGCT TCGAAATGCT TCGAAATGCT TCGAAATGCT TCGAAATGCT TCGAAATGCT
6300 GTTTGTTAGA CATTTATTA ATAGGGCTG ATAGGGCTG ATAGGGCTG ATAGGGCTG ATAGGGCTG ATAGGGCTG
6400 TCAAAATATF TGTCTACAGC TATTTGTTGA ATGTTGTTGA ATGTTGTTGA ATGTTGTTGA ATGTTGTTGA ATGTTGTTGA
6500 GCATTTGTTG GGGTAAACGA CTATTTGTTGA ATGTTGTTGA ATGTTGTTGA ATGTTGTTGA ATGTTGTTGA ATGTTGTTGA
6600 TAAAAAATCT ANCTTTAAGG AGTAOCTAGC ACATGGGGAG ACATGGGGAG ACATGGGGAG ACATGGGGAG ACATGGGGAG
6700 ACATACATAC ATTTCTAGAA TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT
6800 CCGAGGCAAT TCGTTGTCAA AACCATACAC TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT
6900 TCCGTCAGAC CTAGTACAGT TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT TTTCCACTAT
7000 CCGACCAAGT CATCTACCTG TAGAACCTGCT TAGAACCTGCT TAGAACCTGCT TAGAACCTGCT TAGAACCTGCT
7100 GTATGTGCTT CATGTGCTT TAAAAATATA TAAAAATATA TAAAAATATA TAAAAATATA TAAAAATATA TAAAAATATA
7200 ATGTGTGCTG GCAACATAAA TAAACTTATF TAAACTTATF TAAACTTATF TAAACTTATF TAAACTTATF TAAACTTATF
7300 GTTTTATATA TACTATTTT TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA TAAAGTAAA
7400 TCTATGTCAG CAACTATGCT TAAACTTATF TAAACTTATF TAAACTTATF TAAACTTATF TAAACTTATF TAAACTTATF
7500 GTTTTATACA CTGGCACTAT TGGCAACTACT TGGCAACTACT TGGCAACTACT TGGCAACTACT TGGCAACTACT
7600 CACATATTTT TGGCTGTGTT TAACTAACT TAACTAACT TAACTAACT TAACTAACT TAACTAACT TAACTAACT
7700 GTGTAAGAGT TAGTCAFACA TTGTTTCAAT TTGTTTCAAT TTGTTTCAAT TTGTTTCAAT TTGTTTCAAT TTGTTTCAAT
7800 CTA

