Optimization of the regression CpG

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Contents

```
## set up workspace
library(knitr)
library(tidyverse)
options(stringsAsFactors = F)
options(dplyr.width = Inf)
getwd()
```

```
## [1] "/home/guanshim/Documents/gitlab/ECCHO_github/Code"
```

```
## [1] 588 320
```

```
## [1] 10002 10004 10010 10012 10014 10015
```

```
## [1] 308 320
```

```
## [1] 280 320
```

```
## function for 1 out of 300 CpGs and other covariates equal
## length of outcomes and covariates
cpg_reg <- function(outcome, data, name, Topn) {

    ## outcome lm
    outcome_lm = lapply(21:320, function(i) {
        lm = lm(outcome ~ data[, i] + maternal_age + race_4 +
            Bcell + CD4T + CD8T + Gran + Mono + NK + nRBC, data = data)
        coef = round(summary(lm)$coefficients[2, ], 4)
        return(coef)
    })
    outcome_lm = data.frame(matrix(unlist(outcome_lm), ncol = 4,
        byrow = TRUE, dimnames = list(c(colnames(data)[21:320]),
            c("Estimate", "Std.Error", "t.statistic", "p.value"))))

    # adjusted p-value
    outcome_lm = outcome_lm %>% mutate(FDR = p.adjust(p.value,
        "BH", 300), names = colnames(data)[21:320]) %>% select(names,
        everything())
    # sort by p.value
    outcome_lm = outcome_lm[order(outcome_lm$p.value), ]

    ## sample size
    size = length(outcome) - sum(is.na(outcome))

    ## summary table
    kable(head(outcome_lm, Topn), caption = paste("Top10 CpGs for ",
        name, " by p.value", " (Sample Size = ", size, ") ",
        sep = "", collapse = ""))
```

```
}

## test with birthweight_ no log tran outcome, data, name,
## Topn
cpg_reg(pfas_male$birth_weight, pfas_male, "birth_weight", 15)
```

Table 1: Top10 CpGs for birth_weight by p.value (Sample Size = 308)

	names	Estimate	Std.Error	t.statistic	p.value	FDR
49	cg16725984	-223.9782	62.8628	-3.5630	0.0004	0.1200000
67	cg25195288	531.2117	180.0618	2.9502	0.0034	0.4725000
167	cg16495448	-321.1247	116.1410	-2.7650	0.0061	0.4725000
184	cg25137968	338.3636	123.0875	2.7490	0.0063	0.4725000
204	cg15045292	158.0504	59.4286	2.6595	0.0083	0.4980000
71	cg16672637	646.5242	263.2745	2.4557	0.0146	0.5925000
83	cg20741567	505.6544	207.0949	2.4417	0.0152	0.5925000
22	cg00784263	319.4127	131.6031	2.4271	0.0158	0.5925000
117	cg21209948	-118.9226	53.0081	-2.2435	0.0256	0.6804545
160	cg07338658	215.3435	96.2539	2.2372	0.0260	0.6804545
190	cg10832304	-131.9252	59.5469	-2.2155	0.0275	0.6804545
115	cg10436026	-294.5838	134.3338	-2.1929	0.0291	0.6804545
57	cg23206463	-116.4047	55.4694	-2.0985	0.0367	0.6804545
131	cg12271419	-458.9996	223.9282	-2.0498	0.0413	0.6804545
201	cg04591709	379.3098	186.3319	2.0357	0.0427	0.6804545

```
## outcomes 'birth_weight', 'ipv3_pp_fm_pct', 'Chol_IPV3',
## 'FFA_IPV3', 'Gluc_IPV3', 'HDL_IPV3', 'Insu_IPV3'
## 'Trig_IPV3', 'Leptin_actual__ng_ml_'
Outcomes <- colnames(pfas_male)[5:13]

# the regression summary table for original outcomes
unlist(lapply(Outcomes, function(x) {
    cpg_reg(pfas_male[, x], pfas_male, c(x, "Male"), 15)
}))
```

```
##   [1] "Table: Top10 CpGs for birth_weight by p.value (Sample Size = 308) Top10 CpGs for Male by p.val
##   [2] ""
##   [3] "      names          Estimate   Std.Error   t.statistic   p.value         FDR"
##   [4] "----  -----------  ----------  ----------  ------------  --------  ----------"
##   [5] "49    cg16725984    -223.9782     62.8628       -3.5630    0.0004   0.1200000"
##   [6] "67    cg25195288     531.2117    180.0618        2.9502    0.0034   0.4725000"
##   [7] "167   cg16495448    -321.1247    116.1410       -2.7650    0.0061   0.4725000"
##   [8] "184   cg25137968     338.3636    123.0875        2.7490    0.0063   0.4725000"
##   [9] "204   cg15045292     158.0504     59.4286        2.6595    0.0083   0.4980000"
##  [10] "71    cg16672637     646.5242    263.2745        2.4557    0.0146   0.5925000"
##  [11] "83    cg20741567     505.6544    207.0949        2.4417    0.0152   0.5925000"
##  [12] "22    cg00784263     319.4127    131.6031        2.4271    0.0158   0.5925000"
##  [13] "117   cg21209948    -118.9226     53.0081       -2.2435    0.0256   0.6804545"
##  [14] "160   cg07338658     215.3435     96.2539        2.2372    0.0260   0.6804545"
##  [15] "190   cg10832304    -131.9252     59.5469       -2.2155    0.0275   0.6804545"
##  [16] "115   cg10436026    -294.5838    134.3338       -2.1929    0.0291   0.6804545"
##  [17] "57    cg23206463    -116.4047     55.4694       -2.0985    0.0367   0.6804545"
```

```
##  [18] "131   cg12271419    -458.9996    223.9282       -2.0498    0.0413   0.6804545"
##  [19] "201   cg04591709     379.3098    186.3319        2.0357    0.0427   0.6804545"
##  [20] "Table: Top10 CpGs for ipv3_pp_fm_pct by p.value (Sample Size = 295) Top10 CpGs for Male by p.v
##  [21] ""
##  [22] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
##  [23] "----  ----------  ---------  ----------  ------------  --------  ----------"
##  [24] "190   cg10832304     -1.3755      0.4869       -2.8251    0.0051   0.8400000"
##  [25] "112   cg24366087     -2.8077      1.0239       -2.7421    0.0065   0.8400000"
##  [26] "139   cg08743751      2.3959      0.9020        2.6561    0.0084   0.8400000"
##  [27] "203   cg15066197     -2.6715      1.0984       -2.4322    0.0156   0.8626829"
##  [28] "282   cg08732300      1.7887      0.7625        2.3457    0.0197   0.8626829"
##  [29] "171   cg09461851      2.8483      1.2552        2.2692    0.0240   0.8626829"
##  [30] "78    cg17878951     -2.6936      1.2183       -2.2109    0.0278   0.8626829"
##  [31] "205   cg12149692     -1.6584      0.7524       -2.2042    0.0283   0.8626829"
##  [32] "145   cg06404838     -3.1023      1.4108       -2.1990    0.0287   0.8626829"
##  [33] "238   cg07676859      1.0072      0.4713        2.1371    0.0335   0.8626829"
##  [34] "184   cg25137968      2.1172      1.0226        2.0703    0.0393   0.8626829"
##  [35] "106   cg24833819      1.3854      0.6865        2.0179    0.0445   0.8626829"
##  [36] "233   cg02887248     -3.6414      1.8062       -2.0160    0.0447   0.8626829"
##  [37] "4     cg21853587      3.1614      1.5731        2.0097    0.0454   0.8626829"
##  [38] "255   cg00634984     -1.0037      0.5069       -1.9798    0.0487   0.8626829"
##  [39] "Table: Top10 CpGs for Chol_IPV3 by p.value (Sample Size = 290) Top10 CpGs for Male by p.value
##  [40] ""
##  [41] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
##  [42] "----  ----------  ---------  ----------  ------------  --------  ----------"
##  [43] "254   cg22692511      7.2223      2.3323        3.0966    0.0022   0.5040000"
##  [44] "271   cg08162803     15.1963      5.2370        2.9017    0.0040   0.5040000"
##  [45] "112   cg24366087    -12.9362      4.7274       -2.7364    0.0066   0.5040000"
##  [46] "95    cg17850055    -26.7278      9.9250       -2.6930    0.0075   0.5040000"
##  [47] "266   cg12857407     10.9809      4.1342        2.6561    0.0084   0.5040000"
##  [48] "49    cg16725984      5.9979      2.3273        2.5772    0.0105   0.5250000"
##  [49] "279   cg17132124      8.4670      3.5930        2.3565    0.0191   0.8185714"
##  [50] "69    cg04168590     20.7551      9.0932        2.2825    0.0232   0.8584615"
##  [51] "170   cg19554564    -12.5572      5.7514       -2.1833    0.0299   0.8584615"
##  [52] "28    cg12872489     -6.5322      2.9982       -2.1787    0.0302   0.8584615"
##  [53] "211   cg00893875      3.2266      1.5349        2.1022    0.0364   0.8584615"
##  [54] "58    cg09887862      4.7067      2.2466        2.0950    0.0371   0.8584615"
##  [55] "188   cg17500055     -7.2796      3.4775       -2.0934    0.0372   0.8584615"
##  [56] "198   cg09825146     -5.6078      2.8646       -1.9576    0.0513   0.9537273"
##  [57] "143   cg15486454     -6.6270      3.5936       -1.8441    0.0662   0.9537273"
##  [58] "Table: Top10 CpGs for FFA_IPV3 by p.value (Sample Size = 268) Top10 CpGs for Male by p.value
##  [59] ""
##  [60] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
##  [61] "----  ----------  ---------  ----------  ------------  --------  ----------"
##  [62] "4     cg21853587   -169.3376     63.0974       -2.6837    0.0078   0.7016667"
##  [63] "96    cg21215576     82.6143     30.8336        2.6794    0.0079   0.7016667"
##  [64] "163   cg26074111   -134.0200     51.9809       -2.5783    0.0105   0.7016667"
##  [65] "156   cg13858106    115.1631     47.0377        2.4483    0.0150   0.7016667"
##  [66] "148   cg13598480     98.5534     41.1924        2.3925    0.0175   0.7016667"
##  [67] "9     cg20510724    172.4090     72.6345        2.3737    0.0184   0.7016667"
##  [68] "257   cg16529483     37.4015     15.8850        2.3545    0.0193   0.7016667"
##  [69] "54    cg19529074    -97.4207     44.1996       -2.2041    0.0284   0.7016667"
##  [70] "166   cg26275850     99.4629     45.7261        2.1752    0.0305   0.7016667"
##  [71] "126   cg05390685    -69.3031     31.9189       -2.1712    0.0308   0.7016667"
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##  [72] "7     cg27354586    -110.6213     51.8697       -2.1327    0.0339   0.7016667"
