
IECC
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The 1st International Electronic Conference on Cancers
Exploiting Cancer Vulnerability by Targeting the
DNA Damage Response
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cancers
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School of Biological and Medical Physics
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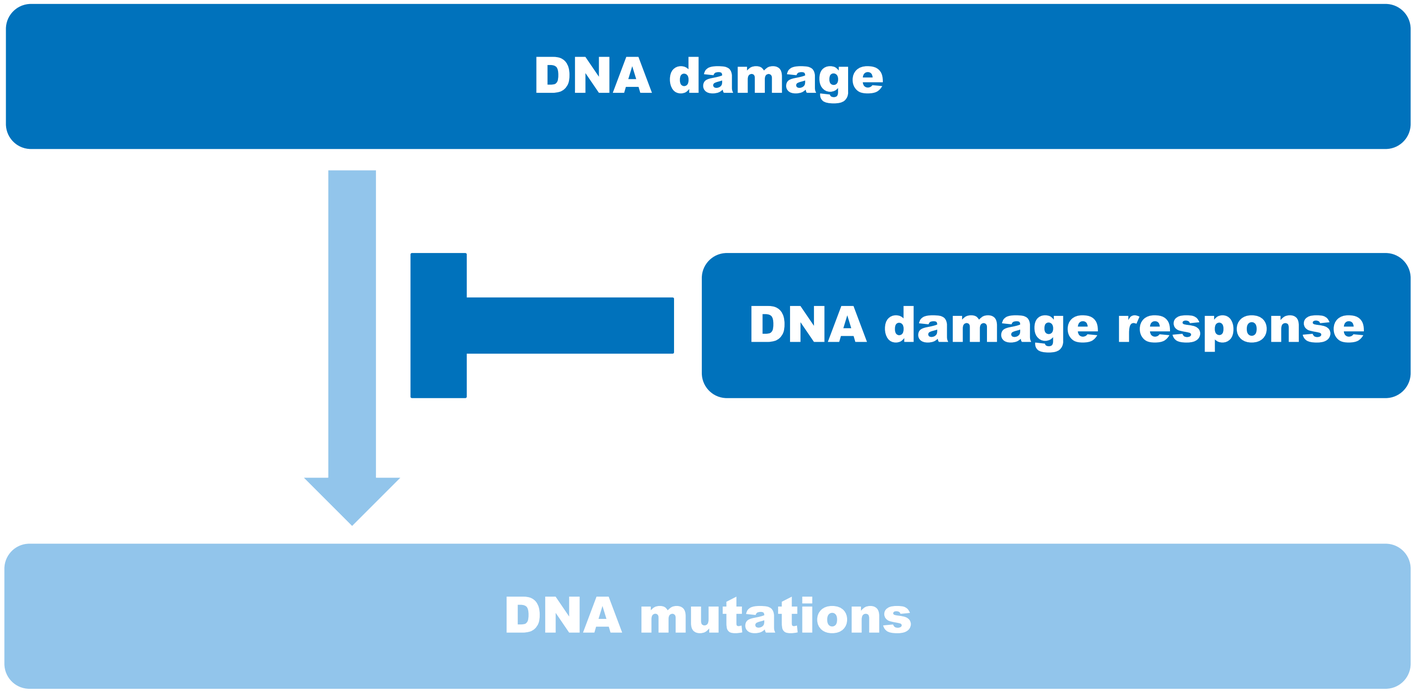
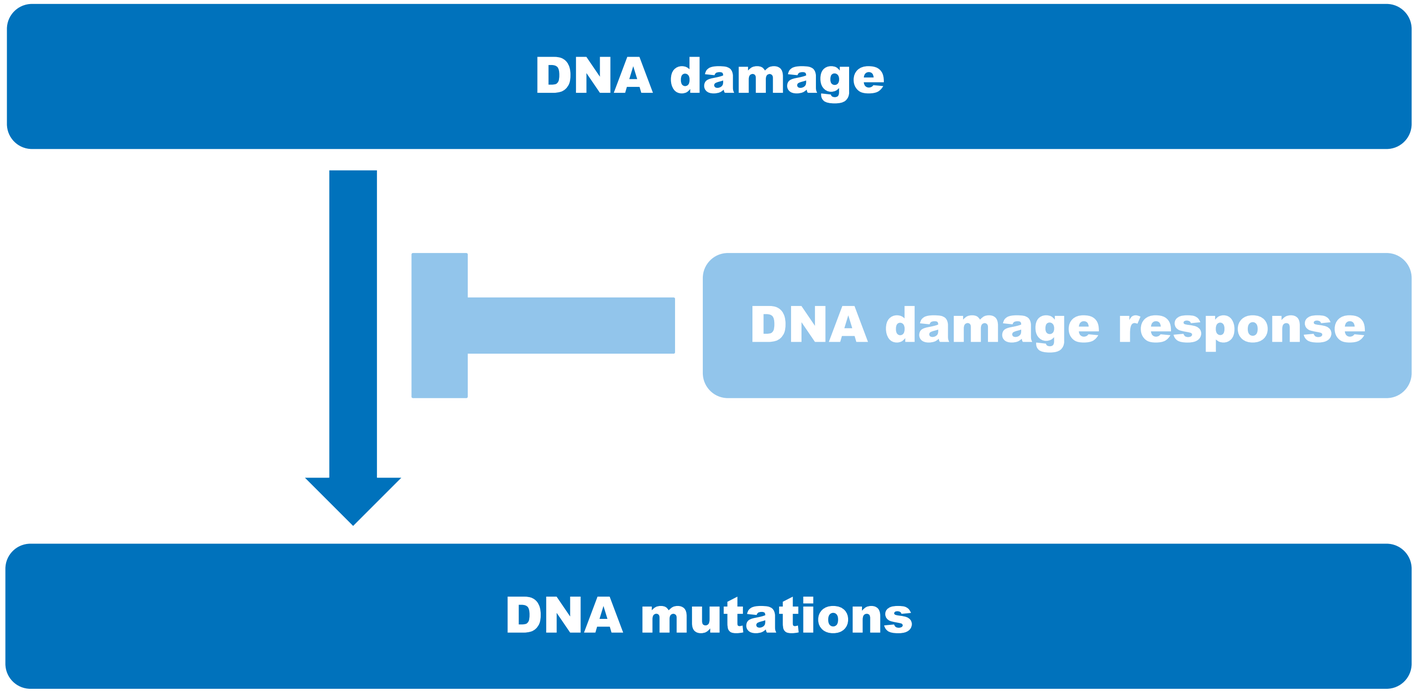
The extent of consequential DNA damage in human tumors from TCGA PanCanAtlas

