Hallmark_Covid_Overlap

March 15, 2021

[9]:
```
get_ol = function(c_clus, compare, s_clus, sets, core = T){
  cmp = read.csv(paste(c_clus,'/', compare, ".tsv", sep = ""), sep = "\t")
  if(core == T){cmp = cmp[cmp[,"CORE.ENRICHMENT"]=="Yes",]}

  lst = list()
  for(set in sets){
    current = read.csv(paste(s_clus,'/', set,".tsv", sep = ""), sep="\t")
    if(core == T){current = current[current[,"CORE.ENRICHMENT"]=="Yes",]}
    lst[set] = ifelse(length(current$SYMBOL[current$SYMBOL %in% cmp$SYMBOL]) >␣
 ↪0 , list(current$SYMBOL[current$SYMBOL %in% cmp$SYMBOL]), NA)
  }
  print(lst, max.levels=0)
}
```

1 Gene list:

ACE2 TMPRSS2 IFITM2 IFITM3 MYCN NTRK1 PTPN6 TP53 CXCL10 CXCL11 AGTR1 BSG PPIA PPIB DPP4

2 Overlap with C2 & C4

Hallmark -> PI3K_AKT_MTOR_Signaling Covid -> NSP3-PP1A & ORF1AB

2.1 NSP3-PP1A with C2

[10]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP3-PP1A FROM VIRUS-HOST PPI␣
 ↪P-HIPSTER 2020",
       "C2_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING")
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] YWHAB GRB2
```

[11]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP3-PP1A FROM VIRUS-HOST PPI␣
 ↪P-HIPSTER 2020",
       "C2_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING", F)
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] YWHAB  GRB2   SQSTM1 SFN
```

2.2 ORF1AB with C2

[12]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS ORF1AB FROM VIRUS-HOST PPI P-HIPSTER␣
↪2020",
       "C2_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING")
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] YWHAB NCK1  GRB2
```

[13]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS ORF1AB FROM VIRUS-HOST PPI P-HIPSTER␣
↪2020",
       "C2_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING", F)
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] YWHAB  NCK1   GRB2   UBE2D3 SQSTM1 EGFR   SFN
```

2.3 NSP3-PP1A with C4

[14]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS NSP3-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       "C4_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING")
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] SQSTM1
```

[15]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS NSP3-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       "C4_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING", F)
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] SQSTM1 YWHAB  GRB2   SFN
```

2.4 ORF1AB with C4

[16]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS ORF1AB FROM VIRUS-HOST PPI P-HIPSTER␣
↪2020",
       "C4_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING")
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] EGFR   NCK1   SQSTM1
```

[17]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS ORF1AB FROM VIRUS-HOST PPI P-HIPSTER␣
 ↪2020",
       "C4_Hall", "HALLMARK_PI3K_AKT_MTOR_SIGNALING", F)
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] EGFR   NCK1   SQSTM1 YWHAB  UBE2D3 GRB2   SFN
```

3 Unique C2

[18]:
```
hall2 = c("HALLMARK_DNA_REPAIR","HALLMARK_MITOTIC_SPINDLE")
```

3.1 Nucleocapsid protein with C2

[19]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NUCLEOCAPSID PROTEIN FROM VIRUS-HOST␣
 ↪PPI P-HIPSTER 2020",
       'C2_Hall', hall2)
```

```
$HALLMARK_DNA_REPAIR
[1] NA

$HALLMARK_MITOTIC_SPINDLE
[1] NA
```

[20]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NUCLEOCAPSID PROTEIN FROM VIRUS-HOST␣
 ↪PPI P-HIPSTER 2020",
       'C2_Hall', hall2, F)
```

```
$HALLMARK_DNA_REPAIR
[1] NA

$HALLMARK_MITOTIC_SPINDLE
[1] TUBA4A YWHAE
```

3.2 NSP4-PP1A with C2

[21]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP4-PP1A FROM VIRUS-HOST PPI␣
 ↪P-HIPSTER 2020",
       'C2_Hall', hall2)
```

