

# MSDS BioSafety Information

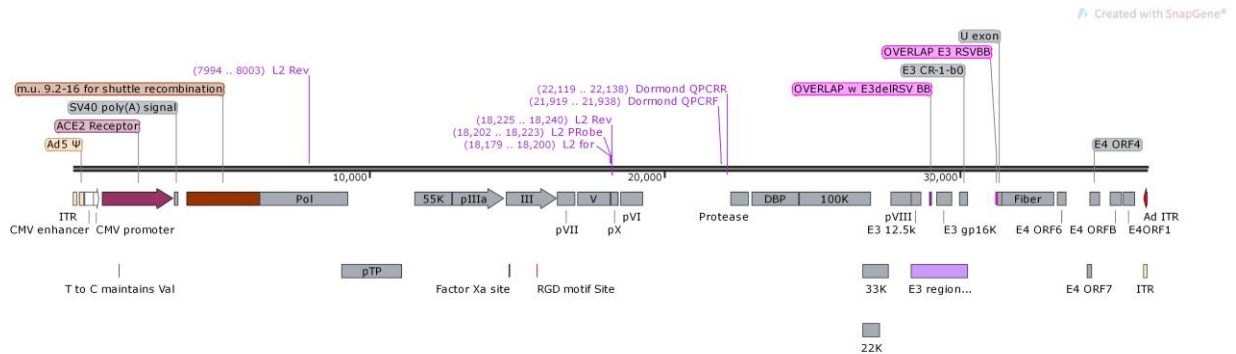
## McCray-7580 Ad5CMVACE2

### Plasmid: pAd5CMVACE2SV40pA



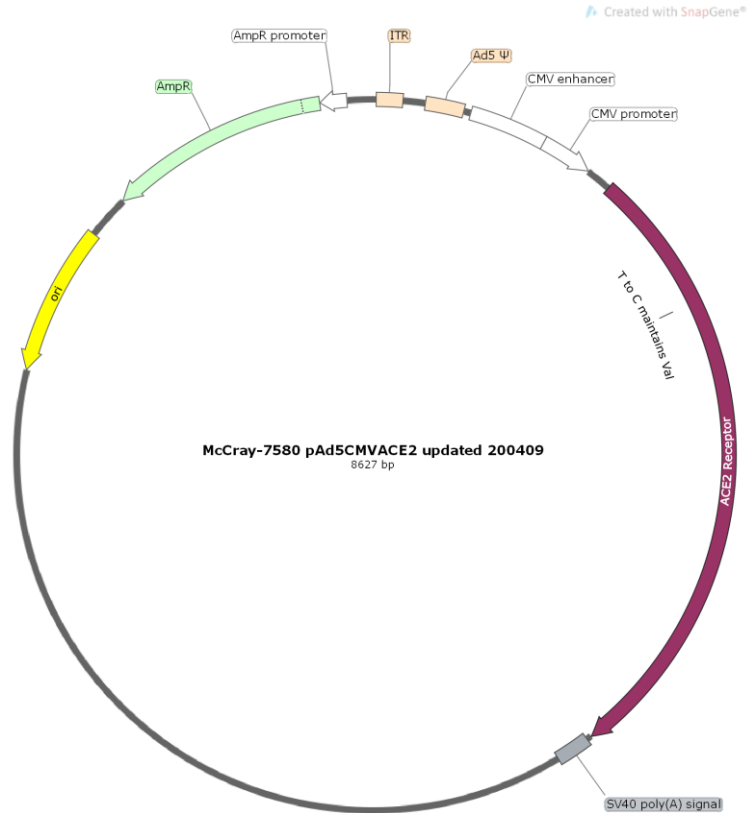
**Replication Competent Adenovirus Contamination Result (RCA): Not detected by immunostain on A549 infected cells.**

**Viral DNA 36,347 bp**



**McCray-7580 Ad5CMVACE2 viral DNA**  
36,347 bp

Shuttle Plasmid:



