Hallmark_Covid_Overlap

March 19, 2021

[20]:
```
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 Unique C2

[11]:
```
hall2 =␣
 ↪c("HALLMARK_HEME_METABOLISM","HALLMARK_MYOGENESIS","HALLMARK_GLYCOLYSIS","HALLMARK_FATTY_AC
```

2.1 COVID-19 NSP7 with C2

[21]:
```
get_ol('C2_COVID_PPI', "COVID19-NSP7 PROTEIN HOST PPI FROM␣
 ↪KROGAN",'C2_Hallmark', hall2)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_GLYCOLYSIS
```

```
[1] FAM162A HS2ST1

$HALLMARK_FATTY_ACID_METABOLISM
[1] NA

$HALLMARK_ADIPOGENESIS
[1] NA

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
[1] ACSL3

$HALLMARK_PROTEIN_SECRETION
[1] RAB2A RAB14

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] ACSL3 RAB1A

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA

$HALLMARK_UV_RESPONSE_UP
[1] NA

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] NA
```

[22]:
```
get_ol('C2_COVID_PPI', "COVID19-NSP7 PROTEIN HOST PPI FROM␣
↪KROGAN",'C2_Hallmark', hall2, F)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA
```

```
$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_GLYCOLYSIS
[1] FAM162A HS2ST1

$HALLMARK_FATTY_ACID_METABOLISM
[1] NA

$HALLMARK_ADIPOGENESIS
[1] SCARB1

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
[1] ACSL3

$HALLMARK_PROTEIN_SECRETION
[1] RAB2A RAB14

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] ACSL3 RAB1A

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] SCARB1

$HALLMARK_UV_RESPONSE_UP
[1] NA

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] NA
```

2.2 SARS ORF1AB with C2

[23]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS ORF1AB FROM VIRUS-HOST PPI P-HIPSTER␣
↪2020",
       'C2_Hallmark', hall2)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] RB1       MYH9      GABARAPL2 APP       TPM3

$HALLMARK_GLYCOLYSIS
[1] EGFR  HSPA5 PKM

$HALLMARK_FATTY_ACID_METABOLISM
[1] HSP90AA1 YWHAH

$HALLMARK_ADIPOGENESIS
[1] YWHAG  UBQLN1

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] EGFR   SQSTM1 YWHAB  NCK1   GRB2   UBE2D3

$HALLMARK_ANDROGEN_RESPONSE
[1] B2M

$HALLMARK_PROTEIN_SECRETION
[1] EGFR

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] YWHAH

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] SQSTM1 HSPA5  HSPA4  UBE2D3

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] JAK1 JAK2

$HALLMARK_UV_RESPONSE_UP
[1] LYN    SQSTM1
```

```
$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] LYN APP
```

[24]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS ORF1AB FROM VIRUS-HOST PPI P-HIPSTER␣
↪2020",
       'C2_Hallmark', hall2, F)
```