```
$HALLMARK_DNA_REPAIR
[1] NA
```

```
$HALLMARK_MITOTIC_SPINDLE
[1] NA
```

[22]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP4-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       'C2_Hall', hall2, F)
```

```
$HALLMARK_DNA_REPAIR
[1] NA

$HALLMARK_MITOTIC_SPINDLE
[1] YWHAE
```

3.3 NSP7-PP1A with C2

[23]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP7-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       'C2_Hall', hall2)
```

```
$HALLMARK_DNA_REPAIR
[1] NA

$HALLMARK_MITOTIC_SPINDLE
[1] EZR
```

[24]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP7-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       'C2_Hall', hall2, F)
```

```
$HALLMARK_DNA_REPAIR
[1] NA

$HALLMARK_MITOTIC_SPINDLE
[1] EZR    PXN    YWHAE  SPTBN1
```

3.4 SARS7A with C2

[25]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS HYPOTHETICAL PROTEIN SARS7A FROM␣
↪VIRUS-HOST PPI P-HIPSTER 2020",
       'C2_Hall', hall2)
```

```
$HALLMARK_DNA_REPAIR
[1] NA
```

```
$HALLMARK_MITOTIC_SPINDLE
[1] EZR
```

[26]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS HYPOTHETICAL PROTEIN SARS7A FROM␣
↪VIRUS-HOST PPI P-HIPSTER 2020",
       'C2_Hall', hall2, F)
```

```
$HALLMARK_DNA_REPAIR
[1] NA

$HALLMARK_MITOTIC_SPINDLE
[1] EZR   WASF1 YWHAE
```

4 Unique with C4

[27]:
```
hall4 =␣
↪c("HALLMARK_APICAL_JUNCTION","HALLMARK_IL2_STAT5_SIGNALING","HALLMARK_COMPLEMENT","HALLMARK
        ␣
↪"HALLMARK_P53_PATHWAY","HALLMARK_ADIPOGENESIS","HALLMARK_HEME_METABOLISM","HALLMARK_MYOGENE
        ␣
↪"HALLMARK_INFLAMMATORY_RESPONSE","HALLMARK_HYPOXIA","HALLMARK_ALLOGRAFT_REJECTION","HALLMAR
        ␣
↪"HALLMARK_ESTROGEN_RESPONSE_EARLY","HALLMARK_APOPTOSIS","HALLMARK_INTERFERON_GAMMA_RESPONSE
        ␣
↪"HALLMARK_KRAS_SIGNALING_UP","HALLMARK_IL6_JAK_STAT3_SIGNALING","HALLMARK_COAGULATION","HAL
        ␣
↪"HALLMARK_BILE_ACID_METABOLISM","HALLMARK_UV_RESPONSE_DN","HALLMARK_INTERFERON_ALPHA_RESPON
        ␣
↪"HALLMARK_WNT_BETA_CATENIN_SIGNALING","HALLMARK_ANDROGEN_RESPONSE","HALLMARK_ESTROGEN_RESPO
```

4.1 E2 Glycoprotein with C4

[28]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS E2 GLYCOPROTEIN PRECURSOR FROM␣
↪VIRUS-HOST PPI P-HIPSTER 2020",
       'C4_Hall', hall4)
```

```
$HALLMARK_APICAL_JUNCTION
[1] VCAM1 MSN   SIRPA THY1

$HALLMARK_IL2_STAT5_SIGNALING
[1] ICOS  CTLA4 CD79B

$HALLMARK_COMPLEMENT
[1] FN1
```

```
$HALLMARK_TGF_BETA_SIGNALING
[1] NA

$HALLMARK_P53_PATHWAY
[1] NA

$HALLMARK_ADIPOGENESIS
[1] NA

$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_INFLAMMATORY_RESPONSE
[1] NA