##  [73] "162   cg18602114     -65.3165     30.8481       -2.1174    0.0352   0.7016667"
##  [74] "250   cg20732198     -69.3452     32.9454       -2.1049    0.0363   0.7016667"
##  [75] "119   cg00438284     -77.5458     36.8574       -2.1039    0.0364   0.7016667"
##  [76] "177   cg25206725     -78.3701     37.7488       -2.0761    0.0389   0.7016667"
##  [77] "Table: Top10 CpGs for Gluc_IPV3 by p.value (Sample Size = 298) Top10 CpGs for Male by p.value
##  [78] ""
##  [79] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
##  [80] "----  ----------  ---------  ----------  ------------  --------  ----------"
##  [81] "145   cg06404838     27.8481      8.4948        3.2783    0.0012   0.3600000"
##  [82] "248   cg11196848    -15.3248      5.5395       -2.7665    0.0060   0.9000000"
##  [83] "27    cg17519749     11.7052      4.5215        2.5888    0.0101   0.9480000"
##  [84] "59    cg20324199     11.6527      5.0313        2.3160    0.0213   0.9480000"
##  [85] "150   cg14163408     11.2035      4.8768        2.2973    0.0223   0.9480000"
##  [86] "16    cg06873590    -32.3360     14.4880       -2.2319    0.0264   0.9480000"
##  [87] "217   cg01816336    -18.4503      8.3155       -2.2188    0.0273   0.9480000"
##  [88] "135   cg17171260    -15.1541      6.8867       -2.2005    0.0286   0.9480000"
##  [89] "287   cg26781129     11.1141      5.1032        2.1779    0.0302   0.9480000"
##  [90] "77    cg23478547      7.9711      3.6905        2.1599    0.0316   0.9480000"
##  [91] "95    cg17850055    -27.8733     13.4284       -2.0757    0.0388   0.9750526"
##  [92] "153   cg01060409     24.6640     12.0796        2.0418    0.0421   0.9750526"
##  [93] "93    cg23054637     23.0425     11.4606        2.0106    0.0453   0.9750526"
##  [94] "36    cg11302884    -16.1529      8.0703       -2.0015    0.0463   0.9750526"
##  [95] "189   cg13382072     10.1078      5.1841        1.9498    0.0522   0.9750526"
##  [96] "Table: Top10 CpGs for HDL_IPV3 by p.value (Sample Size = 263) Top10 CpGs for Male by p.value
##  [97] ""
##  [98] "      names         Estimate   Std.Error   t.statistic   p.value      FDR"
##  [99] "----  ----------  ---------  ----------  ------------  --------  -------"
## [100] "49    cg16725984      3.2542      1.0221        3.1839    0.0016   0.4000"
## [101] "42    cg15355952     -6.1054      2.0229       -3.0181    0.0028   0.4000"
## [102] "236   cg04061372      1.9260      0.6637        2.9022    0.0040   0.4000"
## [103] "271   cg08162803      6.2363      2.3198        2.6883    0.0077   0.5775"
## [104] "211   cg00893875      1.7387      0.7042        2.4690    0.0142   0.7380"
## [105] "281   cg22946159     -7.9944      3.3218       -2.4067    0.0168   0.7380"
## [106] "290   cg00798281     -3.7706      1.5943       -2.3651    0.0188   0.7380"
## [107] "286   cg03989507      4.3550      1.8841        2.3115    0.0216   0.7380"
## [108] "26    cg03452190      6.5512      2.8815        2.2736    0.0238   0.7380"
## [109] "145   cg06404838     -6.5192      2.8836       -2.2608    0.0246   0.7380"
## [110] "120   cg22700790      2.8506      1.2842        2.2198    0.0273   0.7425"
## [111] "230   cg22950210      3.5533      1.6832        2.1110    0.0358   0.7425"
## [112] "52    cg19549232      4.5904      2.1774        2.1082    0.0360   0.7425"
## [113] "294   cg04262934      7.7888      3.7174        2.0952    0.0372   0.7425"
## [114] "188   cg17500055     -3.2273      1.5540       -2.0768    0.0388   0.7425"
## [115] "Table: Top10 CpGs for Insu_IPV3 by p.value (Sample Size = 285) Top10 CpGs for Male by p.value
## [116] ""
## [117] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
## [118] "----  ----------  ---------  ----------  ------------  --------  ----------"
## [119] "169   cg17501712      9.6030      2.9405        3.2658    0.0012   0.3600000"
## [120] "233   cg02887248    -12.1056      4.9070       -2.4670    0.0142   0.9769751"
## [121] "61    cg04569429      5.3313      2.1663        2.4610    0.0145   0.9769751"
## [122] "242   cg06922635      4.9204      2.0773        2.3687    0.0185   0.9769751"
## [123] "141   cg04476891      5.9849      2.5923        2.3087    0.0217   0.9769751"
## [124] "199   cg21261158     -9.0981      4.1012       -2.2184    0.0274   0.9769751"
## [125] "195   cg23785275     -1.4674      0.7066       -2.0767    0.0388   0.9769751"
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## [126] "191   cg25138412     -3.2933      1.6012       -2.0568    0.0407   0.9769751"
## [127] "259   cg06407657     -4.7457      2.3817       -1.9926    0.0473   0.9769751"
## [128] "171   cg09461851      6.9436      3.5456        1.9584    0.0512   0.9769751"
## [129] "86    cg02648057     -3.4881      1.7875       -1.9514    0.0520   0.9769751"
## [130] "20    cg00210042      7.3624      3.7862        1.9445    0.0529   0.9769751"
## [131] "19    cg00128386     -8.2703      4.3246       -1.9124    0.0569   0.9769751"
## [132] "27    cg17519749      3.8344      2.0763        1.8467    0.0659   0.9769751"
## [133] "58    cg09887862      2.4654      1.3877        1.7767    0.0767   0.9769751"
## [134] "Table: Top10 CpGs for Trig_IPV3 by p.value (Sample Size = 287) Top10 CpGs for Male by p.value
## [135] ""
## [136] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
## [137] "----  -----------  ---------  ----------  ------------  --------  ----------"
## [138] "291   cg09630142    -28.1212      8.7979       -3.1963    0.0016   0.4800000"
## [139] "19    cg00128386     46.6354     18.9656        2.4589    0.0146   0.9521495"
## [140] "221   cg19682786    -33.4938     14.5417       -2.3033    0.0220   0.9521495"
## [141] "277   cg05227616    -27.3524     12.4619       -2.1949    0.0290   0.9521495"
## [142] "259   cg06407657    -22.5993     10.4359       -2.1655    0.0312   0.9521495"
## [143] "160   cg07338658    -20.6099      9.5478       -2.1586    0.0317   0.9521495"
## [144] "197   cg14349977    -13.8979      6.4997       -2.1382    0.0334   0.9521495"
## [145] "72    cg16659510    -33.1245     15.6720       -2.1136    0.0355   0.9521495"
## [146] "50    cg27124293     16.2506      7.7557        2.0953    0.0371   0.9521495"
## [147] "170   cg19554564     29.3659     15.3315        1.9154    0.0565   0.9521495"
## [148] "95    cg17850055    -50.5667     26.5950       -1.9014    0.0583   0.9521495"
## [149] "198   cg09825146    -14.4595      7.6284       -1.8955    0.0591   0.9521495"
## [150] "297   cg01607625    -30.0297     16.2658       -1.8462    0.0659   0.9521495"
## [151] "285   cg27535677    -15.9716      8.7706       -1.8210    0.0697   0.9521495"
## [152] "118   cg26400491    -11.1671      6.2129       -1.7974    0.0734   0.9521495"
## [153] "Table: Top10 CpGs for Leptin_actual__ng_ml_ by p.value (Sample Size = 254) Top10 CpGs for Mal
## [154] ""
## [155] "      names         Estimate   Std.Error   t.statistic   p.value         FDR"
## [156] "----  -----------  ---------  ----------  ------------  --------  ----------"
## [157] "49    cg16725984     -6.6381      1.9729       -3.3647    0.0009   0.2550000"
## [158] "22    cg00784263     12.8922      4.0607        3.1749    0.0017   0.2550000"
## [159] "134   cg05906144      7.7035      2.7746        2.7765    0.0059   0.5233333"
## [160] "19    cg00128386    -16.7190      6.2751       -2.6643    0.0082   0.5233333"
## [161] "209   cg24280832      9.1099      3.5388        2.5742    0.0106   0.5233333"
## [162] "85    cg23572459    -15.7889      6.4071       -2.4643    0.0144   0.5233333"
## [163] "135   cg17171260    -10.7783      4.4176       -2.4399    0.0154   0.5233333"
## [164] "116   cg21183455      5.2322      2.1486        2.4351    0.0156   0.5233333"
## [165] "104   cg10119082     -5.3893      2.2145       -2.4336    0.0157   0.5233333"
## [166] "260   cg17284440    -18.5351      7.9487       -2.3319    0.0205   0.6150000"
## [167] "42    cg15355952      8.4318      3.9161        2.1531    0.0323   0.7961538"
## [168] "185   cg07716131     11.4685      5.3443        2.1459    0.0329   0.7961538"
## [169] "214   cg20505445     -5.4479      2.5617       -2.1267    0.0345   0.7961538"
## [170] "182   cg17372941    -12.3407      5.9268       -2.0822    0.0384   0.8006250"
## [171] "126   cg05390685     -6.8460      3.3218       -2.0609    0.0404   0.8006250"
```
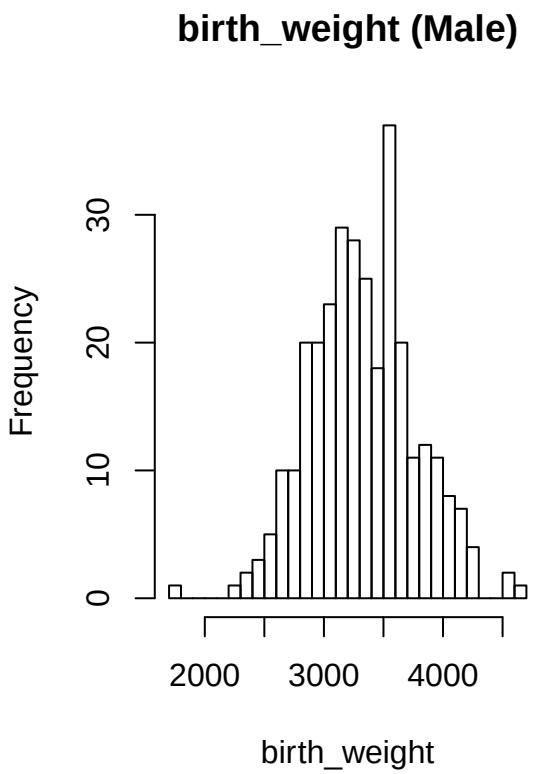
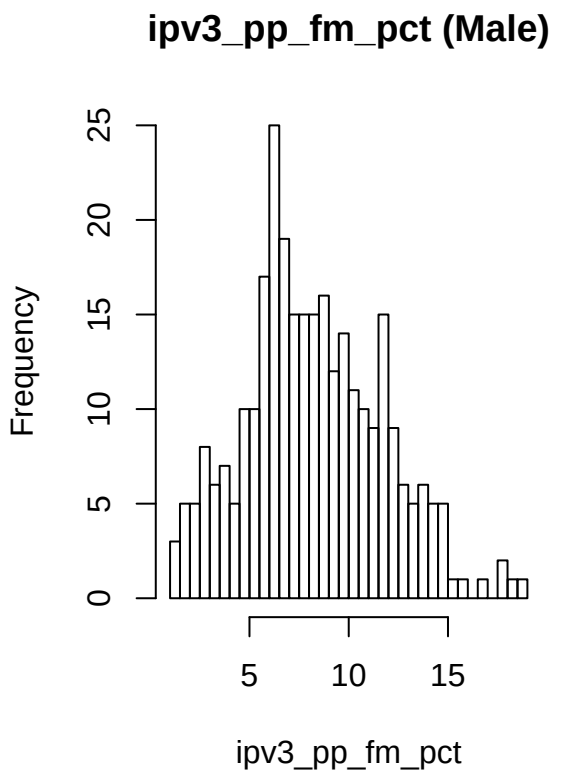
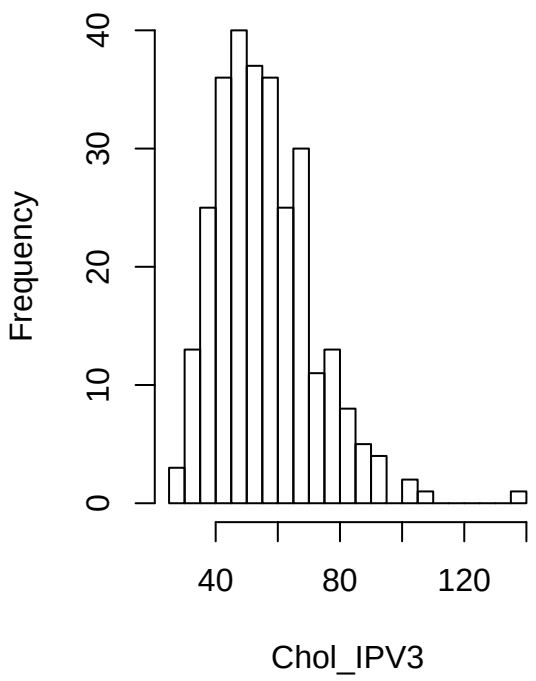
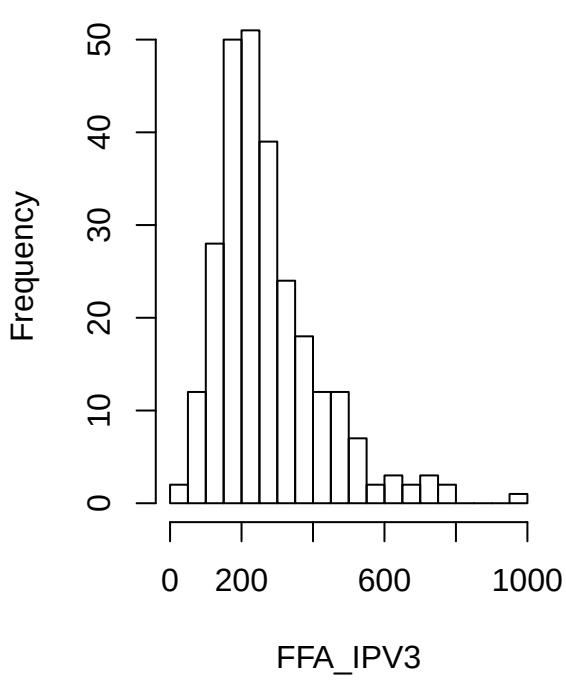
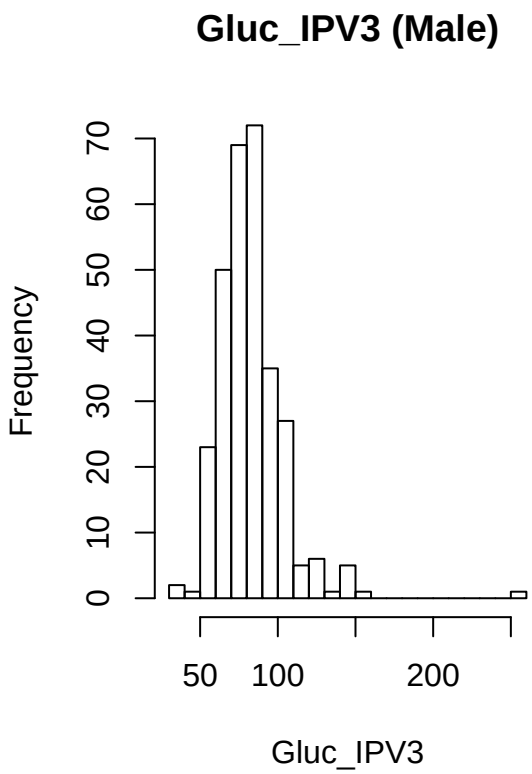

```
## raw outcomes
par(mfrow = c(1, 2))
lapply(Outcomes, function(x) {
    hist(pfas_male[, x], freq = TRUE, breaks = 30, main = paste(x,
        " (Male)", sep = ""), xlab = x)
})
```