TTAATTAAGCTAGCATCATCAATAATATACCTTATTTTGGATTGAAGCCAATATGATAATGAGG  
GGGTGGAGTTTGTGACGTGGCGCGGGGCGTGGGAACGGGGCGGGTGACGTAGTAGTGTGGCGGA  
AGTGTGATGTTGCAAGTGTGGCGGAACACATGTAAGCGACGGATGTGGCAAAAGTGACGTTTTT  
GGTGTGCGCCGGTGTACACAGGAAGTGACAATTTTCGCGCGGTTTTAGGCGGATGTTGTAGTAA  
ATTTGGGCGTAACCGAGTAAGATTTGGCCATTTTCGCGGGAAAACCTGAATAAGAGGAAGTGAAA  
TCTGAATAATTTTGTGTTACTCATAGCGCGTAATATTTGTCTAGGGAGATCAGCCTGCAGGTCGT  
TACATAACTTACGGTAAATGGCCCGCCTGGCTGACCGCCAACGACCCCGCCATTGACGTCAA  
TAATGACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCATTGACGTCAATGGGTGGAGTA  
TTTACGGTAAACTGCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTG  
ACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCCAGTACATGACCTTATGGGACTTTCCT  
ACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTTGGCAGTACAT  
CAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATG  
GGAGTTTGTTTTGGCACCAAAATCAACGGGACTTTCCAAATGTCGTAACAACTCCGCCCCATTG  
ACGCAAATGGGCGGTAGGCGTGTACGGTGGGAGGTCTATATAAGCAGAGCTCGTTTAGTGAACC  
GTCAGATGGTACCGTTTAAACTTAAGCTTGGTACCGAGCTCGGATCCACTAGTAACGGCCGCCAG  
TGTGCTGGAATTCGCCCTTGACGATGTCAAGCTCTTCCTGGCTCCTTCTCAGCCTTGTGCTGTA  
ACTGCTGCTCAGTCCACCATTGAGGAACAGGCCAAGACATTTTTTGGACAAGTTTAACCACGAAGC  
CGAAGACCTGTTCTATCAAAGTTCACCTGCTTCTTGAATTATAACACCAATATTACTGAAGAGA  
ATGTCCAAAACATGAATAATGCTGGGGACAAATGGTCTGCCTTTTTAAAGGAACAGTCCACACT  
TGCCCAAATGTATCCACTACAAGAAATTCAGAATCTCACAGTCAAGCTTCAGCTGCAGGCTCTTC  
AGCAAATGGGTCTTCAGTGCTCTCAGAAGACAAGAGCAAACGGTTGAACACAATTCTAAATAC  
AATGAGCACCATCTACAGTACTGGAAAAGTTTGTAAACCCAGATAATCCACAAGAATGCTTATTA  
CTTGAACCAGGTTTGAATGAAATAATGGCAAACAGTTTAGACTACAATGAGAGGCTCTGGGCTT