Aleksey V. Belikov, Dr.rer.nat.

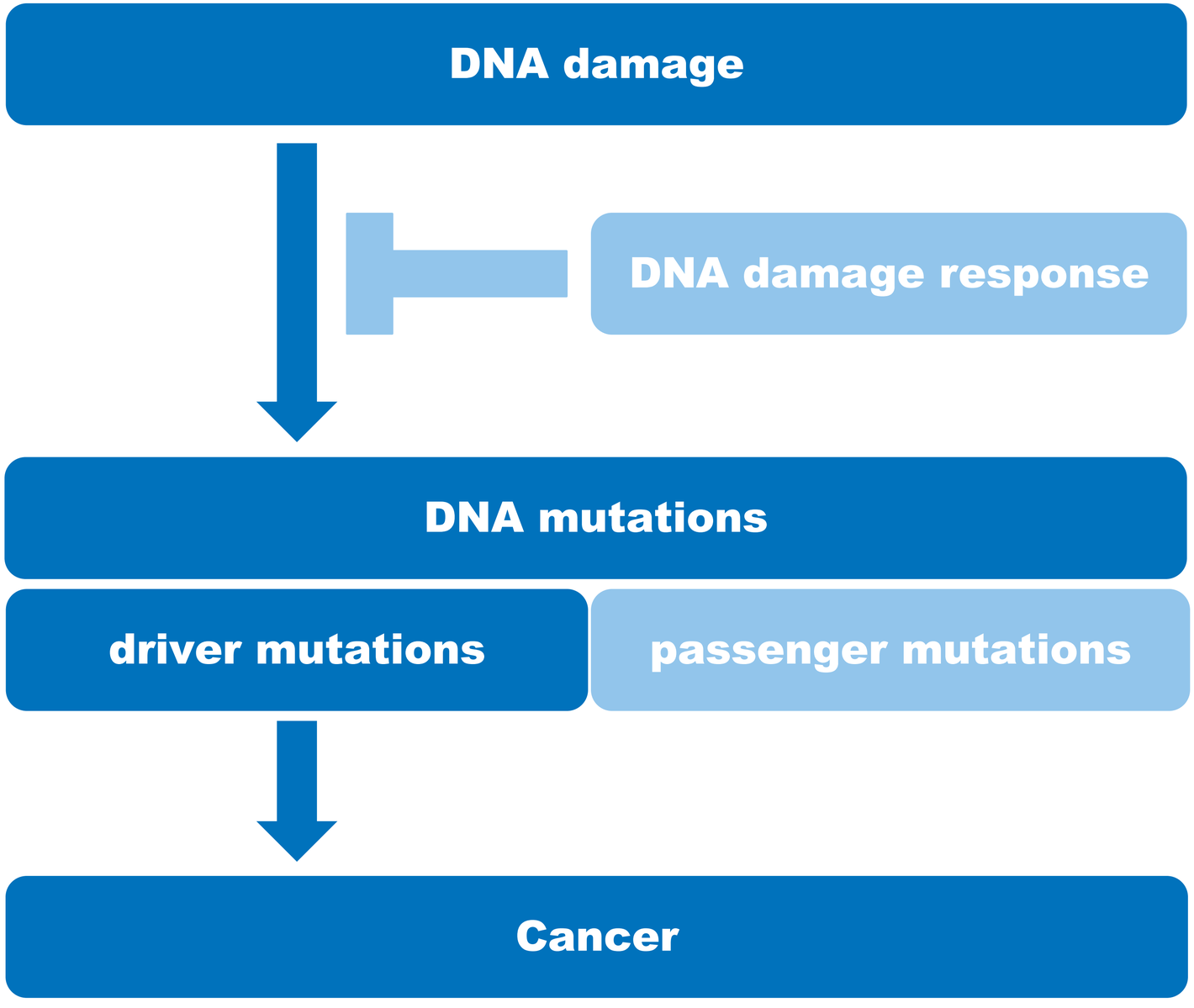
The DNA damage is crucial for the emergence of cancer cells