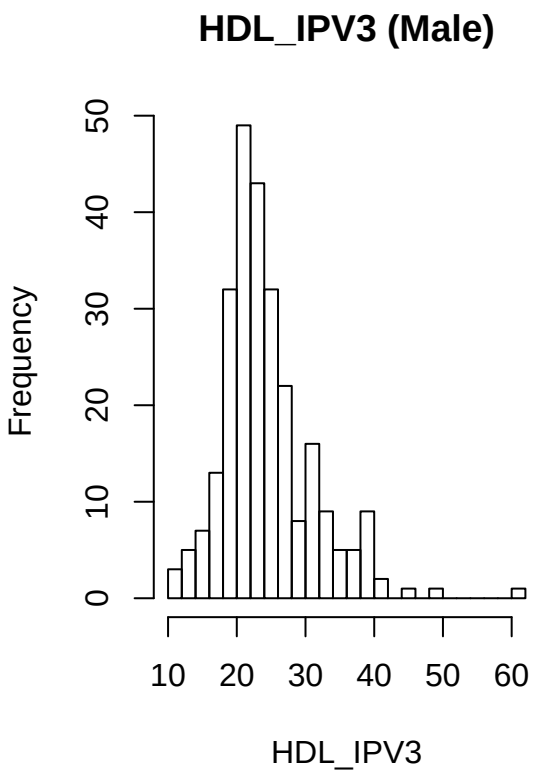

birth_weight (Male)
Frequency
0
10
20
30
2000
3000
4000
birth_weight

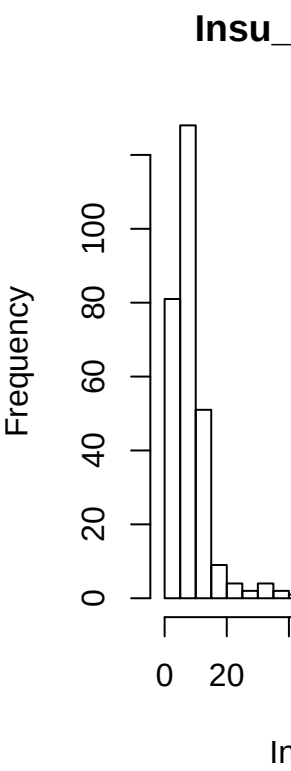

ipv3_pp_fm_pct (Male)
Frequency
0
5
10
15
20
25
5
10
15
ipv3_pp_fm_pct


Chol_IPV3 (Male)
Frequency
0
10
20
30
40
40
80
120
Chol_IPV3


FFA_IPV3 (Male)
Frequency
0
10
20
30
40
50
0
200
600
1000
FFA_IPV3








```
## [[1]]
## $breaks
##  [1] 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000
## [15] 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400
## [29] 4500 4600 4700
##
## $counts
##  [1]  1  0  0  0  0  1  2  3  5 10 10 20 20 23 29 28 25 18 37 20 11 12 11
## [24]  8  7  4  0  0  2  1
##
## $density
##  [1] 3.246753e-05 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [6] 3.246753e-05 6.493506e-05 9.740260e-05 1.623377e-04 3.246753e-04
## [11] 3.246753e-04 6.493506e-04 6.493506e-04 7.467532e-04 9.415584e-04
## [16] 9.090909e-04 8.116883e-04 5.844156e-04 1.201299e-03 6.493506e-04
## [21] 3.571429e-04 3.896104e-04 3.571429e-04 2.597403e-04 2.272727e-04
## [26] 1.298701e-04 0.000000e+00 0.000000e+00 6.493506e-05 3.246753e-05
##
## $mids
##  [1] 1750 1850 1950 2050 2150 2250 2350 2450 2550 2650 2750 2850 2950 3050
## [15] 3150 3250 3350 3450 3550 3650 3750 3850 3950 4050 4150 4250 4350 4450
## [29] 4550 4650
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
```

```
## attr(,"class")
## [1] "histogram"
##
## [[2]]
## $breaks
##  [1]  1.0  1.5  2.0  2.5  3.0  3.5  4.0  4.5  5.0  5.5  6.0  6.5  7.0  7.5
## [15]  8.0  8.5  9.0  9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5
## [29] 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0
##
## $counts
##  [1]  3  5  5  8  6  7  5 10 10 17 25 19 15 15 15 16 12 14 11 10  9 15  9
## [24]  6  5  6  5  5  1  1  0  1  0  2  1  1
##
## $density
##  [1] 0.020338983 0.033898305 0.033898305 0.054237288 0.040677966
##  [6] 0.047457627 0.033898305 0.067796610 0.067796610 0.115254237
## [11] 0.169491525 0.128813559 0.101694915 0.101694915 0.101694915
## [16] 0.108474576 0.081355932 0.094915254 0.074576271 0.067796610
## [21] 0.061016949 0.101694915 0.061016949 0.040677966 0.033898305
## [26] 0.040677966 0.033898305 0.033898305 0.006779661 0.006779661
## [31] 0.000000000 0.006779661 0.000000000 0.013559322 0.006779661
## [36] 0.006779661
##
## $mids
##  [1]  1.25  1.75  2.25  2.75  3.25  3.75  4.25  4.75  5.25  5.75  6.25
## [12]  6.75  7.25  7.75  8.25  8.75  9.25  9.75 10.25 10.75 11.25 11.75
## [23] 12.25 12.75 13.25 13.75 14.25 14.75 15.25 15.75 16.25 16.75 17.25
## [34] 17.75 18.25 18.75
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[3]]
## $breaks
##  [1]  25  30  35  40  45  50  55  60  65  70  75  80  85  90  95 100 105
## [18] 110 115 120 125 130 135 140
##
## $counts
##  [1]  3 13 25 36 40 37 36 25 30 11 13  8  5  4  0  2  1  0  0  0  0  0  1
##
## $density
##  [1] 0.0020689655 0.0089655172 0.0172413793 0.0248275862 0.0275862069
##  [6] 0.0255172414 0.0248275862 0.0172413793 0.0206896552 0.0075862069
## [11] 0.0089655172 0.0055172414 0.0034482759 0.0027586207 0.0000000000
## [16] 0.0013793103 0.0006896552 0.0000000000 0.0000000000 0.0000000000
## [21] 0.0000000000 0.0000000000 0.0006896552
##
## $mids
```

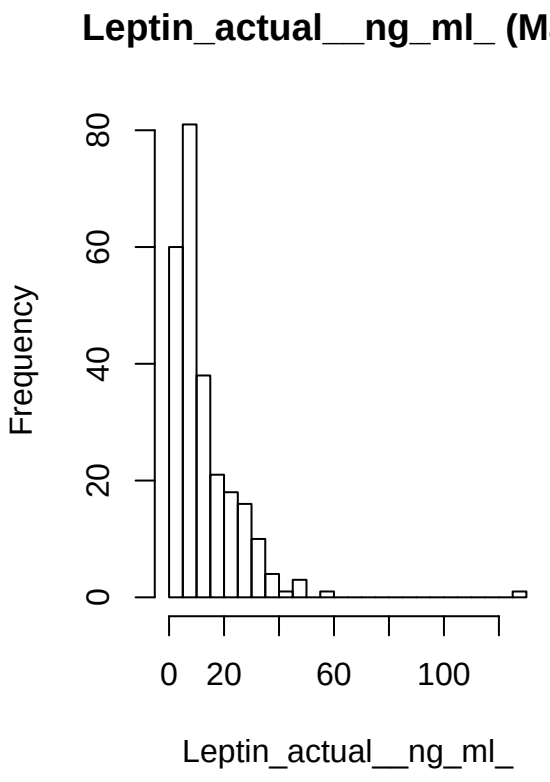
```
##  [1]  27.5  32.5  37.5  42.5  47.5  52.5  57.5  62.5  67.5  72.5  77.5
## [12]  82.5  87.5  92.5  97.5 102.5 107.5 112.5 117.5 122.5 127.5 132.5
## [23] 137.5
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[4]]
## $breaks
##  [1]    0   50  100  150  200  250  300  350  400  450  500  550  600  650
## [15]  700  750  800  850  900  950 1000
##
## $counts
##  [1]  2 12 28 50 51 39 24 18 12 12  7  2  3  2  3  2  0  0  0  1
##
## $density
##  [1] 1.492537e-04 8.955224e-04 2.089552e-03 3.731343e-03 3.805970e-03
##  [6] 2.910448e-03 1.791045e-03 1.343284e-03 8.955224e-04 8.955224e-04
## [11] 5.223881e-04 1.492537e-04 2.238806e-04 1.492537e-04 2.238806e-04
## [16] 1.492537e-04 0.000000e+00 0.000000e+00 0.000000e+00 7.462687e-05
##
## $mids
##  [1]  25  75 125 175 225 275 325 375 425 475 525 575 625 675 725 775 825
## [18] 875 925 975
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[5]]
## $breaks
##  [1]  30  40  50  60  70  80  90 100 110 120 130 140 150 160 170 180 190
## [18] 200 210 220 230 240 250 260
##
## $counts
##  [1]  2  1 23 50 69 72 35 27  5  6  1  5  1  0  0  0  0  0  0  0  0  0  1
##
## $density
##  [1] 0.0006711409 0.0003355705 0.0077181208 0.0167785235 0.0231543624
##  [6] 0.0241610738 0.0117449664 0.0090604027 0.0016778523 0.0020134228
## [11] 0.0003355705 0.0016778523 0.0003355705 0.0000000000 0.0000000000
## [16] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [21] 0.0000000000 0.0000000000 0.0003355705
```

```
##
## $mids
##  [1]  35  45  55  65  75  85  95 105 115 125 135 145 155 165 175 185 195
## [18] 205 215 225 235 245 255
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[6]]
## $breaks
##  [1] 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
## [24] 56 58 60 62
##
## $counts
##  [1]  3  5  7 13 32 49 43 32 22  8 16  9  5  5  9  2  0  1  0  1  0  0  0
## [24]  0  0  1
##
## $density
##  [1] 0.005703422 0.009505703 0.013307985 0.024714829 0.060836502
##  [6] 0.093155894 0.081749049 0.060836502 0.041825095 0.015209125
## [11] 0.030418251 0.017110266 0.009505703 0.009505703 0.017110266
## [16] 0.003802281 0.000000000 0.001901141 0.000000000 0.001901141
## [21] 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000
## [26] 0.001901141
##
## $mids
##  [1] 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55
## [24] 57 59 61
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[7]]
## $breaks
##  [1]   0   5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80
## [18]  85  90  95 100 105 110 115
##
## $counts
##  [1]  81 128  51   9   4   2   4   2   1   1   1   0   0   0   0   0   0
## [18]   0   0   0   0   0   1
##
## $density
```

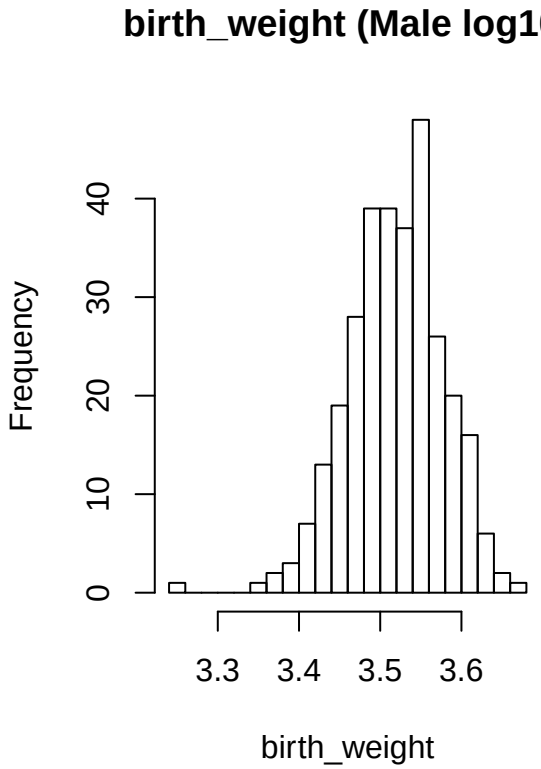
```
##  [1] 0.0568421053 0.0898245614 0.0357894737 0.0063157895 0.0028070175
##  [6] 0.0014035088 0.0028070175 0.0014035088 0.0007017544 0.0007017544
## [11] 0.0007017544 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [16] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [21] 0.0000000000 0.0000000000 0.0007017544
##
## $mids
##  [1]   2.5   7.5  12.5  17.5  22.5  27.5  32.5  37.5  42.5  47.5  52.5
## [12]  57.5  62.5  67.5  72.5  77.5  82.5  87.5  92.5  97.5 102.5 107.5
## [23] 112.5
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[8]]
## $breaks
##  [1]   0  20  40  60  80 100 120 140 160 180 200 220 240 260 280 300 320
## [18] 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660
##
## $counts
##  [1]  19 139  75  26  15   9   3   0   0   0   0   0   0   0   0   0   0
## [18]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   1
##
## $density
##  [1] 0.0033101045 0.0242160279 0.0130662021 0.0045296167 0.0026132404
##  [6] 0.0015679443 0.0005226481 0.0000000000 0.0000000000 0.0000000000
## [11] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [16] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [21] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [26] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [31] 0.0000000000 0.0000000000 0.0001742160
##
## $mids
##  [1]  10  30  50  70  90 110 130 150 170 190 210 230 250 270 290 310 330
## [18] 350 370 390 410 430 450 470 490 510 530 550 570 590 610 630 650
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[9]]
## $breaks
##  [1]   0   5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80
```