GGGAAAGCTGGAGATCTGAGGTCGGCAAGCAGCTGAGGCCATTATATGAAGAGTATGTGGTcTT  
GAAAAATGAGATGGCAAGAGCAAATCATTATGAGGACTATGGGGATTATTGGAGAGGAGACTAT  
GAAGTAAATGGGGTAGATGGCTATGACTACAGCCGCGGCCAGTTGATTGAAGATGTGGAACATA  
CCTTTGAAGAGATTAAACCATTATATGAACATCTTCATGCCTATGTGAGGGCAAAGTTGATGAA  
TGCCTATCCTTCCTATATCAGTCCAATTGGATGCCTCCCTGCTCATTGCTTGGTGATATGTGGG  
GTAGATTTTGGACAAATCTGTA CTCTTTGACAGTTCCCTTTGGACAGAAACCAAACATAGATGTT  
ACTGATGCAATGGTGGACCAGGCCTGGGATGCACAGAGAATATTCAAGGAGGCCGAGAAGTTCT  
TTGTATCTGTTGGTCTTCCTAATATGACTCAAGGATTCTGGGAAAATTCCATGCTAACGGACCCA  
GGAAATGTTCAGAAAGCAGTCTGCCATCCCACAGCTTGGGACCTGGGGAAGGGCGACTTCAGGAT  
CCTTATGTGCACAAAGGTGACAATGGACGACTTCCTGACAGCTCATCATGAGATGGGGCATATCC  
AGTATGATATGGCATATGCTGCACAACCTTTTCTGCTAAGAAATGGAGCTAATGAAGGATTCCA  
TGAAGCTGTTGGGGAATCATGTCACTTTCTGCAGCCACACCTAAGCATTTAAAATCCATTGGTC  
TTCTGTCACCCGATTTTCAAGAAGACAATGAAACAGAAATAAACTTCCTGCTCAAACAAGCACTC  
ACGATTGTTGGGACTCTGCCATTTACTTACATGTTAGAGAAGTGGAGGTGGATGGTCTTTAAAG  
GGGAAATTCCTCAAAGACCAGTGGATGAAAAAGTGGTGGGAGATGAAGCGAGAGATAGTTGGGGT  
GGTGGAACCTGTGCCCATGATGAAACATACTGTGACCCCGCATCTCTGTTCCATGTTTCTAATG  
ATTACTCATTTCATTCGATATTACACAAGGACCCTTTACCAATTCCAGTTTCAAGAAGCACTTTGT  
CAAGCAGCTAAACATGAAGGCCCTCTGCACAAATGTGACATCTCAA ACTCTACAGAAGCTGGACA  
GAAACTGTTCAATATGCTGAGGCTTGGAAAATCAGAACCCTGGACCCTAGCATTGGAAAATGTT  
GTAGGAGCAAAGAACATGAATGTAAGGCCACTGCTCAACTACTTTGAGCCCTTATTTACCTGGCT  
GAAAGACCAGAACAAGAATTTCTTTTGTGGGATGGAGTACCGACTGGAGTCCATATGCAGACCAA  
AGCATCAAAGTGAGGATAAGCCTAAAATCAGCTCTTGGAGATAAAGCATATGAATGGAACGACA  
ATGAAATGTACCTGTTCCGATCATCTGTTGCATATGCTATGAGGCAGTACTTTTTAAAAGTAAA  