```
$HALLMARK_HEME_METABOLISM
[1] SPTB   USP15  EPB41  RAD23A SPTA1

$HALLMARK_MYOGENESIS
[1] RB1       MYH9      GABARAPL2 APP       TPM3      SPTAN1

$HALLMARK_GLYCOLYSIS
[1] EGFR  HSPA5 PKM   RBCK1

$HALLMARK_FATTY_ACID_METABOLISM
[1] HSP90AA1 YWHAH

$HALLMARK_ADIPOGENESIS
[1] YWHAG  UBQLN1 UBC

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

$HALLMARK_ANDROGEN_RESPONSE
[1] B2M    PTPN21

$HALLMARK_PROTEIN_SECRETION
[1] EGFR

$HALLMARK_UV_RESPONSE_DN
[1] ERBB2  FYN    PTPN21

$HALLMARK_PEROXISOME
[1] YWHAH  PABPC1

$HALLMARK_NOTCH_SIGNALING
[1] CUL1

$HALLMARK_MTORC1_SIGNALING
[1] SQSTM1 HSPA5  HSPA4  UBE2D3

$HALLMARK_ESTROGEN_RESPONSE_LATE
```

```
[1] JAK1 JAK2 SFN

$HALLMARK_UV_RESPONSE_UP
[1] LYN    SQSTM1 ARRB2

$HALLMARK_ANGIOGENESIS
[1] APP  PTK2

$HALLMARK_APICAL_SURFACE
[1] LYN   APP   BRCA1
```

2.3 SARS NSP3-PP1A with C2

[25]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP3-PP1A FROM VIRUS-HOST PPI␣
 ↪P-HIPSTER 2020",
       'C2_Hallmark', hall2)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] RB1       MYH9      GABARAPL2 APP

$HALLMARK_GLYCOLYSIS
[1] NA

$HALLMARK_FATTY_ACID_METABOLISM
[1] YWHAH

$HALLMARK_ADIPOGENESIS
[1] YWHAG  UBQLN1

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] SQSTM1 YWHAB  GRB2

$HALLMARK_ANDROGEN_RESPONSE
[1] NA

$HALLMARK_PROTEIN_SECRETION
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] YWHAH
```

```
$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] SQSTM1

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] JAK1 JAK2

$HALLMARK_UV_RESPONSE_UP
[1] SQSTM1

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] APP
```

[26]:
```
get_ol('C2_COVID_PPI', "SARS CORONAVIRUS NSP3-PP1A FROM VIRUS-HOST PPI␣
↪P-HIPSTER 2020",
       'C2_Hallmark', hall2, F)
```

```
$HALLMARK_HEME_METABOLISM
[1] USP15  EPB41  RAD23A

$HALLMARK_MYOGENESIS
[1] RB1       MYH9      GABARAPL2 APP

$HALLMARK_GLYCOLYSIS
[1] RBCK1

$HALLMARK_FATTY_ACID_METABOLISM
[1] YWHAH

$HALLMARK_ADIPOGENESIS
[1] YWHAG  UBQLN1 UBC

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] SQSTM1 YWHAB  GRB2   SFN

$HALLMARK_ANDROGEN_RESPONSE
[1] PTPN21

$HALLMARK_PROTEIN_SECRETION
[1] NA

$HALLMARK_UV_RESPONSE_DN
```

```
[1] PTPN21

$HALLMARK_PEROXISOME
[1] YWHAH

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] SQSTM1

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] JAK1 JAK2 SFN

$HALLMARK_UV_RESPONSE_UP
[1] SQSTM1

$HALLMARK_ANGIOGENESIS
[1] APP  PTK2

$HALLMARK_APICAL_SURFACE
[1] APP   BRCA1
```

2.4 COVID19 ORF9C with C2

[27]:
```
get_ol('C2_COVID_PPI', "COVID19-ORF9C PROTEIN HOST PPI FROM KROGAN",
       'C2_Hallmark', hall2)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_GLYCOLYSIS
[1] NA

$HALLMARK_FATTY_ACID_METABOLISM
[1] NA

$HALLMARK_ADIPOGENESIS
[1] GHITM

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
```

```
[1] NA

$HALLMARK_PROTEIN_SECRETION
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA

$HALLMARK_UV_RESPONSE_UP
[1] NA

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] NA
```

[28]:
```
get_ol('C2_COVID_PPI', "COVID19-ORF9C PROTEIN HOST PPI FROM KROGAN",
       'C2_Hallmark', hall2, F)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_GLYCOLYSIS
[1] NA

$HALLMARK_FATTY_ACID_METABOLISM
[1] NA

$HALLMARK_ADIPOGENESIS
[1] GHITM
```

```
$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] ECSIT

$HALLMARK_ANDROGEN_RESPONSE
[1] NA

$HALLMARK_PROTEIN_SECRETION
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] ABCC1

$HALLMARK_PEROXISOME
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] TMEM97

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] WFS1

$HALLMARK_UV_RESPONSE_UP
[1] NA

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] NA
```

2.5 COVID19-M PROTEIN with C2

[29]:
```
get_ol('C2_COVID_PPI', "COVID19-M PROTEIN HOST PPI FROM KROGAN",
       'C2_Hallmark', hall2)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA

$HALLMARK_GLYCOLYSIS
[1] NA
```

```
$HALLMARK_FATTY_ACID_METABOLISM
[1] ACADM

$HALLMARK_ADIPOGENESIS
[1] STOM  REEP5 ACADM

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
[1] NA

$HALLMARK_PROTEIN_SECRETION
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA

$HALLMARK_UV_RESPONSE_UP
[1] NA

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] NA
```