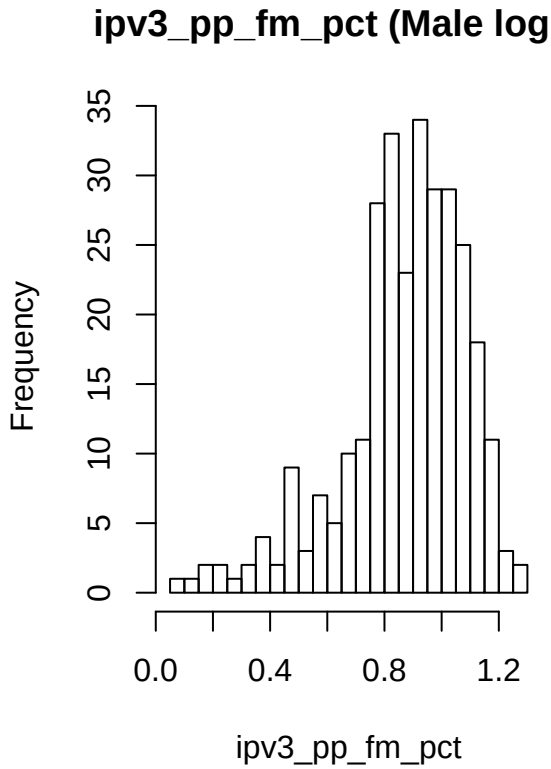
```
## [18]  85  90  95 100 105 110 115 120 125 130
##
## $counts
##  [1] 60 81 38 21 18 16 10  4  1  3  0  1  0  0  0  0  0  0  0  0  0  0
## [24]  0  0  1
##
## $density
##  [1] 0.0472440945 0.0637795276 0.0299212598 0.0165354331 0.0141732283
##  [6] 0.0125984252 0.0078740157 0.0031496063 0.0007874016 0.0023622047
## [11] 0.0000000000 0.0007874016 0.0000000000 0.0000000000 0.0000000000
## [16] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [21] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [26] 0.0007874016
##
## $mids
##  [1]   2.5   7.5  12.5  17.5  22.5  27.5  32.5  37.5  42.5  47.5  52.5
## [12]  57.5  62.5  67.5  72.5  77.5  82.5  87.5  92.5  97.5 102.5 107.5
## [23] 112.5 117.5 122.5 127.5
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```

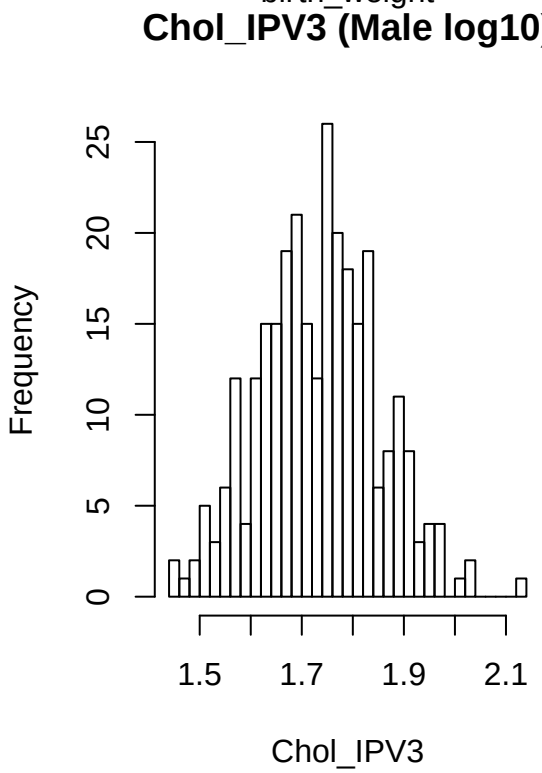
```
## log10
par(mfrow = c(1, 2))
```

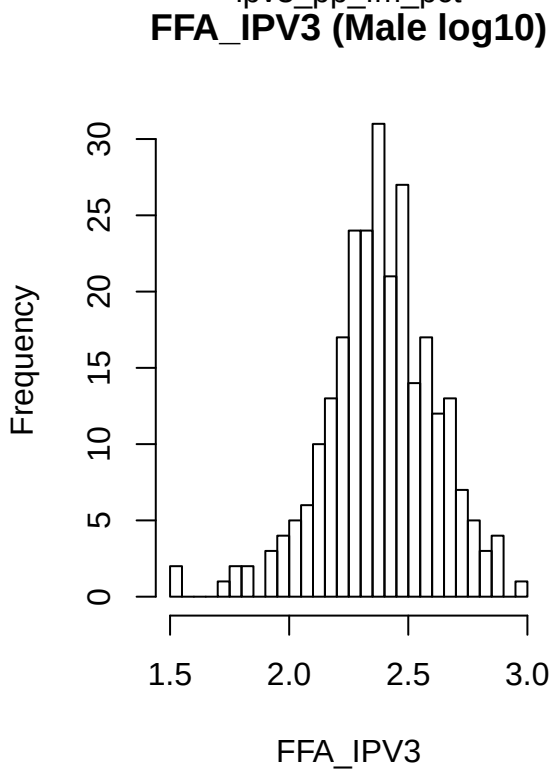


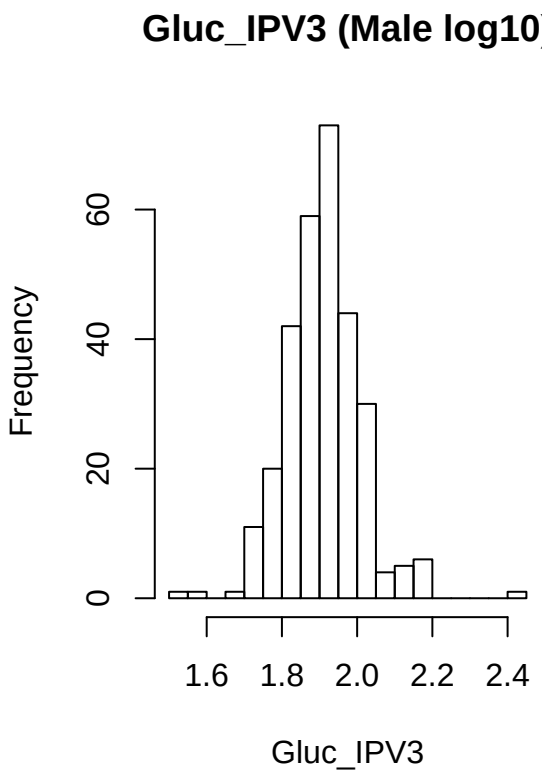
```
lapply(Outcomes, function(x) {
    hist(log10(pfas_male[, x]), freq = TRUE, breaks = 30, main = paste(x,
        " (Male log10)", sep = ""), xlab = x)
})
```

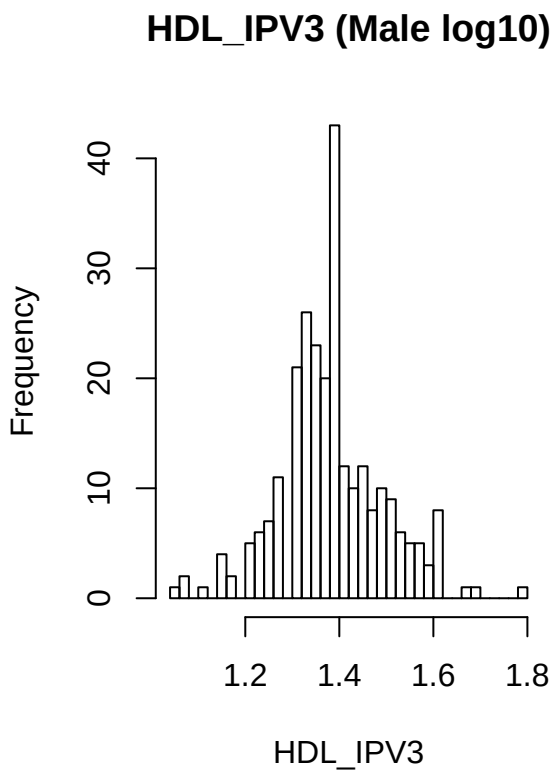


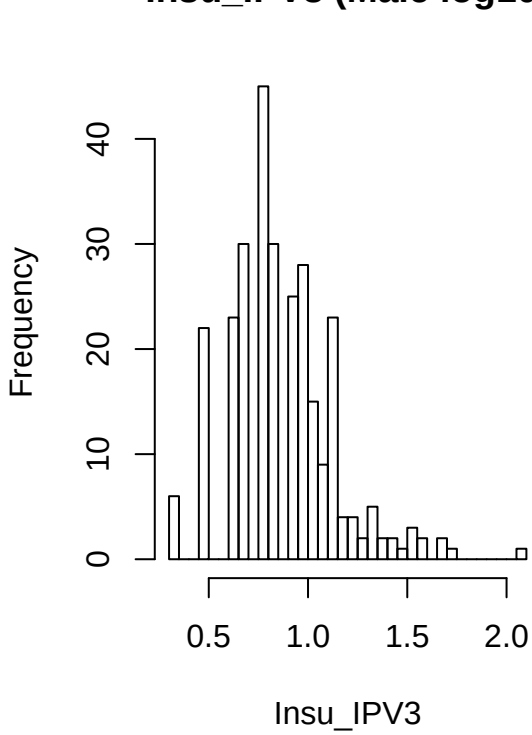


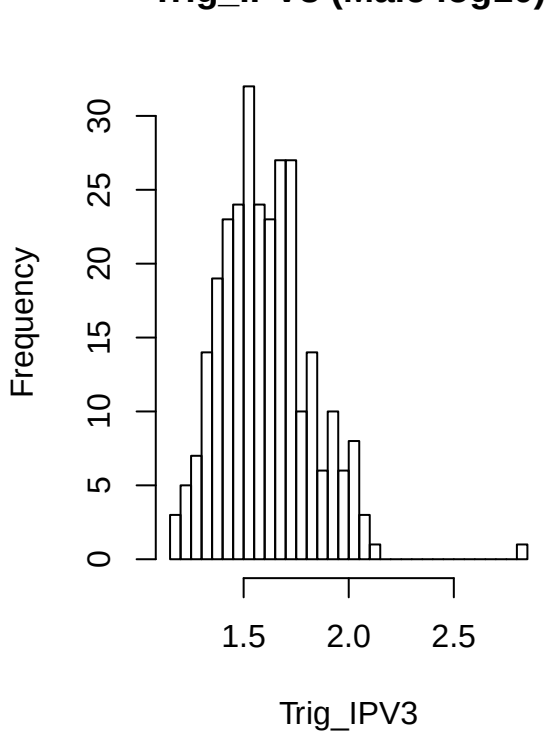













```
## [[1]]
## $breaks
##  [1] 3.24 3.26 3.28 3.30 3.32 3.34 3.36 3.38 3.40 3.42 3.44 3.46 3.48 3.50
## [15] 3.52 3.54 3.56 3.58 3.60 3.62 3.64 3.66 3.68
##
## $counts
```

```
##  [1]  1  0  0  0  0  1  2  3  7 13 19 28 39 39 37 48 26 20 16  6  2  1
##
## $density
##  [1] 0.1623377 0.0000000 0.0000000 0.0000000 0.0000000 0.1623377 0.3246753
##  [8] 0.4870130 1.1363636 2.1103896 3.0844156 4.5454545 6.3311688 6.3311688
## [15] 6.0064935 7.7922078 4.2207792 3.2467532 2.5974026 0.9740260 0.3246753
## [22] 0.1623377
##
## $mids
##  [1] 3.25 3.27 3.29 3.31 3.33 3.35 3.37 3.39 3.41 3.43 3.45 3.47 3.49 3.51
## [15] 3.53 3.55 3.57 3.59 3.61 3.63 3.65 3.67
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[2]]
## $breaks
##  [1] 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70
## [15] 0.75 0.80 0.85 0.90 0.95 1.00 1.05 1.10 1.15 1.20 1.25 1.30
##
## $counts
##  [1]  1  1  2  2  1  2  4  2  9  3  7  5 10 11 28 33 23 34 29 29 25 18 11
## [24]  3  2
##
## $density
##  [1] 0.06779661 0.06779661 0.13559322 0.13559322 0.06779661 0.13559322
##  [7] 0.27118644 0.13559322 0.61016949 0.20338983 0.47457627 0.33898305
## [13] 0.67796610 0.74576271 1.89830508 2.23728814 1.55932203 2.30508475
## [19] 1.96610169 1.96610169 1.69491525 1.22033898 0.74576271 0.20338983
## [25] 0.13559322
##
## $mids
##  [1] 0.075 0.125 0.175 0.225 0.275 0.325 0.375 0.425 0.475 0.525 0.575
## [12] 0.625 0.675 0.725 0.775 0.825 0.875 0.925 0.975 1.025 1.075 1.125
## [23] 1.175 1.225 1.275
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[3]]
## $breaks
##  [1] 1.44 1.46 1.48 1.50 1.52 1.54 1.56 1.58 1.60 1.62 1.64 1.66 1.68 1.70
```

```
## [15] 1.72 1.74 1.76 1.78 1.80 1.82 1.84 1.86 1.88 1.90 1.92 1.94 1.96 1.98
## [29] 2.00 2.02 2.04 2.06 2.08 2.10 2.12 2.14
##
## $counts
##  [1]  2  1  2  5  3  6 12  4 12 15 15 19 21 15 12 26 20 18 15 19  6  8 11
## [24]  8  3  4  4  0  1  2  0  0  0  0  1
##
## $density
##  [1] 0.3448276 0.1724138 0.3448276 0.8620690 0.5172414 1.0344828 2.0689655
##  [8] 0.6896552 2.0689655 2.5862069 2.5862069 3.2758621 3.6206897 2.5862069
## [15] 2.0689655 4.4827586 3.4482759 3.1034483 2.5862069 3.2758621 1.0344828
## [22] 1.3793103 1.8965517 1.3793103 0.5172414 0.6896552 0.6896552 0.0000000
## [29] 0.1724138 0.3448276 0.0000000 0.0000000 0.0000000 0.0000000 0.1724138
##
## $mids
##  [1] 1.45 1.47 1.49 1.51 1.53 1.55 1.57 1.59 1.61 1.63 1.65 1.67 1.69 1.71
## [15] 1.73 1.75 1.77 1.79 1.81 1.83 1.85 1.87 1.89 1.91 1.93 1.95 1.97 1.99
## [29] 2.01 2.03 2.05 2.07 2.09 2.11 2.13
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[4]]
## $breaks
##  [1] 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15
## [15] 2.20 2.25 2.30 2.35 2.40 2.45 2.50 2.55 2.60 2.65 2.70 2.75 2.80 2.85
## [29] 2.90 2.95 3.00
##
## $counts
##  [1]  2  0  0  0  1  2  2  0  3  4  5  6 10 13 17 24 24 31 21 27 14 17 12
## [24] 13  7  5  3  4  0  1
##
## $density
##  [1] 0.14925373 0.00000000 0.00000000 0.00000000 0.07462687 0.14925373
##  [7] 0.14925373 0.00000000 0.22388060 0.29850746 0.37313433 0.44776119
## [13] 0.74626866 0.97014925 1.26865672 1.79104478 1.79104478 2.31343284
## [19] 1.56716418 2.01492537 1.04477612 1.26865672 0.89552239 0.97014925
## [25] 0.52238806 0.37313433 0.22388060 0.29850746 0.00000000 0.07462687
##
## $mids
##  [1] 1.525 1.575 1.625 1.675 1.725 1.775 1.825 1.875 1.925 1.975 2.025
## [12] 2.075 2.125 2.175 2.225 2.275 2.325 2.375 2.425 2.475 2.525 2.575
## [23] 2.625 2.675 2.725 2.775 2.825 2.875 2.925 2.975
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
```

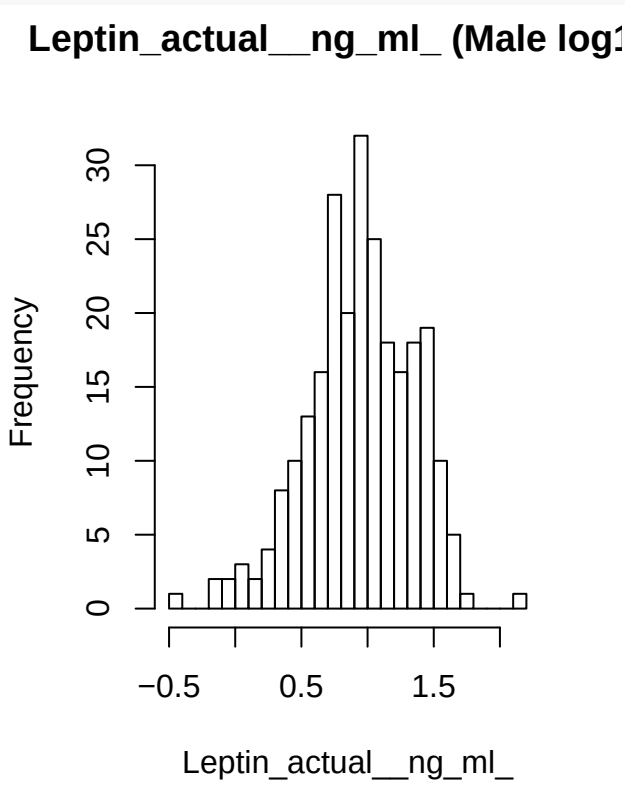
```
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[5]]
## $breaks
##  [1] 1.50 1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10 2.15
## [15] 2.20 2.25 2.30 2.35 2.40 2.45
##
## $counts
##  [1]  1  1  0  1 11 20 42 59 73 44 30  4  5  6  0  0  0  0  1
##
## $density
##  [1] 0.06711409 0.06711409 0.00000000 0.06711409 0.73825503 1.34228188
##  [7] 2.81879195 3.95973154 4.89932886 2.95302013 2.01342282 0.26845638
## [13] 0.33557047 0.40268456 0.00000000 0.00000000 0.00000000 0.00000000
## [19] 0.06711409
##
## $mids
##  [1] 1.525 1.575 1.625 1.675 1.725 1.775 1.825 1.875 1.925 1.975 2.025
## [12] 2.075 2.125 2.175 2.225 2.275 2.325 2.375 2.425
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[6]]
## $breaks
##  [1] 1.04 1.06 1.08 1.10 1.12 1.14 1.16 1.18 1.20 1.22 1.24 1.26 1.28 1.30
## [15] 1.32 1.34 1.36 1.38 1.40 1.42 1.44 1.46 1.48 1.50 1.52 1.54 1.56 1.58
## [29] 1.60 1.62 1.64 1.66 1.68 1.70 1.72 1.74 1.76 1.78 1.80
##
## $counts
##  [1]  1  2  0  1  0  4  2  0  5  6  7 11  0 21 26 23 20 43 12 10 12  8 10
## [24]  9  6  5  5  3  8  0  0  1  1  0  0  0  0  1
##
## $density
##  [1] 0.1901141 0.3802281 0.0000000 0.1901141 0.0000000 0.7604563 0.3802281
##  [8] 0.0000000 0.9505703 1.1406844 1.3307985 2.0912548 0.0000000 3.9923954
## [15] 4.9429658 4.3726236 3.8022814 8.1749049 2.2813688 1.9011407 2.2813688
## [22] 1.5209125 1.9011407 1.7110266 1.1406844 0.9505703 0.9505703 0.5703422
## [29] 1.5209125 0.0000000 0.0000000 0.1901141 0.1901141 0.0000000 0.0000000
## [36] 0.0000000 0.0000000 0.1901141
##
## $mids
##  [1] 1.05 1.07 1.09 1.11 1.13 1.15 1.17 1.19 1.21 1.23 1.25 1.27 1.29 1.31
## [15] 1.33 1.35 1.37 1.39 1.41 1.43 1.45 1.47 1.49 1.51 1.53 1.55 1.57 1.59
## [29] 1.61 1.63 1.65 1.67 1.69 1.71 1.73 1.75 1.77 1.79
```