AAATCAGATGATTCTTTTGGGGAGGAGGATGTGCGAGTGGCTAATTTGAAACCAAGAATCTCC  
TTTAATTTCTTTGTCACTGCACCTAAAAATGTGTCTGATATCATTCCTAGA ACTGAAGTTGAAAA  
GGCCATCAGGATGTCCCGGAGCCGTATCAATGATGCTTTCCGTCTGAATGACAACAGCCTAGAGT  
TTCTGGGGATACAGCCAACACTTGGACCTCCTAACCCAGCCCCCTGTTCCATATGGCTGATTGTT  
TTTGGAGTTGTGATGGGAGTGATAGTGGTTGGCATTGTCATCCTGATCTTCACTGGGATCAGAG  
ATCGGAAGAAGAAAAATAAAGCAAGAAGTGGAGAAAATCCTTATGCCTCCATCGATATTAGCAA  
AGGAGAAAATAATCCAGGATTCCAAACACTGATGATGTTGAGACCTCCTTTTAGGCGGCCGCCA  
CaGCGGGGAGATCCAGACATGATAAGATACATTGATGAGTTTGGACAAACCACA ACTAGAATGC  
AGTGAAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAG  
CTGCAATAAACAAGTTAACAACAACAATTGCATTTCATTTTATGTTTCAGGTTCAgGGGGAGGTGT  
GGGAGGTTTTTTAAAGCAAGTAAAACCTCTACAAATGTGGTATGGCTGATTATGATCCGGCTGC  
CTCGCGCGTTTTCGGTGATGACGGTGA AACCTCTGACACATGCAGCTCCCGGAGACGGTCACAGC  
TTGTCTGTAAGCGGATGCCGGGAGCAGACAAGCCCGTCAGGGCGCGTCAGCGGGTGTGGCGGGT  
GTCGGGGCGCAGCCATGAGGTGACTCTAGTCCCGCGGTGGCAGATCTGGAAGGTGCTGAGGTA  
CGATGAGACCCGCACCAGGTGCAGACCCTGCGAGTGTGGCGGTAAACATATTAGGAACCAGCCTG  
TGATGCTGGATGTGACCGAGGAGCTGAGGCCGATCACTTGGTGCTGGCCTGCACCCGCGCTGAG  
TTTGGCTCTAGCGATGAAGATACAGATTGAGGTA CTGAAATGTGTGGGCGTGGCTTAAGGGTGG  
GAAAGAATATATAAGGTGGGGTCTTATGTAGTTTTGTATCTGTTTTGCAGCAGCCGCCGCC  
ATGAGCACCAACTCGTTTGTGGAAGCATTGTGAGCTCATATTTGACAACGCGCATGCCCCCATG  
GGCCGGGGTGCCTCAGAATGTGATGGGCTCCAGCATTGATGGTCGCCCCGTCCTGCCCGCAA ACT  
CTACTACCTTGACCTACGAGACCGTGTCTGGAACGCCGTTGGAGACTGCAGCCTCCGCCGCCGCT  
TCAGCCGCTGCAGCCACCGCCCGGGATTGTGACTGACTTTGCTTTCCTGAGCCCGCTTGCAAGC  
AGTGCAGCTTCCCGTTCATCCGCCCGGATGACAAGTTGACGGCTTTTTGGCACAATTGGATTC