[30]:
```
get_ol('C2_COVID_PPI', "COVID19-M PROTEIN HOST PPI FROM KROGAN",
       'C2_Hallmark', hall2, F)
```

```
$HALLMARK_HEME_METABOLISM
[1] NA

$HALLMARK_MYOGENESIS
[1] NA
```

```
$HALLMARK_GLYCOLYSIS
[1] NA

$HALLMARK_FATTY_ACID_METABOLISM
[1] ACADM REEP6

$HALLMARK_ADIPOGENESIS
[1] STOM  REEP5 ACADM REEP6

$HALLMARK_PI3K_AKT_MTOR_SIGNALING
[1] NA

$HALLMARK_ANDROGEN_RESPONSE
[1] NA

$HALLMARK_PROTEIN_SECRETION
[1] NA

$HALLMARK_UV_RESPONSE_DN
[1] NA

$HALLMARK_PEROXISOME
[1] NA

$HALLMARK_NOTCH_SIGNALING
[1] NA

$HALLMARK_MTORC1_SIGNALING
[1] NA

$HALLMARK_ESTROGEN_RESPONSE_LATE
[1] NA

$HALLMARK_UV_RESPONSE_UP
[1] NA

$HALLMARK_ANGIOGENESIS
[1] NA

$HALLMARK_APICAL_SURFACE
[1] NA
```

3 Unique with C3

[31]:
```
hall3 =␣
↪c("HALLMARK_IL2_STAT5_SIGNALING","HALLMARK_ALLOGRAFT_REJECTION","HALLMARK_INFLAMMATORY_RESP
        ␣
↪"HALLMARK_INTERFERON_GAMMA_RESPONSE","HALLMARK_IL6_JAK_STAT3_SIGNALING","HALLMARK_TNFA_SIGN
        ␣
↪"HALLMARK_INTERFERON_ALPHA_RESPONSE","HALLMARK_TGF_BETA_SIGNALING","HALLMARK_COAGULATION")
```

3.1 SARS E2 Glycoprotein with C3

[33]:
```
get_ol('C3_COVID_PPI', "SARS CORONAVIRUS E2 GLYCOPROTEIN PRECURSOR FROM␣
↪VIRUS-HOST PPI P-HIPSTER 2020",
      'C3_Hallmark', hall3)
```

```
$HALLMARK_IL2_STAT5_SIGNALING
[1] ICOS  CTLA4 CD79B

$HALLMARK_ALLOGRAFT_REJECTION
[1] CD4   B2M   STAT1 CD8B

$HALLMARK_INFLAMMATORY_RESPONSE
[1] NA

$HALLMARK_INTERFERON_GAMMA_RESPONSE
[1] VCAM1 B2M   STAT1

$HALLMARK_IL6_JAK_STAT3_SIGNALING
[1] STAT1

$HALLMARK_TNFA_SIGNALING_VIA_NFKB
[1] NA

$HALLMARK_INTERFERON_ALPHA_RESPONSE
[1] B2M

$HALLMARK_TGF_BETA_SIGNALING
[1] NA

$HALLMARK_COAGULATION
[1] FN1
```

[34]:
```
get_ol('C3_COVID_PPI', "SARS CORONAVIRUS E2 GLYCOPROTEIN PRECURSOR FROM␣
↪VIRUS-HOST PPI P-HIPSTER 2020",
      'C3_Hallmark', hall3, F)
```

```
$HALLMARK_IL2_STAT5_SIGNALING
[1] ICOS  CTLA4 CD79B

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

$HALLMARK_INFLAMMATORY_RESPONSE
[1] NA

$HALLMARK_INTERFERON_GAMMA_RESPONSE
[1] VCAM1 B2M   STAT1 STAT3

$HALLMARK_IL6_JAK_STAT3_SIGNALING
[1] STAT1 STAT3 GRB2

$HALLMARK_TNFA_SIGNALING_VIA_NFKB
[1] NA

$HALLMARK_INTERFERON_ALPHA_RESPONSE
[1] B2M

$HALLMARK_TGF_BETA_SIGNALING
[1] NA

$HALLMARK_COAGULATION
[1] FN1
```

4 Unique with C5

[35]:
```
hall5 = c("HALLMARK_MYC_TARGETS_V2","HALLMARK_MYC_TARGETS_V1")
```

5 COVID NSP8 with C5

[36]:
```
get_ol('C5_COVID_PPI', "COVID19-NSP8 PROTEIN HOST PPI FROM KROGAN",
       'C5_Hallmark', hall5)
```

```
$HALLMARK_MYC_TARGETS_V2
[1] EXOSC5    MPHOSPH10

$HALLMARK_MYC_TARGETS_V1
[1] NA
```

[37]:
```
get_ol('C5_COVID_PPI', "COVID19-NSP8 PROTEIN HOST PPI FROM KROGAN",
       'C5_Hallmark', hall5, F)
```

```
$HALLMARK_MYC_TARGETS_V2
[1] EXOSC5    MPHOSPH10

$HALLMARK_MYC_TARGETS_V1
[1] NA
```