```
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[7]]
## $breaks
##  [1] 0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 0.80 0.85 0.90 0.95
## [15] 1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65
## [29] 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.10
##
## $counts
##  [1]  6  0  0 22  0  0 23 30  0 45 30  0 25 28 15  9 23  4  4  2  5  2  2
## [24]  1  3  2  0  2  1  0  0  0  0  0  0  1
##
## $density
##  [1] 0.42105263 0.00000000 0.00000000 1.54385965 0.00000000 0.00000000
##  [7] 1.61403509 2.10526316 0.00000000 3.15789474 2.10526316 0.00000000
## [13] 1.75438596 1.96491228 1.05263158 0.63157895 1.61403509 0.28070175
## [19] 0.28070175 0.14035088 0.35087719 0.14035088 0.14035088 0.07017544
## [25] 0.21052632 0.14035088 0.00000000 0.14035088 0.07017544 0.00000000
## [31] 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.07017544
##
## $mids
##  [1] 0.325 0.375 0.425 0.475 0.525 0.575 0.625 0.675 0.725 0.775 0.825
## [12] 0.875 0.925 0.975 1.025 1.075 1.125 1.175 1.225 1.275 1.325 1.375
## [23] 1.425 1.475 1.525 1.575 1.625 1.675 1.725 1.775 1.825 1.875 1.925
## [34] 1.975 2.025 2.075
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[8]]
## $breaks
##  [1] 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55 1.60 1.65 1.70 1.75 1.80
## [15] 1.85 1.90 1.95 2.00 2.05 2.10 2.15 2.20 2.25 2.30 2.35 2.40 2.45 2.50
## [29] 2.55 2.60 2.65 2.70 2.75 2.80 2.85
##
## $counts
##  [1]  3  5  7 14 19 23 24 32 24 23 27 27 10 14  6 10  6  8  3  1  0  0  0
## [24]  0  0  0  0  0  0  0  0  0  0  0  1
##
## $density
```

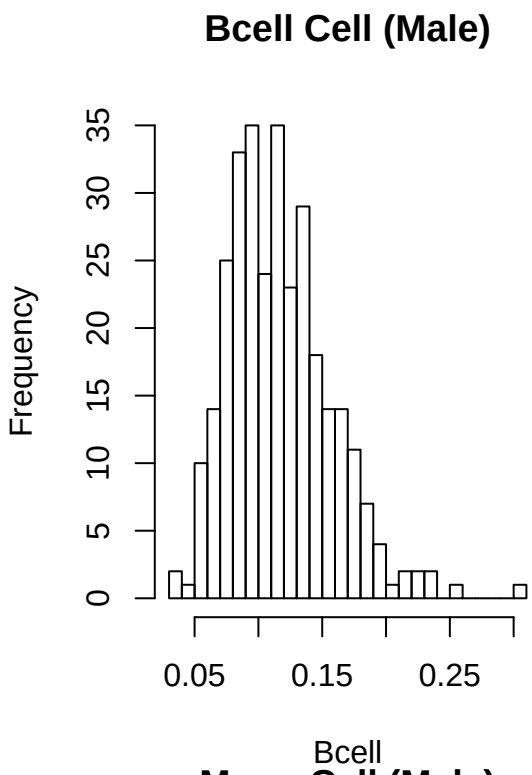
```
##  [1] 0.20905923 0.34843206 0.48780488 0.97560976 1.32404181 1.60278746
##  [7] 1.67247387 2.22996516 1.67247387 1.60278746 1.88153310 1.88153310
## [13] 0.69686411 0.97560976 0.41811847 0.69686411 0.41811847 0.55749129
## [19] 0.20905923 0.06968641 0.00000000 0.00000000 0.00000000 0.00000000
## [25] 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## [31] 0.00000000 0.00000000 0.00000000 0.06968641
##
## $mids
##  [1] 1.175 1.225 1.275 1.325 1.375 1.425 1.475 1.525 1.575 1.625 1.675
## [12] 1.725 1.775 1.825 1.875 1.925 1.975 2.025 2.075 2.125 2.175 2.225
## [23] 2.275 2.325 2.375 2.425 2.475 2.525 2.575 2.625 2.675 2.725 2.775
## [34] 2.825
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[9]]
## $breaks
##  [1] -0.5 -0.4 -0.3 -0.2 -0.1  0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8
## [15]  0.9  1.0  1.1  1.2  1.3  1.4  1.5  1.6  1.7  1.8  1.9  2.0  2.1  2.2
##
## $counts
##  [1]  1  0  0  2  2  3  2  4  8 10 13 16 28 20 32 25 18 16 18 19 10  5  1
## [24]  0  0  0  1
##
## $density
##  [1] 0.03937008 0.00000000 0.00000000 0.07874016 0.07874016 0.11811024
##  [7] 0.07874016 0.15748031 0.31496063 0.39370079 0.51181102 0.62992126
## [13] 1.10236220 0.78740157 1.25984252 0.98425197 0.70866142 0.62992126
## [19] 0.70866142 0.74803150 0.39370079 0.19685039 0.03937008 0.00000000
## [25] 0.00000000 0.00000000 0.03937008
##
## $mids
##  [1] -0.45 -0.35 -0.25 -0.15 -0.05  0.05  0.15  0.25  0.35  0.45  0.55
## [12]  0.65  0.75  0.85  0.95  1.05  1.15  1.25  1.35  1.45  1.55  1.65
## [23]  1.75  1.85  1.95  2.05  2.15
##
## $xname
## [1] "log10(pfas_male[, x])"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```

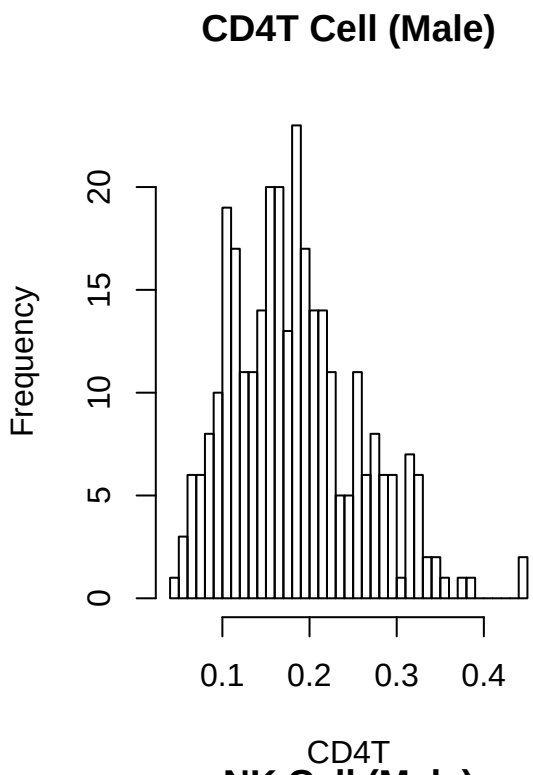
```
## check the distribution of cell types
cellnames <- colnames(pfas_male[, 14:20])
```

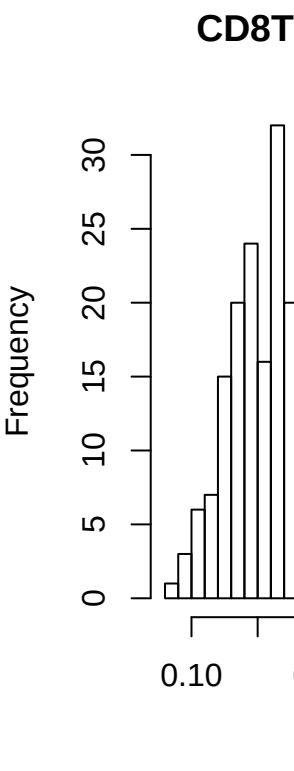
```r
par(mfrow = c(1, 2))
```

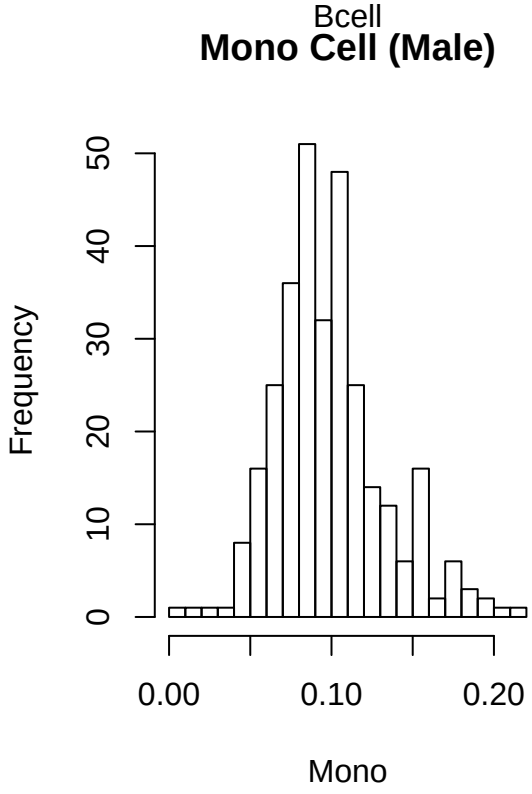


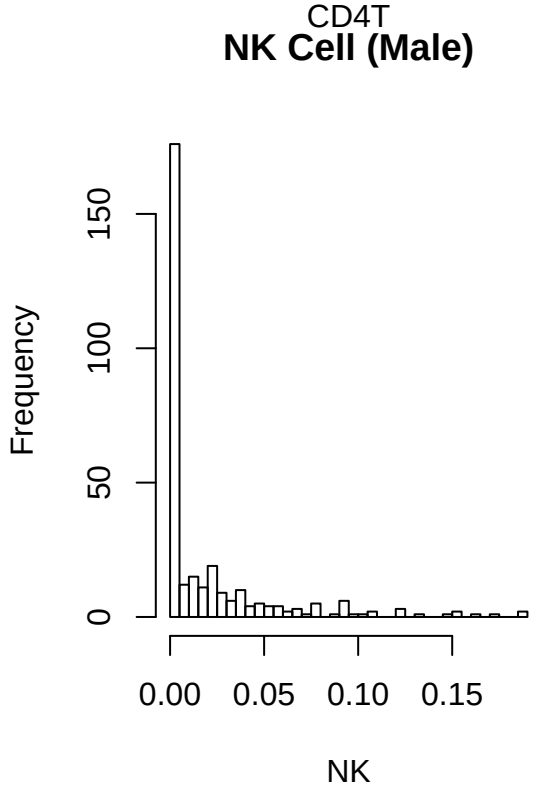

```r
lapply(cellnames, function(x) {
    hist(pfas_male[, x], freq = TRUE, breaks = 30, main = paste(x,
        " Cell (Male)", sep = ""), xlab = x)
})
```












```
## [[1]]
## $breaks
##  [1] 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16
## [15] 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [29] 0.31
##
```