TTTGACCCGGGAACCTTAATGTCGTTTCTCAGCAGCTGTTGGATCTGCGCCAGCAGGTTTCTGCC  
TGAAGGCTTCCTCCCCTCCAATGCGGTTTAAACATAAATAAAAAACCAGACTCTGTTTGGATT  
TGGATCAAGCAAGTGTCTTGCTGTCTTTATTTAGGGGTTTTGCGCGCGCGGTAGGCCCGGGACCA  
GCGGTCTCGGTGCTTGAAGGTCCTGTGTATTTTTCCAGGACGTGGTAAAGGTGACTCTGGATGT  
TCAGATACATGGGCATAAGCCCGTCTCTGGGGTGGAGGTAGCACCCTGCAGAGCTTCATGCTGC  
GGGTGGTGTGTAGATGATCCAGTCGTAGCAGGAGCGCTGGGCGTGGTGCCTAAAAATGTCTT  
TCAGTAGCAAGCTGATTGCCAGGGGCAGGCCCTTGGTGTAAAGTGTTTACAAAGCGGTTAAGCTG  
GGATGGGTGCATACGTGGGGATATGAGATGCATCTTGGACTGTATTTTTAGGTTGGCTATGTTC  
CCAGCCATATCCCTCCGGGGATTTCATGTTGTGCAGAACCACCAGCACAGTGTATCCGGTGCACCT  
GGGAAATTTGTCATGTAGCTTAGAAGGAAATGCGTGGAAAGAACTTGGAGACGCCCTTGTGACCT  
CCAAGATTTTCCATGCATTCGTCCATAATGATGGCAATGGGCCACGGGCGGCGGCCTGGGCGAA  
GATATTTCTGGGATCACTAACGTCATAGTTGTGTTCCAGGATGAGATCGTCATAGGCCATTTTTA  
CAAAGCGCGGGCGGAGGGTGCCAGACTGCGGTATAATGGTTCATCCGGCCAGGGGCGTAGTTA  
CCCTCACAGATTTGCATTTCCCACGCTTTGAGTTCAGATGGGGGATCATGTCTACCTGCGGGGC  
GATGAAGAAAACGGTTTCCGGGGTAGGGGAGATCAGCTGGGAAGAAAGCAGGTTCCCTGAGCAGC  
TGCGACTTACCGCAGCCGTGGGCCCGTAAATCACACCTATTACCGGcTGCAACTGGTAGTTAAG  
AGAGCTGCAGCTGCCGTCATCCCTGAGCAGGGGGCCACTTCGTTAAGCATGTCCCTGACTCGCA  
TGTTTTCCCTGACCAAATCCGCCAGAAGGCGCTCGCCGCCAGCGATAGCAGTTCTTGCAAGGAA  
GCAAAGTTTTTCAACGGTTTGAGACCGTCCGCCGTAGGCATGCTTTTGAGCGTTTGACCAAGCAG  
TTCCAGGCGGTCCCACAGCTCGGTCACCTGCTCTACGGCATCTCGATCCAGCATATCTCCTCGTTT  
CGCGGGTTGGGGCGGCTTTCGCTGTACGGCAGTAGTCGGTGCTCGTCCAGACGGGCCAGGGTCAT  
GTCTTTCCAGGGCGCAGGGTCCCTCGTCAGCGTAGTCTGGGTCACGGTGAAGGGTGCCTCCGG  
GCTGCGCGCTGGCCAGGGTGCCTTGAAGGCTGGTCTGCTGGTGAAGCGCTGCCGGTCTTCG  
CCCTGCGCGTCGGCCAGGTAGCATTGACCATGGTGTATAGTCCAGCCCTCCGCGGCGTGGCC  
TTGGCGCGCAGCTTGCCCTTGGAGGAGGCGCCGACGAGGGGCAGTGCAGACTTTTGAGGGCGTA  
GAGCTTGGGCGGAGAAATACCGATTCCGGGGAGTAGGCATCCGCGCCGACGGCCCCGACAGCG  
TCTCGCATCCACGAGCCAGGTGAGCTCTGGCCGTTCCGGGTCAAAAACCAGGTTTCCCCCATGC  
TTTTTGATGCGTTTCTTACCTCTGGTTTCCATGAGCCGGTGTCCACGCTCGGTGACGAAAAGGCT  
GTCCGTGTCCCCGTATACAGACTTGAGAGGCTGTCCCTCGACCGATGCCCTTGAAGCCTTCAAC  
CCAGTCAGCTCCTTCCGGTGGGCGCGGGGCATGACTATCGTCGCCGCACTTATGACTGTCTTCTT  
TATCATGCAACTCGTAGGACAGGTGCCGGCAGCGCTCTGGGTCATTTTCGGCGAGGACCGCTTTC  
GCTGGAGCGGACGATGATCGGCCTGTGCTTTCGGTATTCGGAATCTTGACGCCCCTCGCTCAA  
GCCTTCGTCACTGGTCCCGCCACCAAACGTTTCGGCGAGAAGCAGGCCATTATCGCCGGCATGGC  
GGCCGACGCGCTGGGCTACGTCTTGCTGGCGTTTCGCGACCGGAGGCTGGATGGCCTTCCCATTA  
TGATTCTTCTCGCTTCCGGCGGCATCGGGATGCCCGGTTGCAGGCCATGCTGTCCAGGCAGGTA  
GATGACGACCATCAGGGACAGCTTCAAGGCCAGAAAAGGCCAGGAACCGTAAAAAGGCCGCGT  
TGCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCGACGCTCAAGTCAG  
AGGTGGCGAAACCCGACAGGACTATAAAGATAACCAGGCGTTTCCCCCTGGAAGCTCCCTCGTGCG  
CTCTCCTGTTCCGACCCTGCCGTTACCGGATACCTGTCCGCTTCTCCTTCGGGAAGCGTGGC  
GCTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTGCTCCAAGCTGGGCT  
GTGTGCACGAACCCCCGTTTCCAGCCGACCGCTGCGCTTATCCGGTAACTATCGTCTTGAAGTCCA  
ACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGG  
TATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGGACAG  
TATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCC  
GGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTTGTTTGAAGCAGCAGATTACGCGCAGAAA  
AAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGAACGAAAAC

TCACGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTCACCTAGATCCTTTTAAATT  
AAAAATGAAGTTTTAAATCAATCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATG  
CTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTTCGTTCCATCCATAGTTGCCTGACTCC  
CCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGCTGCAATGATACCG  
CGAGACCCACGCTCACCGGCTCCAGATTTATCAGCAATAAACCAGCCAGCCGGAAGGGCCGAGCG  
CAGAAGTGGTCTGCAACTTTATCCGCCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAG  
TAAGTAGTTCGCCAGTTAATAGTTTTCGCAACGTTGTTGCCATTGCTGCAGGCATCGTGGTGTCA  
CGCTCGTCGTTTTGGTATGGCTTCATTCAGCTCCGGTTCCTCAACGATCAAGGCGAGTTACATGATC  
CCCCATGTTGTGCAAAAAGCGGTTAGCTCCTTCGGTCTCCGATCGTTGTCAGAAGTAAGTTGG  
CCGCAGTGTATCACTCATGGTTATGGCAGCACTGCATAATTCTCTTACTGTCATGCCATCCGTA  
AGATGCTTTTCTGTGACTGGTGAGTACTCAACCAAGTCATTCTGAGAATAGTGTATGCGGCGACC  
GAGTTGCTCTTGCCGGCGTCAACACGGGATAATACCGCGCCACATAGCAGAACTTTAAAAGTGC  
TCATCATTGGAAAACGTTCTTCGGGGCGAAAACCTCTCAAGGATCTTACCCTGTTGAGATCCAGT  
TCGATGTAACCCACTCGTGCACCCAACCTGATCTTCAGCATCTTTTACTTTTACCAGCGTTTCTGG  
GTGAGCAAAAACAGGAAGGCAAAAATGCCGCAAAAAGGGAATAAGGGCGACACGGAAATGTTGA  
ATACTCATACTCTTCCTTTTTCAATATTATTGAAGCATTATCAGGGTTATTGTCTCATGAGCGG  
ATACATATTTGAATGTATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACtTTTCgggGAAAtG  
TGCCACCTGACGTCTAAGAAACCATTATTATCATGACATTAACCTATAAAAATAGGCGTATCAGG  
AGGCCCTTTCGTCTTCAA