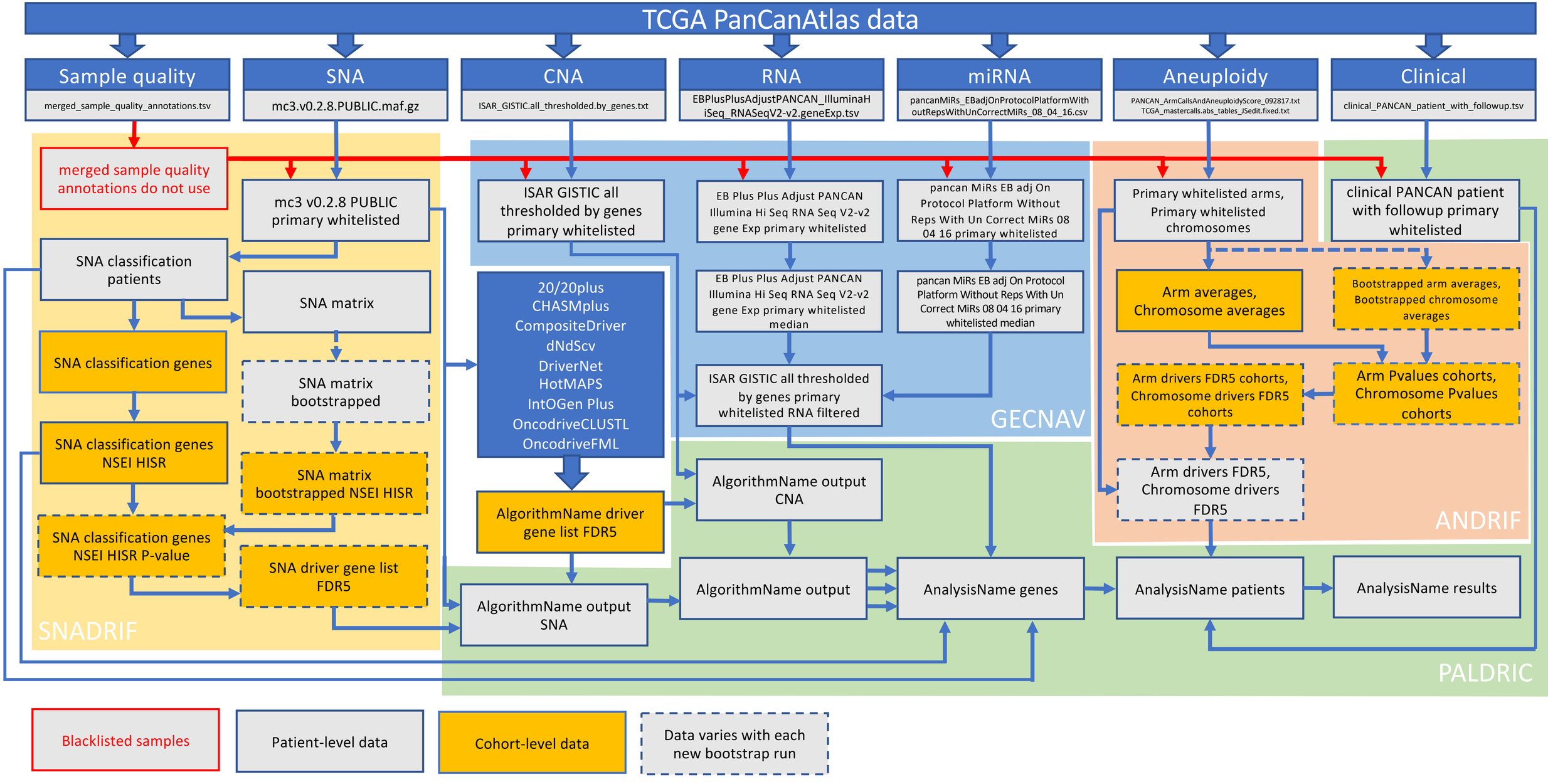
The DNA damage is crucial for the emergence of cancer cells



The DNA damage is crucial for the emergence of cancer cells



What is the extent of *consequential* DNA damage *per tumor*, i.e. the number of various kinds of driver mutations?