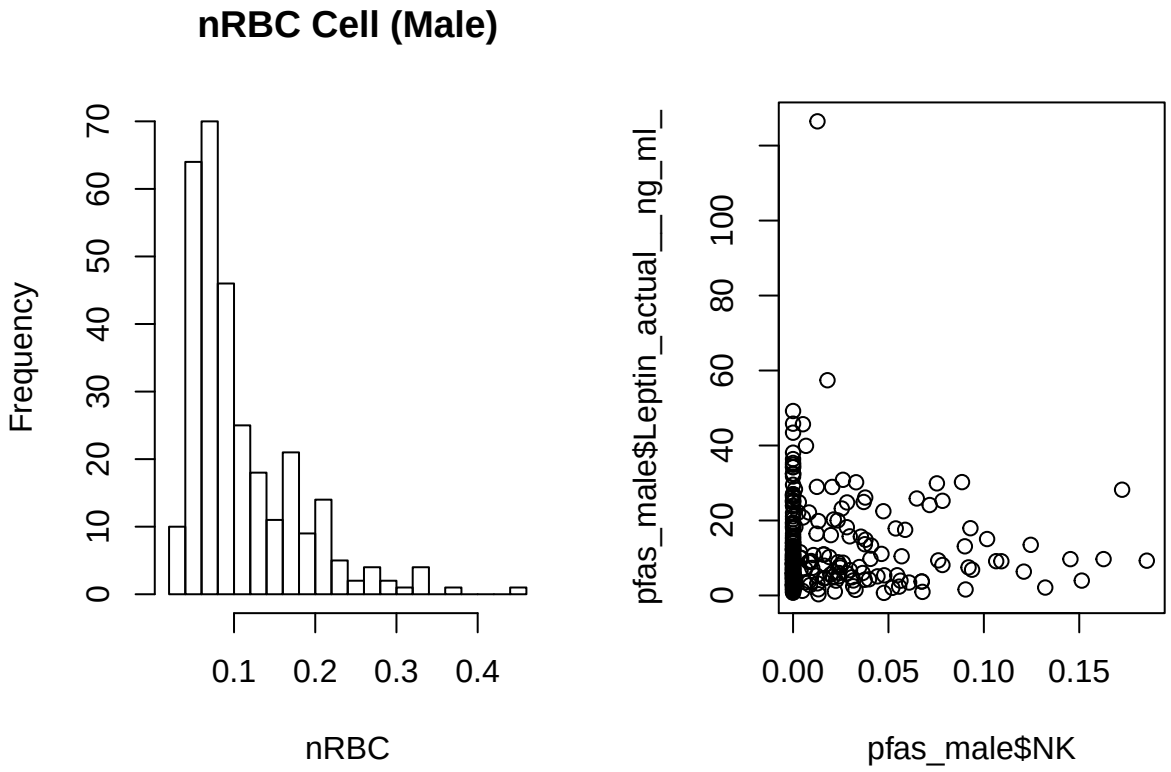
```
## $counts
##  [1]  2  1 10 14 25 33 35 24 35 23 29 18 14 14 11  7  4  1  2  2  2  0  1
## [24]  0  0  0  0  1
##
## $density
##  [1]  0.6493506  0.3246753  3.2467532  4.5454545  8.1168831 10.7142857
##  [7] 11.3636364  7.7922078 11.3636364  7.4675325  9.4155844  5.8441558
## [13]  4.5454545  4.5454545  3.5714286  2.2727273  1.2987013  0.3246753
## [19]  0.6493506  0.6493506  0.6493506  0.0000000  0.3246753  0.0000000
## [25]  0.0000000  0.0000000  0.0000000  0.3246753
##
## $mids
##  [1] 0.035 0.045 0.055 0.065 0.075 0.085 0.095 0.105 0.115 0.125 0.135
## [12] 0.145 0.155 0.165 0.175 0.185 0.195 0.205 0.215 0.225 0.235 0.245
## [23] 0.255 0.265 0.275 0.285 0.295 0.305
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[2]]
## $breaks
##  [1] 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17
## [15] 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30 0.31
## [29] 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
##
## $counts
##  [1]  1  3  6  6  8 10 19 17 11 11 14 20 20 13 23 17 14 14 11  5  5 11  6
## [24]  8  6  6  1  7  6  2  2  1  0  1  1  0  0  0  0  0  2
##
## $density
##  [1] 0.3246753 0.9740260 1.9480519 1.9480519 2.5974026 3.2467532 6.1688312
##  [8] 5.5194805 3.5714286 3.5714286 4.5454545 6.4935065 6.4935065 4.2207792
## [15] 7.4675325 5.5194805 4.5454545 4.5454545 3.5714286 1.6233766 1.6233766
## [22] 3.5714286 1.9480519 2.5974026 1.9480519 1.9480519 0.3246753 2.2727273
## [29] 1.9480519 0.6493506 0.6493506 0.3246753 0.0000000 0.3246753 0.3246753
## [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.6493506
##
## $mids
##  [1] 0.045 0.055 0.065 0.075 0.085 0.095 0.105 0.115 0.125 0.135 0.145
## [12] 0.155 0.165 0.175 0.185 0.195 0.205 0.215 0.225 0.235 0.245 0.255
## [23] 0.265 0.275 0.285 0.295 0.305 0.315 0.325 0.335 0.345 0.355 0.365
## [34] 0.375 0.385 0.395 0.405 0.415 0.425 0.435 0.445
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
```

```
##
## attr(,"class")
## [1] "histogram"
##
## [[3]]
## $breaks
##  [1] 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19 0.20 0.21
## [15] 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30 0.31 0.32 0.33 0.34 0.35
##
## $counts
##  [1]  1  3  6  7 15 20 24 16 32 20 20 17 16 20 15 11 12 12  8  7  8  3  6
## [24]  2  4  2  1
##
## $density
##  [1]  0.3246753  0.9740260  1.9480519  2.2727273  4.8701299  6.4935065
##  [7]  7.7922078  5.1948052 10.3896104  6.4935065  6.4935065  5.5194805
## [13]  5.1948052  6.4935065  4.8701299  3.5714286  3.8961039  3.8961039
## [19]  2.5974026  2.2727273  2.5974026  0.9740260  1.9480519  0.6493506
## [25]  1.2987013  0.6493506  0.3246753
##
## $mids
##  [1] 0.085 0.095 0.105 0.115 0.125 0.135 0.145 0.155 0.165 0.175 0.185
## [12] 0.195 0.205 0.215 0.225 0.235 0.245 0.255 0.265 0.275 0.285 0.295
## [23] 0.305 0.315 0.325 0.335 0.345
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[4]]
## $breaks
##  [1] 0.00 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16 0.18 0.20 0.22 0.24 0.26
## [15] 0.28 0.30 0.32 0.34 0.36 0.38 0.40 0.42 0.44 0.46 0.48 0.50 0.52 0.54
## [29] 0.56 0.58 0.60 0.62 0.64 0.66 0.68
##
## $counts
##  [1]  1  2  1  3  0  7 11 15 14 18  6 12 13 21 14 18 15 12 21 16 14 23 10
## [24]  6  8  4  5  5  6  2  3  1  0  1
##
## $density
##  [1] 0.1623377 0.3246753 0.1623377 0.4870130 0.0000000 1.1363636 1.7857143
##  [8] 2.4350649 2.2727273 2.9220779 0.9740260 1.9480519 2.1103896 3.4090909
## [15] 2.2727273 2.9220779 2.4350649 1.9480519 3.4090909 2.5974026 2.2727273
## [22] 3.7337662 1.6233766 0.9740260 1.2987013 0.6493506 0.8116883 0.8116883
## [29] 0.9740260 0.3246753 0.4870130 0.1623377 0.0000000 0.1623377
##
## $mids
##  [1] 0.01 0.03 0.05 0.07 0.09 0.11 0.13 0.15 0.17 0.19 0.21 0.23 0.25 0.27
## [15] 0.29 0.31 0.33 0.35 0.37 0.39 0.41 0.43 0.45 0.47 0.49 0.51 0.53 0.55
```

```
## [29] 0.57 0.59 0.61 0.63 0.65 0.67
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[5]]
## $breaks
##  [1] 0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13
## [15] 0.14 0.15 0.16 0.17 0.18 0.19 0.20 0.21 0.22
##
## $counts
##  [1]  1  1  1  1  8 16 25 36 51 32 48 25 14 12  6 16  2  6  3  2  1  1
##
## $density
##  [1]  0.3246753  0.3246753  0.3246753  0.3246753  2.5974026  5.1948052
##  [7]  8.1168831 11.6883117 16.5584416 10.3896104 15.5844156  8.1168831
## [13]  4.5454545  3.8961039  1.9480519  5.1948052  0.6493506  1.9480519
## [19]  0.9740260  0.6493506  0.3246753  0.3246753
##
## $mids
##  [1] 0.005 0.015 0.025 0.035 0.045 0.055 0.065 0.075 0.085 0.095 0.105
## [12] 0.115 0.125 0.135 0.145 0.155 0.165 0.175 0.185 0.195 0.205 0.215
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[6]]
## $breaks
##  [1] 0.000 0.005 0.010 0.015 0.020 0.025 0.030 0.035 0.040 0.045 0.050
## [12] 0.055 0.060 0.065 0.070 0.075 0.080 0.085 0.090 0.095 0.100 0.105
## [23] 0.110 0.115 0.120 0.125 0.130 0.135 0.140 0.145 0.150 0.155 0.160
## [34] 0.165 0.170 0.175 0.180 0.185 0.190
##
## $counts
##  [1] 176  12  15  11  19   9   6  10   4   5   4   4   2   3   1   5   0
## [18]   1   6   1   1   2   0   0   3   0   1   0   0   1   2   0   1   0
## [35]   1   0   0   2
##
## $density
##  [1] 114.2857143   7.7922078   9.7402597   7.1428571  12.3376623
##  [6]   5.8441558   3.8961039   6.4935065   2.5974026   3.2467532
## [11]   2.5974026   2.5974026   1.2987013   1.9480519   0.6493506
```

```
## [16]   3.2467532   0.0000000   0.6493506   3.8961039   0.6493506
## [21]   0.6493506   1.2987013   0.0000000   0.0000000   1.9480519
## [26]   0.0000000   0.6493506   0.0000000   0.0000000   0.6493506
## [31]   1.2987013   0.0000000   0.6493506   0.0000000   0.6493506
## [36]   0.0000000   0.0000000   1.2987013
##
## $mids
##  [1] 0.0025 0.0075 0.0125 0.0175 0.0225 0.0275 0.0325 0.0375 0.0425 0.0475
## [11] 0.0525 0.0575 0.0625 0.0675 0.0725 0.0775 0.0825 0.0875 0.0925 0.0975
## [21] 0.1025 0.1075 0.1125 0.1175 0.1225 0.1275 0.1325 0.1375 0.1425 0.1475
## [31] 0.1525 0.1575 0.1625 0.1675 0.1725 0.1775 0.1825 0.1875
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[7]]
## $breaks
##  [1] 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16 0.18 0.20 0.22 0.24 0.26 0.28
## [15] 0.30 0.32 0.34 0.36 0.38 0.40 0.42 0.44 0.46
##
## $counts
##  [1] 10 64 70 46 25 18 11 21  9 14  5  2  4  2  1  4  0  1  0  0  0  1
##
## $density
##  [1]  1.6233766 10.3896104 11.3636364  7.4675325  4.0584416  2.9220779
##  [7]  1.7857143  3.4090909  1.4610390  2.2727273  0.8116883  0.3246753
## [13]  0.6493506  0.3246753  0.1623377  0.6493506  0.0000000  0.1623377
## [19]  0.0000000  0.0000000  0.0000000  0.1623377
##
## $mids
##  [1] 0.03 0.05 0.07 0.09 0.11 0.13 0.15 0.17 0.19 0.21 0.23 0.25 0.27 0.29
## [15] 0.31 0.33 0.35 0.37 0.39 0.41 0.43 0.45
##
## $xname
## [1] "pfas_male[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```

```
## check the NK vs outcome, whether there is a dichotomous
## pattern
plot(pfas_male$NK, pfas_male$Leptin_actual__ng_ml_)
```




```
paste("It seems like the slope of this outcome vs NK is 0")
```

```
## [1] "It seems like the slope of this outcome vs NK is 0"
```

```
## Based on histograms
paste(Outcomes[-c(1, 2)], " should be log10 transformed. ", sep = "")
```

```
## [1] "Chol_IPV3 should be log10 transformed. "
## [2] "FFA_IPV3 should be log10 transformed. "
## [3] "Gluc_IPV3 should be log10 transformed. "
## [4] "HDL_IPV3 should be log10 transformed. "
## [5] "Insu_IPV3 should be log10 transformed. "
## [6] "Trig_IPV3 should be log10 transformed. "
## [7] "Leptin_actual__ng_ml_ should be log10 transformed. "
```

```
## # the regression summary table for log10 outcomes
lapply(Outcomes[3:9], function(x) {
    cpg_reg(log10(pfas_male[, x]), pfas_male, c(x, "Male log10"),
        15)
})
```

```
## [[1]]
##
##
## Table: Top10 CpGs for Chol_IPV3 by p.value (Sample Size = 290) Top10 CpGs for Male log10 by p.value
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ---- ----------- ---------- ----------- ------------ -------- -----------
## 254   cg22692511      0.0521      0.0174        2.9882   0.0031   0.5880000
## 271   cg08162803      0.1084      0.0391        2.7697   0.0060   0.5880000
## 95    cg17850055     -0.2039      0.0740       -2.7537   0.0063   0.5880000
```

```
## 112   cg24366087     -0.0930      0.0353       -2.6337    0.0089   0.5880000
## 266   cg12857407      0.0803      0.0309        2.6013    0.0098   0.5880000
## 69    cg04168590      0.1649      0.0678        2.4322    0.0156   0.7328571
## 170   cg19554564     -0.1028      0.0429       -2.3986    0.0171   0.7328571
## 28    cg12872489     -0.0494      0.0224       -2.2082    0.0280   0.9450593
## 49    cg16725984      0.0380      0.0174        2.1774    0.0303   0.9450593
## 188   cg17500055     -0.0548      0.0260       -2.1106    0.0357   0.9450593
## 279   cg17132124      0.0543      0.0269        2.0178    0.0446   0.9450593
## 211   cg00893875      0.0228      0.0115        1.9871    0.0479   0.9450593
## 183   cg07105947     -0.0320      0.0162       -1.9805    0.0486   0.9450593
## 278   cg15565231      0.0986      0.0506        1.9495    0.0522   0.9450593
## 58    cg09887862      0.0324      0.0168        1.9312    0.0545   0.9450593
##
## [[2]]
##
##
## Table: Top10 CpGs for FFA_IPV3 by p.value (Sample Size = 268) Top10 CpGs for Male log10 by p.value (S
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  -----------  ---------  ----------  ------------  --------  ----------
## 96    cg21215576      0.1471      0.0490        3.0009    0.0030   0.7033333
## 166   cg26275850      0.1911      0.0726        2.6312    0.0090   0.7033333
## 156   cg13858106      0.1891      0.0750        2.5225    0.0123   0.7033333
## 163   cg26074111     -0.2017      0.0830       -2.4295    0.0158   0.7033333
## 4     cg21853587     -0.2427      0.1009       -2.4048    0.0169   0.7033333
## 148   cg13598480      0.1532      0.0657        2.3314    0.0205   0.7033333
## 162   cg18602114     -0.1145      0.0491       -2.3321    0.0205   0.7033333
## 126   cg05390685     -0.1180      0.0508       -2.3206    0.0211   0.7033333
## 257   cg16529483      0.0588      0.0253        2.3198    0.0211   0.7033333
## 240   cg16375541      0.2518      0.1152        2.1857    0.0298   0.7414286
## 113   cg22685502      0.1820      0.0837        2.1740    0.0306   0.7414286
## 250   cg20732198     -0.1131      0.0525       -2.1526    0.0323   0.7414286
## 9     cg20510724      0.2494      0.1161        2.1488    0.0326   0.7414286
## 119   cg00438284     -0.1249      0.0588       -2.1246    0.0346   0.7414286
## 54    cg19529074     -0.1445      0.0706       -2.0468    0.0417   0.7470000
##
## [[3]]
##
##
## Table: Top10 CpGs for Gluc_IPV3 by p.value (Sample Size = 298) Top10 CpGs for Male log10 by p.value
##
##       names         Estimate   Std.Error   t.statistic   p.value        FDR
## ----  -----------  ---------  ----------  ------------  --------  ---------
## 145   cg06404838      0.1502      0.0400        3.7533    0.0002   0.060000
## 16    cg06873590     -0.1780      0.0684       -2.6000    0.0098   0.834000
## 27    cg17519749      0.0546      0.0214        2.5468    0.0114   0.834000
## 248   cg11196848     -0.0664      0.0263       -2.5232    0.0122   0.834000
## 217   cg01816336     -0.0974      0.0393       -2.4762    0.0139   0.834000
## 150   cg14163408      0.0543      0.0231        2.3488    0.0195   0.860000
## 153   cg01060409      0.1307      0.0571        2.2875    0.0229   0.860000
## 283   cg11144990      0.0717      0.0315        2.2777    0.0235   0.860000
## 189   cg13382072      0.0545      0.0245        2.2211    0.0271   0.860000
## 278   cg15565231     -0.0938      0.0434       -2.1594    0.0317   0.860000
## 59    cg20324199      0.0513      0.0239        2.1475    0.0326   0.860000
```