### **Vector Bio-safety Information**

At the University of Iowa, all varieties of viral vectors produced at the Viral Vector Core are required to be handled at Biosafety Level 2 (BSL2). In animal studies, adenoviral vectors require ABL2 containment. Please check with your institution's Biosafety Officer to confirm local requirements

### **Adenovirus Background:**

Adenoviruses are very important tool in basic research. They are used to identify proteins role in different biological processes both *in vivo* and *in vitro*. Virus construction is performed using the RapAd™ System developed by the University of Iowa VVC (For description, refer to the article "[A simple method for the rapid generation of recombinant adenovirus vectors](#)" published in [Gene Therapy 7:1034-1038, 2000](#)).

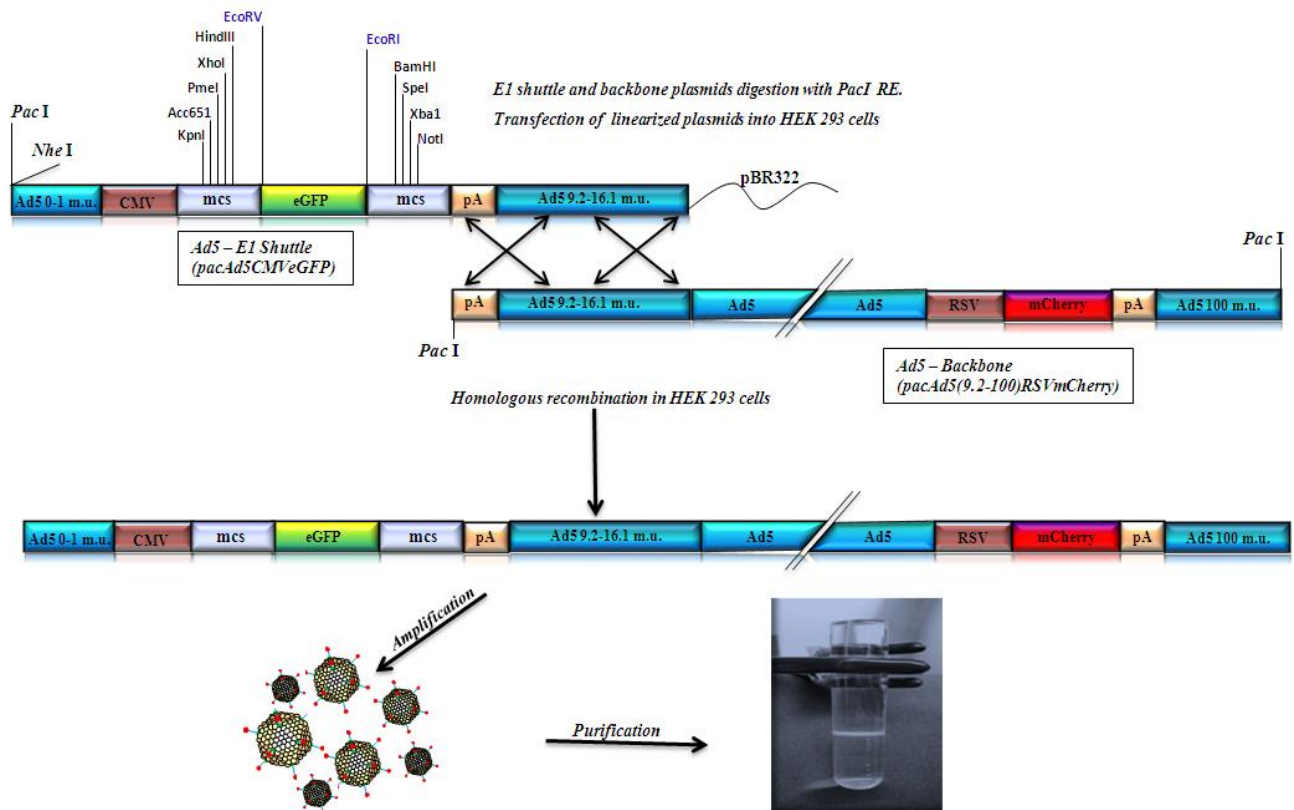
Adenovirus vectors prepared in the core are E1 and E3 deleted. They have a total E1a deletion (\*m.u. 1.4 to 4.5) plus a partial E1b deletion (\*m.u. 4.7 to 9.2). These deletions are what make the vector replication deficient. They also have a partial E3 deletion, 720bp for the sub360 backbone, a 1.6Kb deletion for the dl309 backbone and a 3.1Kb deletion for the total E3 deleted backbone.

\*m.u = Map units (1 m.u = 360bp)

### Characteristics:

- Episomal gene expression.
- Infects dividing and non-dividing cells.
- Transient high-level protein expression.
- Accommodates inserts of up to 7.5kb. Larger inserts can be added, provided that an equivalent part of the viral genome has been properly deleted.
- High viral titer can be produced, 1E+10 to 5E+10pfu/ml (1E+12pt/ml) to 8E+10 to 1E+11/ml (1E+13pt/ml).

## Adenovirus Construction RapAd™ System



### Disadvantages and adverse effects:

- Elicits host immune response, thus depleting the number of transduced cells *in-vivo*.
- Viral particles can be neutralized by the host immune response.
- Short-term expression of the transgene due to lack of integration into the host genome.

### Recombination:

The recombinant adenoviruses can revert to wild type during virus production, thus packaging replication competent particles (RCA). For this reason, each new lot produced at the core is tested for the presence of RCA by immuno-staining.

### References:

- **RapAd™ System:** Anderson RD, Haskell RE, Xia H, Roessler BJ, Davidson BL. *"A simple method for the rapid generation of recombinant adenovirus vectors"*. Gene Ther. 2000 Jun;7(12):1034-8

- **A195 Buffer:** [Evans RK](#), [Nawrocki DK](#), [Isopi LA](#), [Williams DM](#), [Casimiro DR](#), [Chin S](#), [Chen M](#), [Zhu DM](#), [Shiver JW](#), [Volkin DB](#). *Development of stable liquid formulations for adenovirus-based vaccines.* [J Pharm Sci.](#) 2004 Oct;93(10):2458-7

**Contact Information:**

**Viral Vector Core**

University of Iowa

500 Newton Road

221 Eckstein Medical Research Building

Iowa City, IA 52242

Tel: (319) 335-6726

vectors@uiowa.edu