TCGA PanCanAtlas data
Sample quality
merged_sample_quality_annotations.tsv
SNA
mc3.v0.2.8.PUBLIC.maf.gz
CNA
ISAR_GISTIC.all_thresholded.by_genes.txt
RNA
EBPlusPlusAdjustPANCAN_IlluminaHiSeq_RNASeqV2-v2.geneExp.tsv
miRNA
pancanMiRs_EBadjOnProtocolPlatformWithoutRepsWithUnCorrectMiRs_08_04_16.csv
Aneuploidy
PANCAN_ArmCallsAndAneuploidyScore_092817.txt
TCGA_mastercalls.abs_tables_JSedit.fixed.txt
Clinical
clinical_PANCAN_patient_with_followup.tsv
merged sample quality annotations do not use
mc3 v0.2.8 PUBLIC primary whitelisted
ISAR GISTIC all thresholded by genes primary whitelisted
EB Plus Plus Adjust PANCAN Illumina Hi Seq RNA Seq V2-v2 gene Exp primary whitelisted
pancan MiRs EB adj On Protocol Platform Without Reps With Un Correct MiRs 08 04 16 primary whitelisted
Primary whitelisted arms, Primary whitelisted chromosomes
clinical PANCAN patient with followup primary whitelisted
SNA classification patients
SNA matrix
20/20plus
CHASMplus
CompositeDriver
dNdScv
DriverNet
HotMAPS
IntOGen Plus
OncodriveCLUSTL
OncodriveFML
EB Plus Plus Adjust PANCAN Illumina Hi Seq RNA Seq V2-v2 gene Exp primary whitelisted median
pancan MiRs EB adj On Protocol Platform Without Reps With Un Correct MiRs 08 04 16 primary whitelisted median
Arm averages, Chromosome averages
Bootstrapped arm averages, Bootstrapped chromosome averages
SNA classification genes
SNA matrix bootstrapped
ISAR GISTIC all thresholded by genes primary whitelisted RNA filtered
Arm drivers FDR5 cohorts, Chromosome drivers FDR5 cohorts
Arm Pvalues cohorts, Chromosome Pvalues cohorts
SNA classification genes NSEI HISR
SNA matrix bootstrapped NSEI HISR
AlgorithmName output CNA
Arm drivers FDR5, Chromosome drivers FDR5
SNA classification genes NSEI HISR P-value
SNA driver gene list FDR5
AlgorithmName driver gene list FDR5
AlgorithmName output
AnalysisName genes
AnalysisName patients
AnalysisName results
AlgorithmName output SNA
SNADRIF
GECNAV
ANDRIF
PALDRIC
Blacklisted samples
Patient-level data
Cohort-level data
Data varies with each new bootstrap run

Results

- Average number of Driver arm gains per patient
- Average number of Driver arm losses per patient
- Average number of Driver chromosome gains per patient
- Average number of Driver chromosome losses per patient
- Average number of Mixed tumor suppressor events per patient
- Average number of CNA-based tumor suppressor events per patient
- Average number of SNA-based tumor suppressor events per patient
- Average number of Mixed oncogenic events per patient
- Average number of CNA-based oncogenic events per patient
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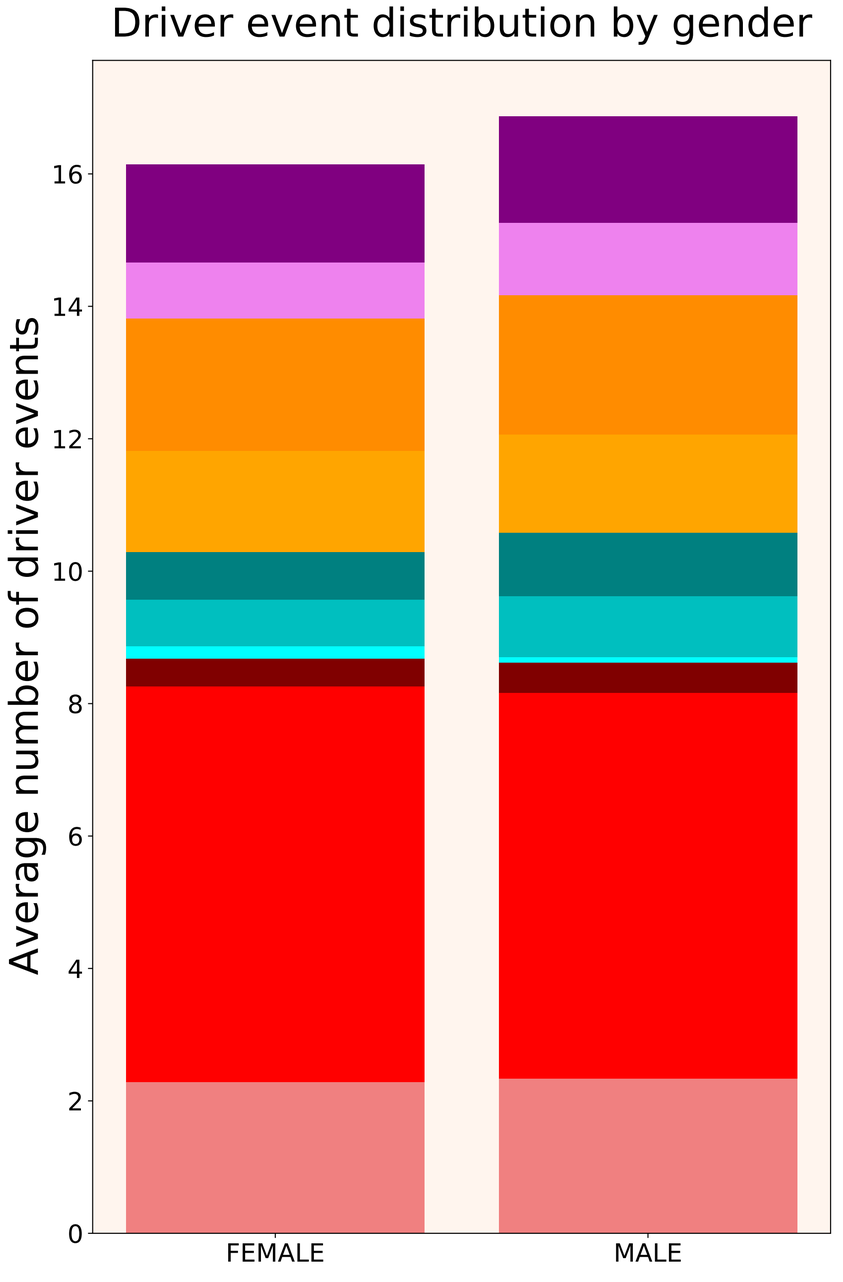