```
## 135   cg17171260     -0.0694      0.0327       -2.1256    0.0344   0.860000
## 77    cg23478547      0.0360      0.0175        2.0578    0.0405   0.890625
## 93    cg23054637      0.1109      0.0543        2.0430    0.0420   0.890625
## 250   cg20732198      0.0465      0.0233        1.9955    0.0469   0.890625
##
## [[4]]
##
##
## Table: Top10 CpGs for HDL_IPV3 by p.value (Sample Size = 263) Top10 CpGs for Male log10 by p.value (S
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  -----------  ---------  ----------  ------------  --------  ----------
## 42    cg15355952     -0.1053      0.0334       -3.1566    0.0018   0.3300000
## 49    cg16725984      0.0523      0.0169        3.0953    0.0022   0.3300000
## 236   cg04061372      0.0315      0.0110        2.8744    0.0044   0.4400000
## 271   cg08162803      0.1055      0.0383        2.7542    0.0063   0.4725000
## 281   cg22946159     -0.1414      0.0548       -2.5802    0.0104   0.5571429
## 120   cg22700790      0.0516      0.0212        2.4355    0.0156   0.5571429
## 230   cg22950210      0.0672      0.0277        2.4238    0.0161   0.5571429
## 211   cg00893875      0.0281      0.0116        2.4121    0.0166   0.5571429
## 290   cg00798281     -0.0632      0.0263       -2.4000    0.0171   0.5571429
## 286   cg03989507      0.0727      0.0311        2.3353    0.0203   0.5571429
## 145   cg06404838     -0.1087      0.0476       -2.2828    0.0233   0.5571429
## 296   cg19059839     -0.0322      0.0141       -2.2728    0.0239   0.5571429
## 170   cg19554564     -0.0974      0.0431       -2.2586    0.0248   0.5571429
## 26    cg03452190      0.1067      0.0476        2.2400    0.0260   0.5571429
## 216   cg06230206     -0.0640      0.0292       -2.1896    0.0295   0.5629412
##
## [[5]]
##
##
## Table: Top10 CpGs for Insu_IPV3 by p.value (Sample Size = 285) Top10 CpGs for Male log10 by p.value
##
##       names         Estimate   Std.Error   t.statistic   p.value       FDR
## ----  -----------  ---------  ----------  ------------  --------  --------
## 195   cg23785275     -0.0556      0.0194       -2.8653    0.0045   0.75000
## 36    cg11302884     -0.2737      0.1015       -2.6959    0.0075   0.75000
## 169   cg17501712      0.2207      0.0819        2.6951    0.0075   0.75000
## 86    cg02648057     -0.1260      0.0492       -2.5587    0.0110   0.82500
## 191   cg25138412     -0.1068      0.0442       -2.4169    0.0163   0.97800
## 19    cg00128386     -0.2761      0.1193       -2.3139    0.0214   0.99625
## 278   cg15565231     -0.2468      0.1145       -2.1553    0.0320   0.99625
## 61    cg04569429      0.1292      0.0601        2.1487    0.0325   0.99625
## 223   cg03786743     -0.1351      0.0632       -2.1356    0.0336   0.99625
## 291   cg09630142      0.1203      0.0567        2.1214    0.0348   0.99625
## 199   cg21261158     -0.2298      0.1137       -2.0213    0.0442   0.99625
## 233   cg02887248     -0.2659      0.1364       -1.9501    0.0522   0.99625
## 29    cg06814892      0.1862      0.0964        1.9323    0.0544   0.99625
## 251   cg00442112     -0.0505      0.0262       -1.9271    0.0550   0.99625
## 122   cg13344961      0.1590      0.0839        1.8959    0.0590   0.99625
##
## [[6]]
##
##
```

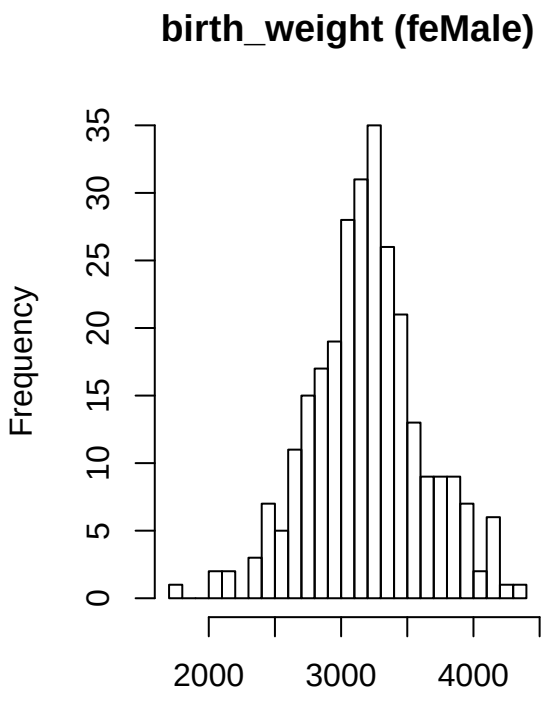
Table: Top10 CpGs for Trig_IPV3 by p.value (Sample Size = 287) Top10 CpGs for Male log10 by p.value
##
| | names | Estimate | Std.Error | t.statistic | p.value | FDR
--- | --- | --- | --- | --- | --- | --- | ---
291 | cg09630142 | -0.1392 | 0.0440 | -3.1634 | 0.0017 | 0.5100000
237 | cg21380181 | -0.1321 | 0.0473 | -2.7913 | 0.0056 | 0.6100000
190 | cg10832304 | 0.0784 | 0.0293 | 2.6711 | 0.0080 | 0.6100000
82 | cg18373158 | 0.1302 | 0.0507 | 2.5682 | 0.0108 | 0.6100000
197 | cg14349977 | -0.0827 | 0.0324 | -2.5531 | 0.0112 | 0.6100000
121 | cg23241335 | 0.1569 | 0.0622 | 2.5218 | 0.0122 | 0.6100000
240 | cg16375541 | 0.2540 | 0.1049 | 2.4217 | 0.0161 | 0.6736364
87 | cg10397322 | 0.1802 | 0.0773 | 2.3317 | 0.0204 | 0.6736364
103 | cg04029532 | -0.2042 | 0.0879 | -2.3229 | 0.0209 | 0.6736364
77 | cg23478547 | 0.0825 | 0.0361 | 2.2852 | 0.0231 | 0.6736364
15 | cg05564760 | 0.0898 | 0.0398 | 2.2579 | 0.0247 | 0.6736364
16 | cg06873590 | -0.3116 | 0.1430 | -2.1786 | 0.0302 | 0.7135714
254 | cg22692511 | 0.0675 | 0.0313 | 2.1587 | 0.0317 | 0.7135714
198 | cg09825146 | -0.0815 | 0.0381 | -2.1395 | 0.0333 | 0.7135714
49 | cg16725984 | -0.0638 | 0.0312 | -2.0481 | 0.0415 | 0.7994118
##
[[7]]
##
##
Table: Top10 CpGs for Leptin_actual__ng_ml_ by p.value (Sample Size = 254) Top10 CpGs for Male log10
##
| | names | Estimate | Std.Error | t.statistic | p.value | FDR
--- | --- | --- | --- | --- | --- | --- | ---
49 | cg16725984 | -0.2968 | 0.0614 | -4.8354 | 0.0000 | 0.0000000
209 | cg24280832 | 0.4023 | 0.1113 | 3.6151 | 0.0004 | 0.0600000
84 | cg05524354 | 0.3002 | 0.1002 | 2.9968 | 0.0030 | 0.2640000
116 | cg21183455 | 0.1961 | 0.0681 | 2.8794 | 0.0043 | 0.2640000
42 | cg15355952 | 0.3563 | 0.1238 | 2.8775 | 0.0044 | 0.2640000
19 | cg00128386 | -0.5118 | 0.2001 | -2.5577 | 0.0112 | 0.5600000
158 | cg13973086 | 0.1817 | 0.0775 | 2.3461 | 0.0198 | 0.8383784
104 | cg10119082 | -0.1604 | 0.0706 | -2.2698 | 0.0241 | 0.8383784
214 | cg20505445 | -0.1758 | 0.0816 | -2.1555 | 0.0321 | 0.8383784
185 | cg07716131 | 0.3560 | 0.1703 | 2.0904 | 0.0376 | 0.8383784
143 | cg15486454 | 0.1922 | 0.0942 | 2.0408 | 0.0424 | 0.8383784
71 | cg16672637 | 0.5533 | 0.2738 | 2.0209 | 0.0444 | 0.8383784
178 | cg10403849 | 0.1702 | 0.0847 | 2.0091 | 0.0456 | 0.8383784
133 | cg23903244 | -0.0627 | 0.0313 | -1.9995 | 0.0467 | 0.8383784
278 | cg15565231 | -0.3670 | 0.1875 | -1.9570 | 0.0515 | 0.8383784

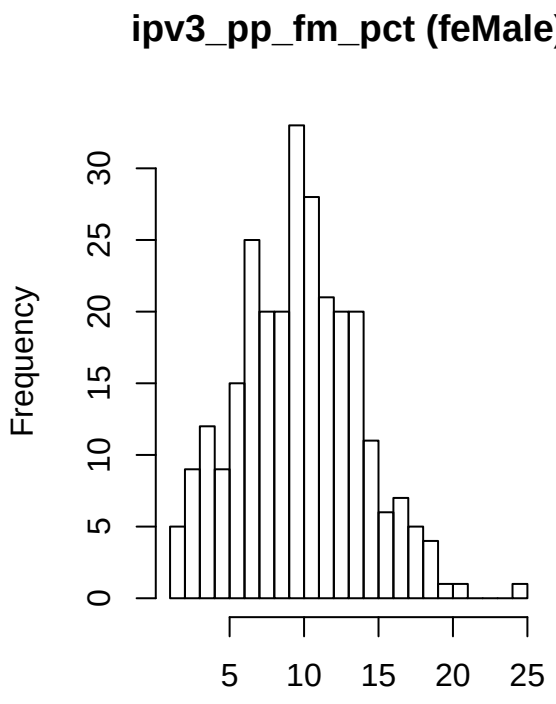
```
lapply(Outcomes[1:2], function(x) {
    cpg_reg(log10(pfas_male[, x]), pfas_male, c(x, "Male log10"),
        15)
})
```

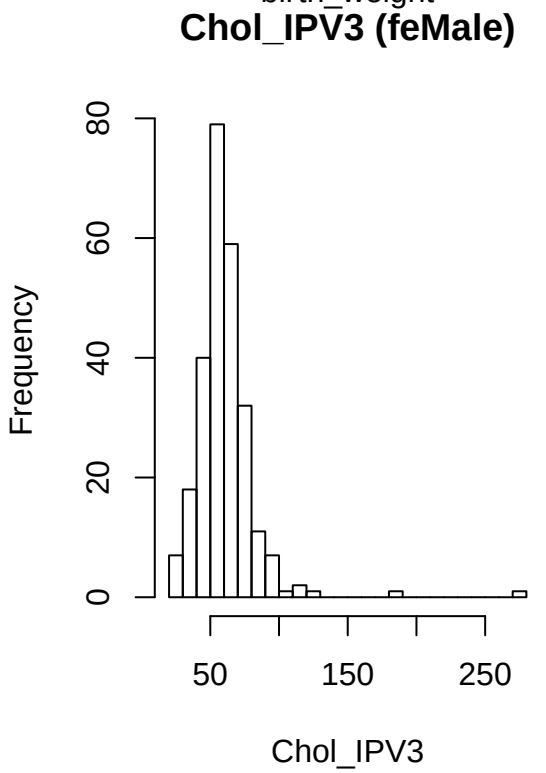
[[1]]
##
##
Table: Top10 CpGs for birth_weight by p.value (Sample Size = 308) Top10 CpGs for Male log10 by p.valu
##
| | names | Estimate | Std.Error | t.statistic | p.value | FDR
--- | --- | --- | --- | --- | --- | --- | ---

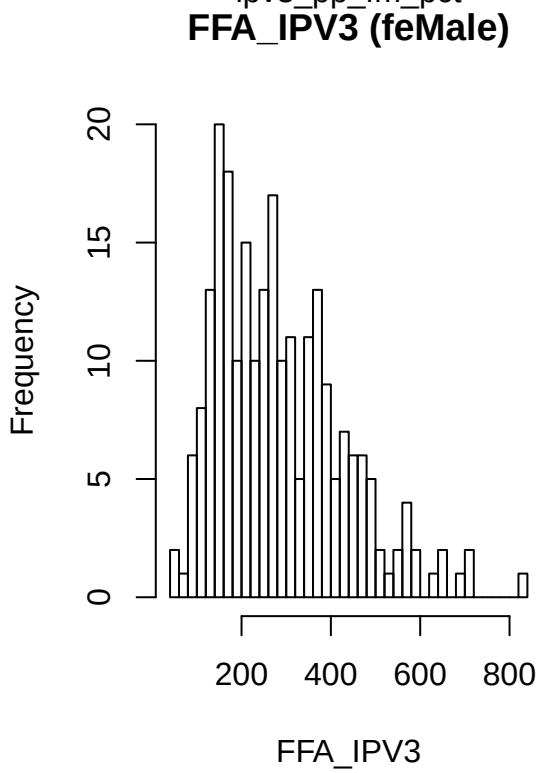
```
## 49    cg16725984     -0.0318      0.0083       -3.8234    0.0002   0.0600000
## 184   cg25137968      0.0453      0.0163        2.7732    0.0059   0.4680000
## 204   cg15045292      0.0216      0.0079        2.7389    0.0065   0.4680000
## 67    cg25195288      0.0642      0.0240        2.6776    0.0078   0.4680000
## 167   cg16495448     -0.0414      0.0154       -2.6794    0.0078   0.4680000
## 71    cg16672637      0.0831      0.0350        2.3752    0.0182   0.6980769
## 117   cg21209948     -0.0165      0.0070       -2.3387    0.0200   0.6980769
## 196   cg03015672      0.0339      0.0145        2.3288    0.0205   0.6980769
## 83    cg20741567      0.0630      0.0275        2.2864    0.0229   0.6980769
## 22    cg00784263      0.0398      0.0175        2.2726    0.0238   0.6980769
## 115   cg10436026     -0.0389      0.0178       -2.1771    0.0303   0.6980769
## 160   cg07338658      0.0276      0.0128        2.1589    0.0317   0.6980769
## 131   cg12271419     -0.0638      0.0297       -2.1466    0.0326   0.6980769
## 190   cg10832304     -0.0164      0.0079       -2.0684    0.0395   0.6980769
## 57    cg23206463     -0.0152      0.0074       -2.0670    0.0396   0.6980769
##
## [[2]]
##
##
## Table: Top10 CpGs for ipv3_pp_fm_pct by p.value (Sample Size = 295) Top10 CpGs for Male log10 by p.va
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  -----------  ---------  ----------  ------------  --------  ----------
## 203   cg15066197     -0.1912      0.0688       -2.7785    0.0058   0.8823529
## 190   cg10832304     -0.0821      0.0306       -2.6787    0.0078   0.8823529
## 112   cg24366087     -0.1565      0.0645       -2.4249    0.0159   0.8823529
## 282   cg08732300      0.1141      0.0479        2.3807    0.0179   0.8823529
## 4     cg21853587      0.2218      0.0987        2.2474    0.0254   0.8823529
## 292   cg04804814      0.1903      0.0858        2.2186    0.0273   0.8823529
## 255   cg00634984     -0.0705      0.0318       -2.2161    0.0275   0.8823529
## 23    cg22305268     -0.2103      0.0969       -2.1712    0.0307   0.8823529
## 184   cg25137968      0.1395      0.0642        2.1725    0.0307   0.8823529
## 139   cg08743751      0.1225      0.0569        2.1519    0.0323   0.8823529
## 233   cg02887248     -0.2419      0.1134       -2.1327    0.0338   0.8823529
## 257   cg16529483     -0.0499      0.0246       -2.0235    0.0440   0.8823529
## 145   cg06404838     -0.1794      0.0888       -2.0203    0.0443   0.8823529
## 173   cg23506842      0.1186      0.0590        2.0090    0.0455   0.8823529
## 205   cg12149692     -0.0947      0.0474       -2.0003    0.0464   0.8823529
```

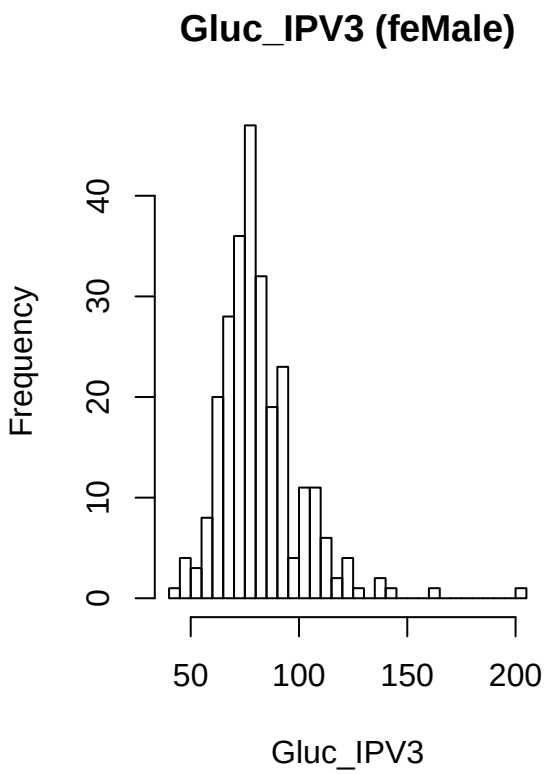
```
## raw outcomes
par(mfrow = c(1, 2))
lapply(Outcomes, function(x) {
    hist(pfas_female[, x], freq = TRUE, breaks = 30, main = paste(x,
        " (feMale)", sep = ""), xlab = x)
})
```

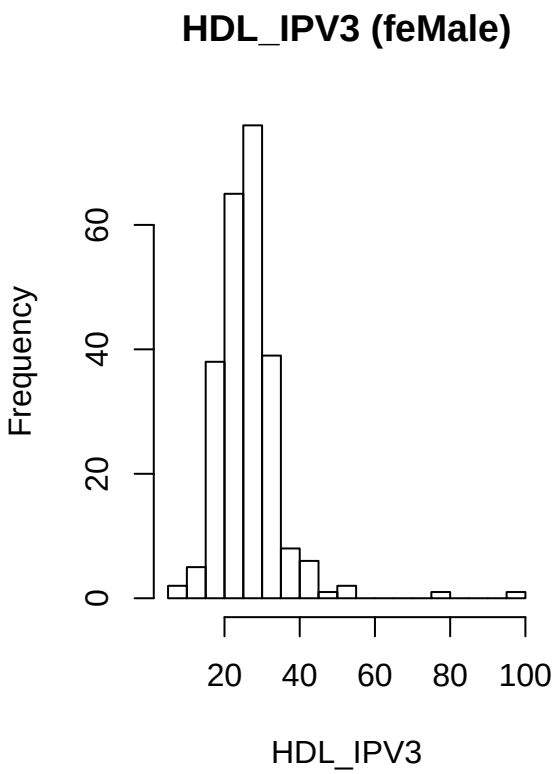

birth_weight (feMale)
Frequency
0
5
10
15
20
25
30
35
2000
3000
4000
birth_weight

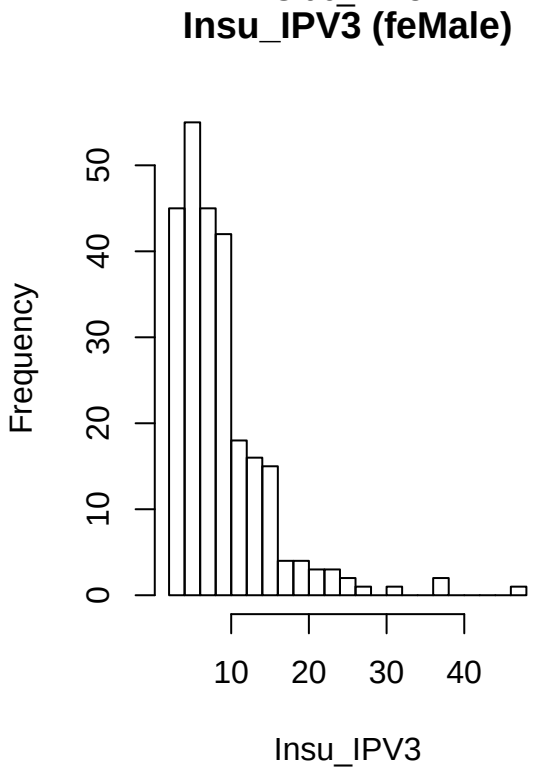

ipv3_pp_fm_pct (feMale)
Frequency
0
5
10
15
20
25
30
5
10
15
20
25
ipv3_pp_fm_pct

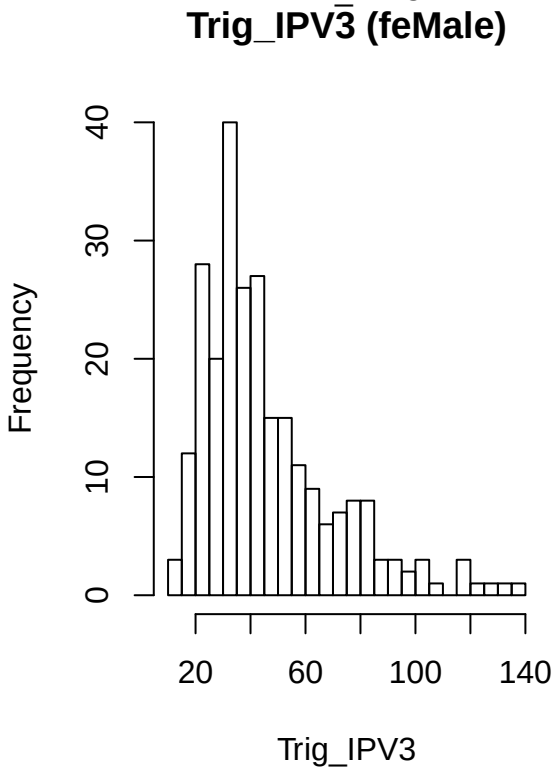

Chol_IPV3 (feMale)
Frequency
0
20
40
60
80
50
150
250
Chol_IPV3


FFA_IPV3 (feMale)
Frequency
0
5
10
15
20
200
400
600
800
FFA_IPV3