$HALLMARK_HYPOXIA
[1] NA

$HALLMARK_ALLOGRAFT_REJECTION
[1] CD4   B2M   STAT1 CD8B  THY1

$HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_EARLY
[1] NA

$HALLMARK_APOPTOSIS
[1] NA

$HALLMARK_INTERFERON_GAMMA_RESPONSE
[1] VCAM1 B2M   STAT1

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_KRAS_SIGNALING_UP
[1] NA

$HALLMARK_IL6_JAK_STAT3_SIGNALING
[1] STAT1 STAT3

$HALLMARK_COAGULATION
[1] FN1
```

```
$HALLMARK_TNFA_SIGNALING_VIA_NFKB
[1] NA

$HALLMARK_BILE_ACID_METABOLISM
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_INTERFERON_ALPHA_RESPONSE
[1] B2M

$HALLMARK_WNT_BETA_CATENIN_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
[1] B2M

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA
```

[29]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS E2 GLYCOPROTEIN PRECURSOR FROM␣
↪VIRUS-HOST PPI P-HIPSTER 2020",
       'C4_Hall', hall4, F)
```

```
$HALLMARK_APICAL_JUNCTION
[1] VCAM1 MSN   SIRPA THY1  MPZL1 YWHAH SRC

$HALLMARK_IL2_STAT5_SIGNALING
[1] ICOS  CTLA4 CD79B

$HALLMARK_COMPLEMENT
[1] FN1  GRB2 SRC

$HALLMARK_TGF_BETA_SIGNALING
[1] NA

$HALLMARK_P53_PATHWAY
[1] APP SFN

$HALLMARK_ADIPOGENESIS
[1] YWHAG

$HALLMARK_HEME_METABOLISM
[1] IGSF3
```

```
$HALLMARK_MYOGENESIS
[1] APP

$HALLMARK_INFLAMMATORY_RESPONSE
[1] NA

$HALLMARK_HYPOXIA
[1] NCAN

$HALLMARK_ALLOGRAFT_REJECTION
[1] CD4   B2M   STAT1 CD8B  THY1  CD8A  CD7   BRCA1

$HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_EARLY
[1] SFN

$HALLMARK_APOPTOSIS
[1] APP   BRCA1

$HALLMARK_INTERFERON_GAMMA_RESPONSE
[1] VCAM1 B2M   STAT1 STAT3

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_KRAS_SIGNALING_UP
[1] NA

$HALLMARK_IL6_JAK_STAT3_SIGNALING
[1] STAT1 STAT3 GRB2

$HALLMARK_COAGULATION
[1] FN1

$HALLMARK_TNFA_SIGNALING_VIA_NFKB
[1] NA

$HALLMARK_BILE_ACID_METABOLISM
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_INTERFERON_ALPHA_RESPONSE
[1] B2M
```

```
$HALLMARK_WNT_BETA_CATENIN_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
[1] B2M

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] SFN
```

5 NSP8-PP1A with C4

[30]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS NSP8-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       'C4_Hall', hall4)
```

```
$HALLMARK_APICAL_JUNCTION
[1] MSN

$HALLMARK_IL2_STAT5_SIGNALING
[1] PLEC

$HALLMARK_COMPLEMENT
[1] FN1

$HALLMARK_TGF_BETA_SIGNALING
[1] SPTBN1 CTNNB1

$HALLMARK_P53_PATHWAY
[1] NA

$HALLMARK_ADIPOGENESIS
[1] UBC

$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_INFLAMMATORY_RESPONSE
[1] ABI1