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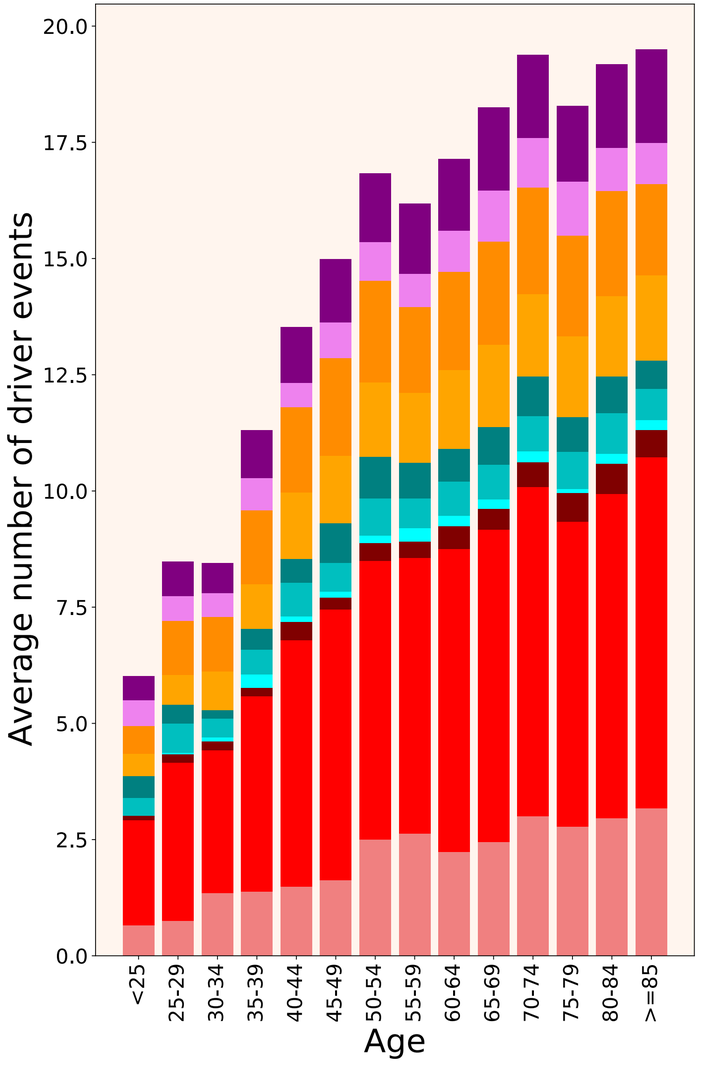
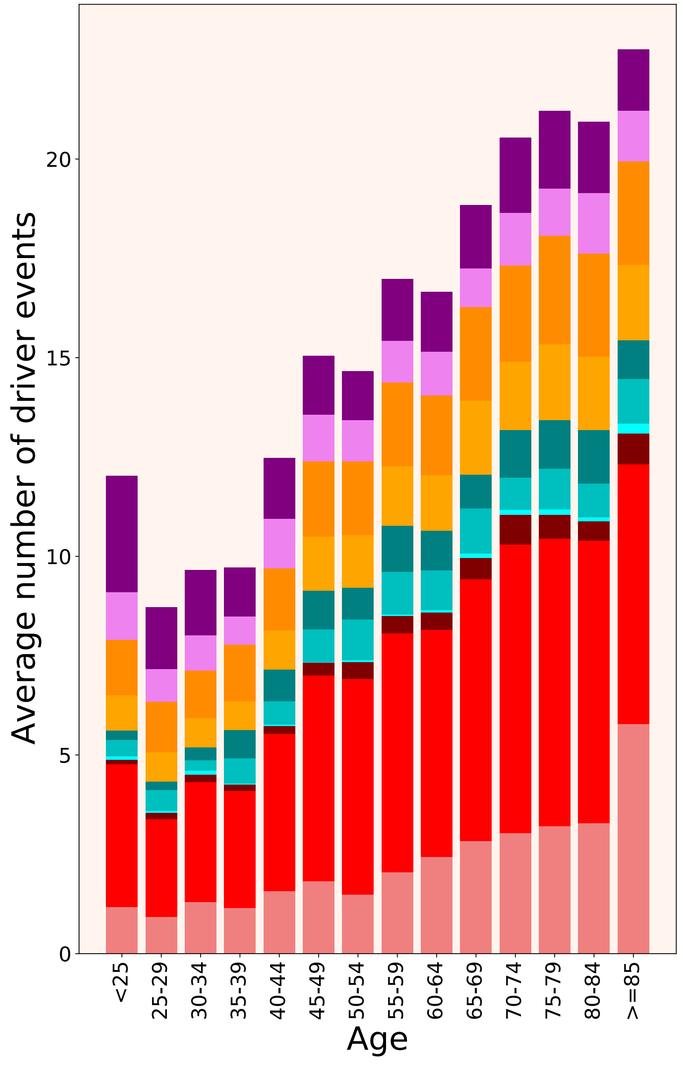
Driver event distribution by age in females