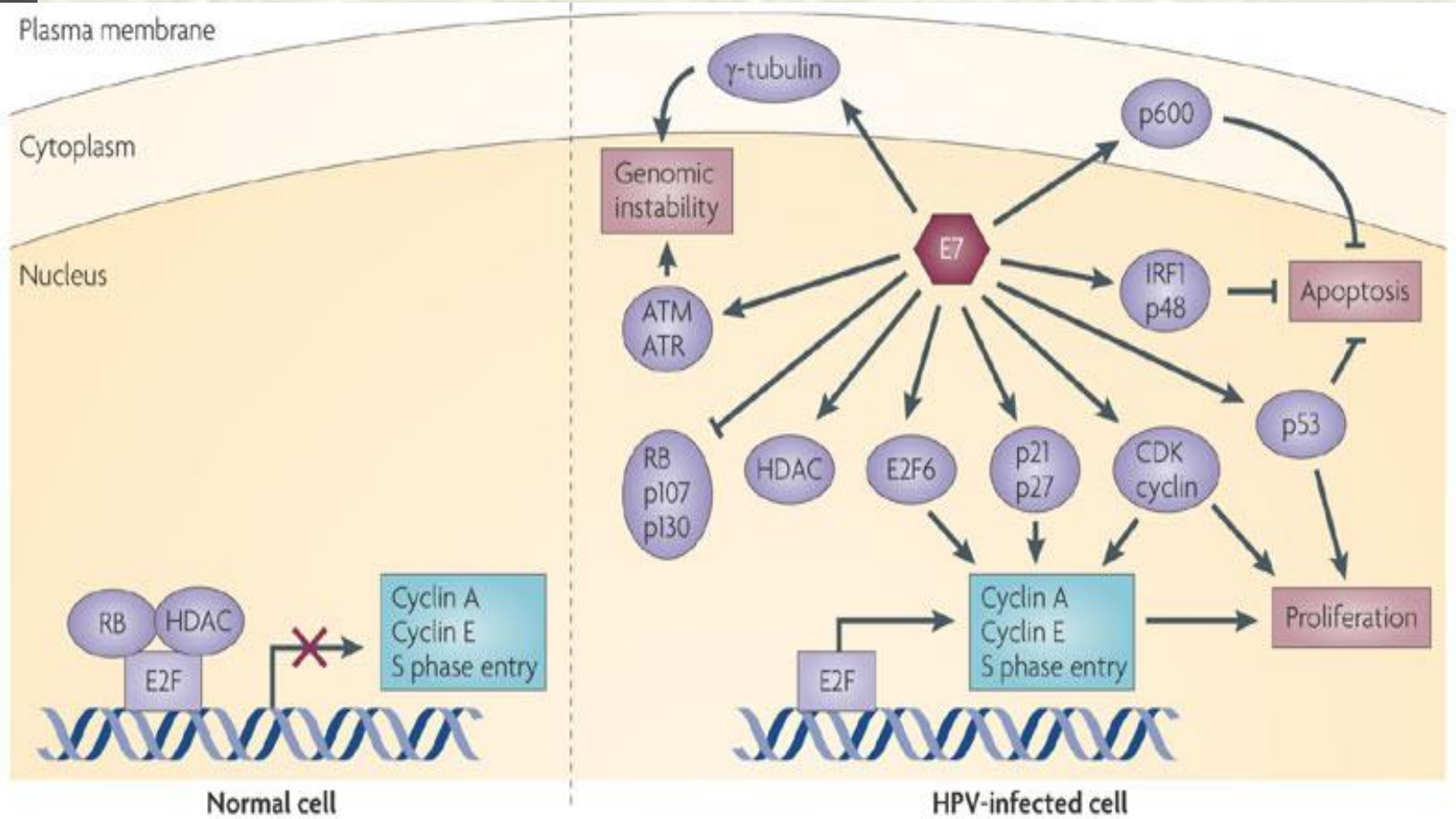
URR: регуляторы

- AP1 , YY1 , SP1 , TEF1 и TEF2 , NF1, Oct , KRF1 , C/EBP и ядерные рецепторы .
 - Транскрипционные факторы TEF1 и TEF2 имеют четыре сайта в энхансере HPV16 и они, по-видимому, являются активаторами для промотора P97
-

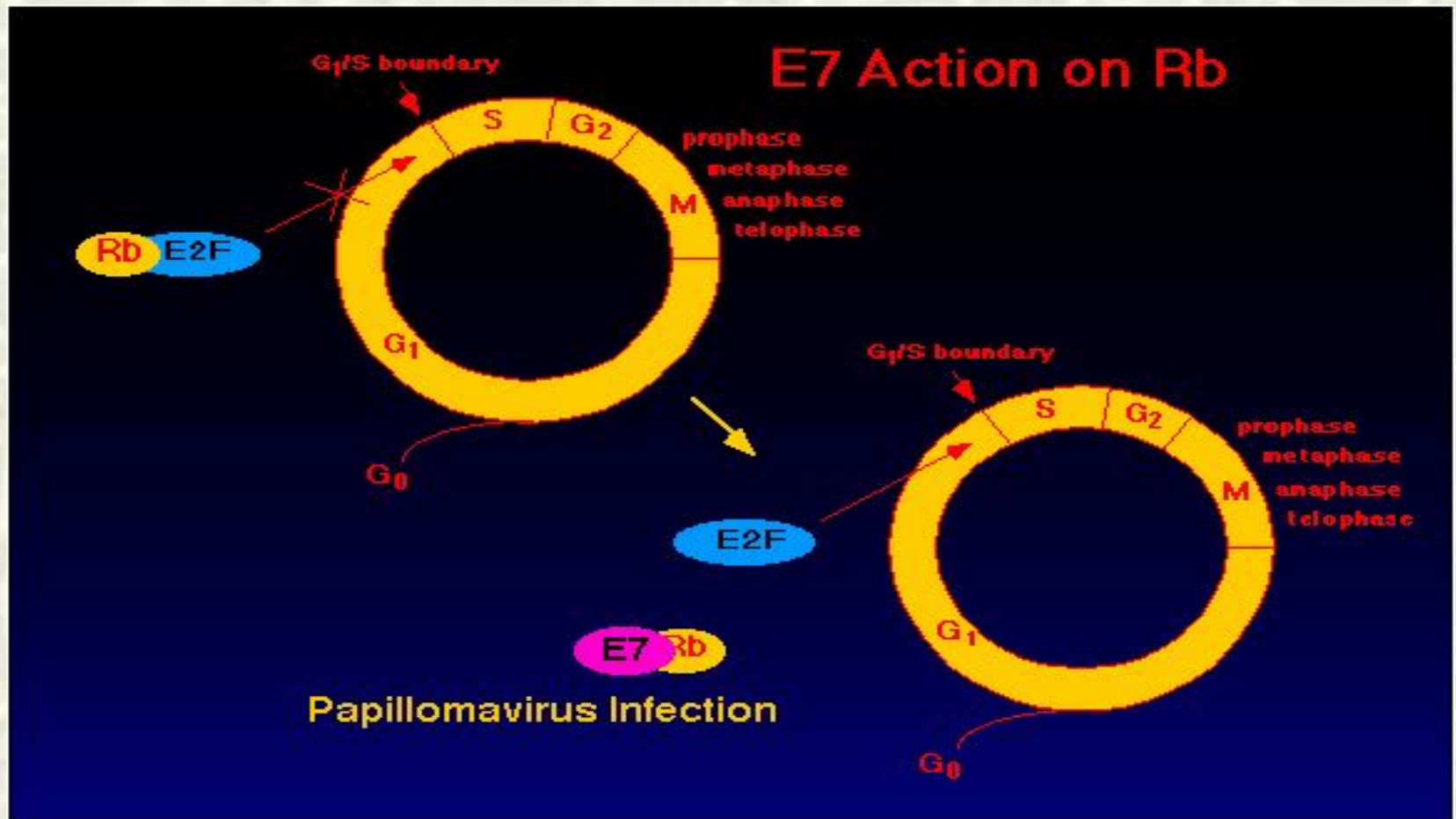
Действие «ранних генов» E6, E7



Действие E7



Изменение клеточного цикла



Спасибо за внимание!