$HALLMARK_HYPOXIA
[1] NA

$HALLMARK_ALLOGRAFT_REJECTION
```

```
[1] ABI1

$HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_EARLY
[1] NA

$HALLMARK_APOPTOSIS
[1] NEDD9  CTNNB1

$HALLMARK_INTERFERON_GAMMA_RESPONSE
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_KRAS_SIGNALING_UP
[1] NA

$HALLMARK_IL6_JAK_STAT3_SIGNALING
[1] STAT3

$HALLMARK_COAGULATION
[1] FN1   CAPN2

$HALLMARK_TNFA_SIGNALING_VIA_NFKB
[1] NA

$HALLMARK_BILE_ACID_METABOLISM
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_INTERFERON_ALPHA_RESPONSE
[1] NA

$HALLMARK_WNT_BETA_CATENIN_SIGNALING
[1] CTNNB1

$HALLMARK_ANDROGEN_RESPONSE
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA
```

[31]:
```
get_ol('C4_COVID_PPI', "SARS CORONAVIRUS NSP8-PP1A FROM VIRUS-HOST PPI␣
 ↪P-HIPSTER 2020",
       'C4_Hall', hall4, F)
```

```
$HALLMARK_APICAL_JUNCTION
[1] MSN SRC

$HALLMARK_IL2_STAT5_SIGNALING
[1] PLEC

$HALLMARK_COMPLEMENT
[1] FN1  GRB2 SRC

$HALLMARK_TGF_BETA_SIGNALING
[1] SPTBN1 CTNNB1

$HALLMARK_P53_PATHWAY
[1] APP

$HALLMARK_ADIPOGENESIS
[1] UBC

$HALLMARK_HEME_METABOLISM
[1] SPTA1

$HALLMARK_MYOGENESIS
[1] TPM3   APP    CHRNB1 SPTAN1

$HALLMARK_INFLAMMATORY_RESPONSE
[1] ABI1

$HALLMARK_HYPOXIA
[1] NA

$HALLMARK_ALLOGRAFT_REJECTION
[1] ABI1  BRCA1

$HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_EARLY
[1] NA

$HALLMARK_APOPTOSIS
[1] NEDD9  CTNNB1 APP    ERBB2  SPTAN1 BRCA1

$HALLMARK_INTERFERON_GAMMA_RESPONSE
```

```
[1] STAT3 ISG15

$HALLMARK_NOTCH_SIGNALING
[1] CUL1

$HALLMARK_KRAS_SIGNALING_UP
[1] NA

$HALLMARK_IL6_JAK_STAT3_SIGNALING
[1] STAT3 GRB2

$HALLMARK_COAGULATION
[1] FN1   CAPN2

$HALLMARK_TNFA_SIGNALING_VIA_NFKB
[1] NA

$HALLMARK_BILE_ACID_METABOLISM
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] ERBB2

$HALLMARK_INTERFERON_ALPHA_RESPONSE
[1] ISG15

$HALLMARK_WNT_BETA_CATENIN_SIGNALING
[1] CTNNB1 CUL1

$HALLMARK_ANDROGEN_RESPONSE
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA
```

6 Unique with C6

[32]:
```
hall6 =␣
 ↪c("HALLMARK_MYC_TARGETS_V1","HALLMARK_MYC_TARGETS_V2","HALLMARK_G2M_CHECKPOINT","HALLMARK_E
```

[33]:
```
get_ol('C6_COVID_PPI', "COVID19-NSP8 PROTEIN HOST PPI FROM KROGAN",
       'C6_Hall', hall6)
```

```
$HALLMARK_MYC_TARGETS_V1
[1] NA
```

```
$HALLMARK_MYC_TARGETS_V2
[1] EXOSC5    MPHOSPH10

$HALLMARK_G2M_CHECKPOINT
[1] NSD2

$HALLMARK_E2F_TARGETS
[1] EXOSC8
```

[34]:
```
get_ol('C6_COVID_PPI', "COVID19-NSP8 PROTEIN HOST PPI FROM KROGAN",
       'C6_Hall', hall6, F)
```

```
$HALLMARK_MYC_TARGETS_V1
[1] NA

$HALLMARK_MYC_TARGETS_V2
[1] EXOSC5    MPHOSPH10

$HALLMARK_G2M_CHECKPOINT
[1] NSD2

$HALLMARK_E2F_TARGETS
[1] EXOSC8
```