Driver event distribution by age in males



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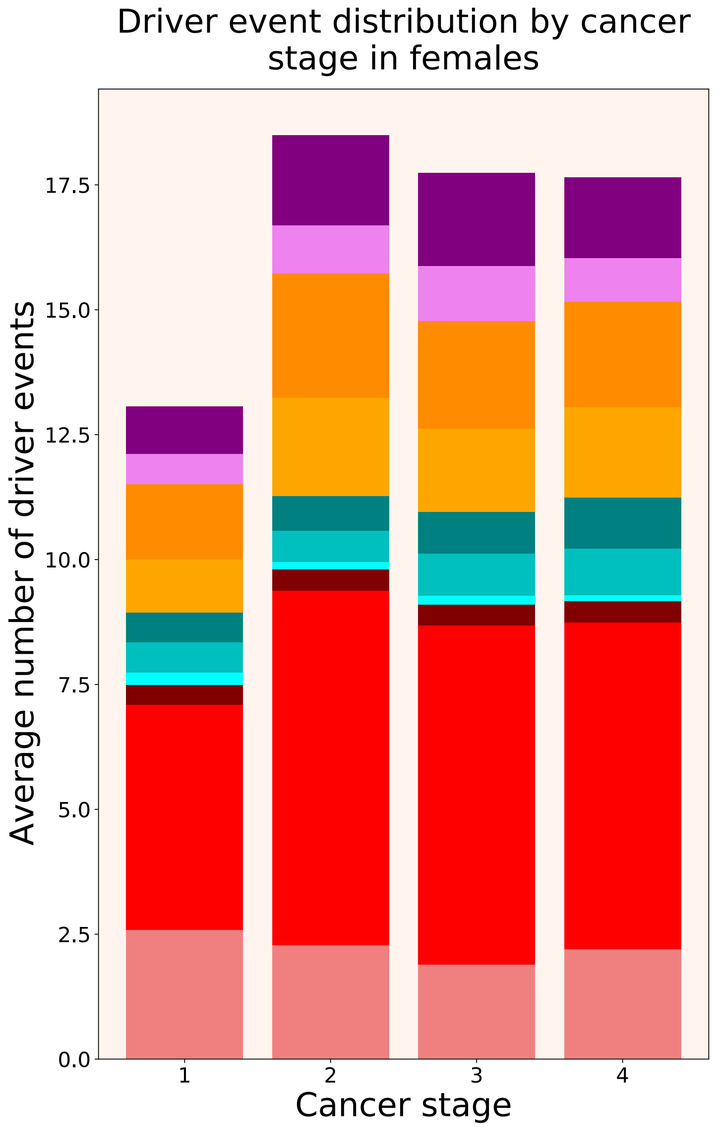

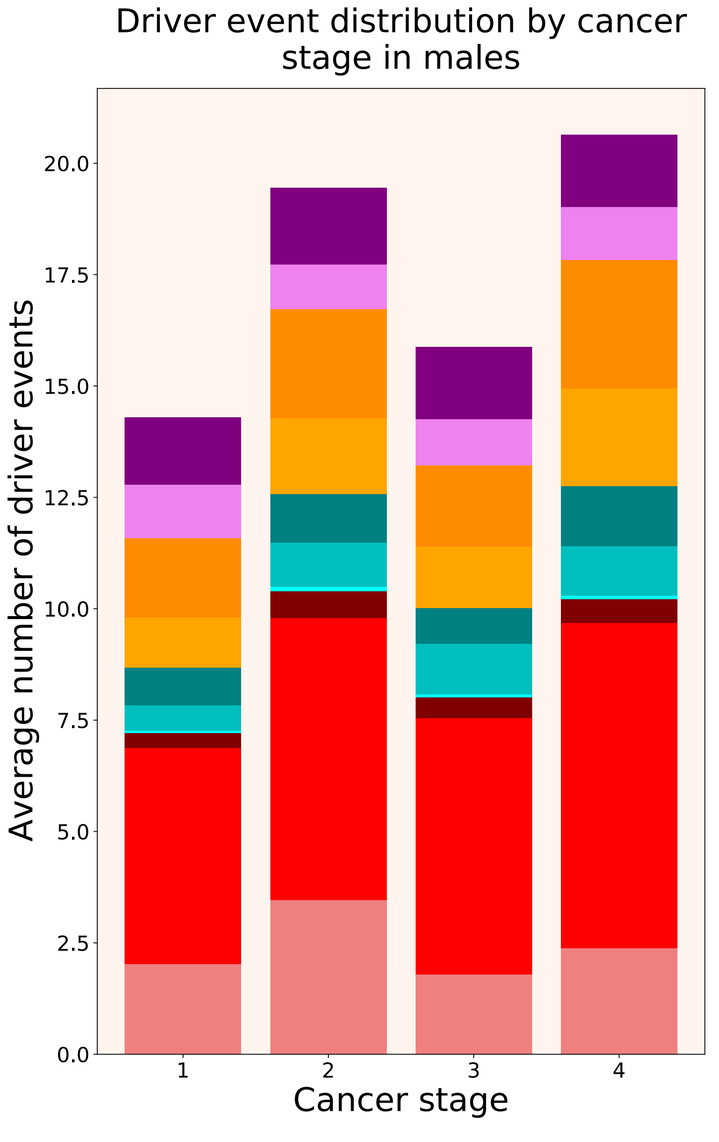

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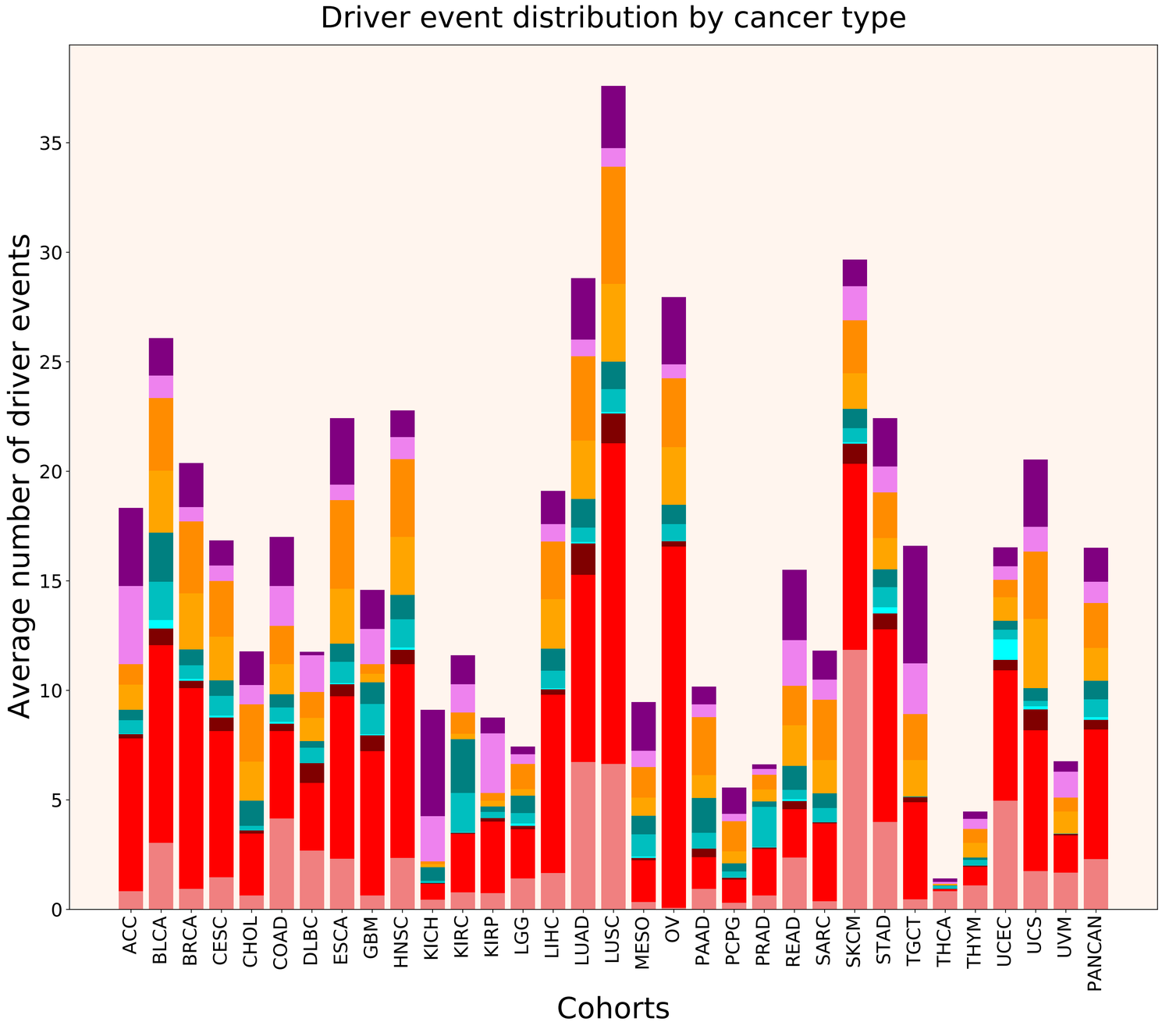

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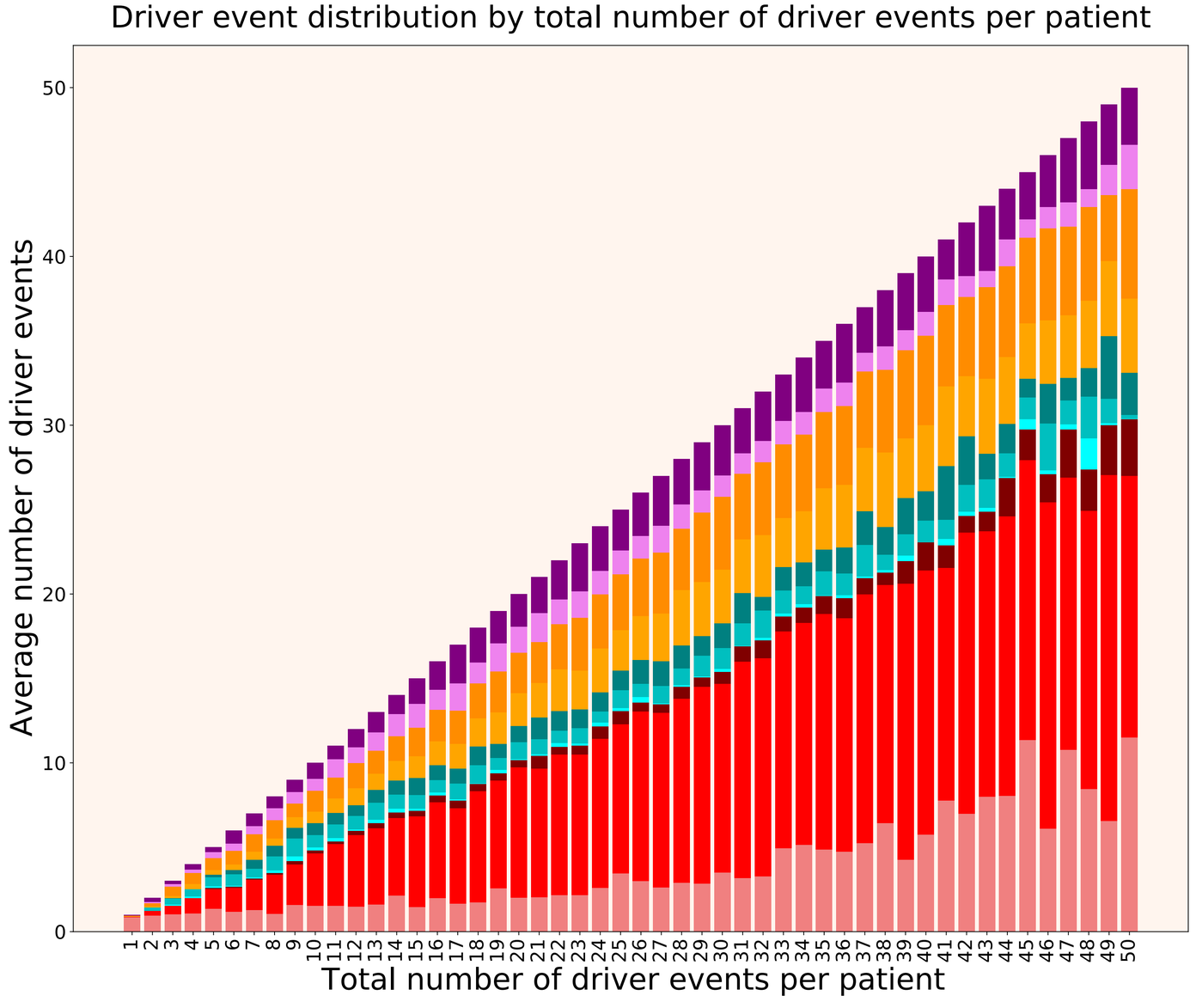

CONCLUSIONS

16.5 Driver mutations per patient's tumor

2.3 Hyperactivating SNA mutations in oncogenes

0.1 Homozygous inactivating SNA mutations in tumor suppressors

1.5 Driver chromosome losses

1.0 Driver chromosome arm loss

9.0 Driver mutations per <25 years old patient

5.9 CNA amplifications of oncogenes

0.8 Homozygous CNA deletions in tumor suppressors

2.0 Driver chromosome gains

1.5 Driver chromosome arm gains

20.7 Driver mutations per >85 years old patient

0.4 Simultaneous hyperactivating SNA mutation and CNA amplification

0.8 Inactivating SNA mutation in one allele and CNA deletion in the other allele

BIG THANKS TO OUR TEAM

Moscow Institute of Physics and Technology

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TEAM MEMBERS

- Aleksey V. Belikov, Dr.rer.nat., Senior research scientist, *project development*
- Alexey D. Vyatkin, Masters student, *Python programming*
- Danila V. Otnyukov, Masters student, *Python programming*
- Sergey V. Leonov, Ph.D., M.D., Lab head, *supervision*

THANK YOU
FOR YOUR ATTENTION!