```
## [[1]]
## $breaks
##  [1] 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000
## [15] 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400
##
## $counts
```

```
##  [1]  1  0  0  2  2  0  3  7  5 11 15 17 19 28 31 35 26 21 13  9  9  9  7
## [24]  2  6  1  1
##
## $density
##  [1] 3.571429e-05 0.000000e+00 0.000000e+00 7.142857e-05 7.142857e-05
##  [6] 0.000000e+00 1.071429e-04 2.500000e-04 1.785714e-04 3.928571e-04
## [11] 5.357143e-04 6.071429e-04 6.785714e-04 1.000000e-03 1.107143e-03
## [16] 1.250000e-03 9.285714e-04 7.500000e-04 4.642857e-04 3.214286e-04
## [21] 3.214286e-04 3.214286e-04 2.500000e-04 7.142857e-05 2.142857e-04
## [26] 3.571429e-05 3.571429e-05
##
## $mids
##  [1] 1750 1850 1950 2050 2150 2250 2350 2450 2550 2650 2750 2850 2950 3050
## [15] 3150 3250 3350 3450 3550 3650 3750 3850 3950 4050 4150 4250 4350
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[2]]
## $breaks
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
## [24] 24 25
##
## $counts
##  [1]  5  9 12  9 15 25 20 20 33 28 21 20 20 11  6  7  5  4  1  1  0  0  0
## [24]  1
##
## $density
##  [1] 0.018315018 0.032967033 0.043956044 0.032967033 0.054945055
##  [6] 0.091575092 0.073260073 0.073260073 0.120879121 0.102564103
## [11] 0.076923077 0.073260073 0.073260073 0.040293040 0.021978022
## [16] 0.025641026 0.018315018 0.014652015 0.003663004 0.003663004
## [21] 0.000000000 0.000000000 0.000000000 0.003663004
##
## $mids
##  [1]  1.5  2.5  3.5  4.5  5.5  6.5  7.5  8.5  9.5 10.5 11.5 12.5 13.5 14.5
## [15] 15.5 16.5 17.5 18.5 19.5 20.5 21.5 22.5 23.5 24.5
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[3]]
```

```
## $breaks
##  [1]  20  30  40  50  60  70  80  90 100 110 120 130 140 150 160 170 180
## [18] 190 200 210 220 230 240 250 260 270 280
##
## $counts
##  [1]  7 18 40 79 59 32 11  7  1  2  1  0  0  0  0  0  1  0  0  0  0  0  0
## [24]  0  0  1
##
## $density
##  [1] 0.0027027027 0.0069498069 0.0154440154 0.0305019305 0.0227799228
##  [6] 0.0123552124 0.0042471042 0.0027027027 0.0003861004 0.0007722008
## [11] 0.0003861004 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [16] 0.0000000000 0.0003861004 0.0000000000 0.0000000000 0.0000000000
## [21] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0000000000
## [26] 0.0003861004
##
## $mids
##  [1]  25  35  45  55  65  75  85  95 105 115 125 135 145 155 165 175 185
## [18] 195 205 215 225 235 245 255 265 275
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[4]]
## $breaks
##  [1]  40  60  80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
## [18] 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700
## [35] 720 740 760 780 800 820 840
##
## $counts
##  [1]  2  1  6  8 13 20 18 10 15 10 13 17 10 11  5 11 13  9  5  7  6  6  5
## [24]  2  1  2  4  2  0  1  2  0  1  2  0  0  0  0  0  1
##
## $density
##  [1] 0.0004184100 0.0002092050 0.0012552301 0.0016736402 0.0027196653
##  [6] 0.0041841004 0.0037656904 0.0020920502 0.0031380753 0.0020920502
## [11] 0.0027196653 0.0035564854 0.0020920502 0.0023012552 0.0010460251
## [16] 0.0023012552 0.0027196653 0.0018828452 0.0010460251 0.0014644351
## [21] 0.0012552301 0.0012552301 0.0010460251 0.0004184100 0.0002092050
## [26] 0.0004184100 0.0008368201 0.0004184100 0.0000000000 0.0002092050
## [31] 0.0004184100 0.0000000000 0.0002092050 0.0004184100 0.0000000000
## [36] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0002092050
##
## $mids
##  [1]  50  70  90 110 130 150 170 190 210 230 250 270 290 310 330 350 370
## [18] 390 410 430 450 470 490 510 530 550 570 590 610 630 650 670 690 710
## [35] 730 750 770 790 810 830
##
```

```
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[5]]
## $breaks
##  [1]  40  45  50  55  60  65  70  75  80  85  90  95 100 105 110 115 120
## [18] 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205
##
## $counts
##  [1]  1  4  3  8 20 28 36 47 32 19 23  4 11 11  6  2  4  1  0  2  1  0  0
## [24]  0  1  0  0  0  0  0  0  0  1
##
## $density
##  [1] 0.000754717 0.003018868 0.002264151 0.006037736 0.015094340
##  [6] 0.021132075 0.027169811 0.035471698 0.024150943 0.014339623
## [11] 0.017358491 0.003018868 0.008301887 0.008301887 0.004528302
## [16] 0.001509434 0.003018868 0.000754717 0.000000000 0.001509434
## [21] 0.000754717 0.000000000 0.000000000 0.000000000 0.000754717
## [26] 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000
## [31] 0.000000000 0.000000000 0.000754717
##
## $mids
##  [1]  42.5  47.5  52.5  57.5  62.5  67.5  72.5  77.5  82.5  87.5  92.5
## [12]  97.5 102.5 107.5 112.5 117.5 122.5 127.5 132.5 137.5 142.5 147.5
## [23] 152.5 157.5 162.5 167.5 172.5 177.5 182.5 187.5 192.5 197.5 202.5
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[6]]
## $breaks
##  [1]   5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85
## [18]  90  95 100
##
## $counts
##  [1]  2  5 38 65 76 39  8  6  1  2  0  0  0  0  1  0  0  0  1
##
## $density
##  [1] 0.0016393443 0.0040983607 0.0311475410 0.0532786885 0.0622950820
##  [6] 0.0319672131 0.0065573770 0.0049180328 0.0008196721 0.0016393443
## [11] 0.0000000000 0.0000000000 0.0000000000 0.0000000000 0.0008196721
## [16] 0.0000000000 0.0000000000 0.0000000000 0.0008196721
```

```
##
## $mids
##  [1]  7.5 12.5 17.5 22.5 27.5 32.5 37.5 42.5 47.5 52.5 57.5 62.5 67.5 72.5
## [15] 77.5 82.5 87.5 92.5 97.5
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[7]]
## $breaks
##  [1]  2  4  6  8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
## [24] 48
##
## $counts
##  [1] 45 55 45 42 18 16 15  4  4  3  3  2  1  0  1  0  0  2  0  0  0  0  1
##
## $density
##  [1] 0.087548638 0.107003891 0.087548638 0.081712062 0.035019455
##  [6] 0.031128405 0.029182879 0.007782101 0.007782101 0.005836576
## [11] 0.005836576 0.003891051 0.001945525 0.000000000 0.001945525
## [16] 0.000000000 0.000000000 0.003891051 0.000000000 0.000000000
## [21] 0.000000000 0.000000000 0.001945525
##
## $mids
##  [1]  3  5  7  9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[8]]
## $breaks
##  [1]  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90
## [18]  95 100 105 110 115 120 125 130 135 140
##
## $counts
##  [1]  3 12 28 20 40 26 27 15 15 11  9  6  7  8  8  3  3  2  3  1  0  3  1
## [24]  1  1  1
##
## $density
##  [1] 0.0023622047 0.0094488189 0.0220472441 0.0157480315 0.0314960630
##  [6] 0.0204724409 0.0212598425 0.0118110236 0.0118110236 0.0086614173
## [11] 0.0070866142 0.0047244094 0.0055118110 0.0062992126 0.0062992126
```

```
## [16] 0.0023622047 0.0023622047 0.0015748031 0.0023622047 0.0007874016
## [21] 0.0000000000 0.0023622047 0.0007874016 0.0007874016 0.0007874016
## [26] 0.0007874016
##
## $mids
##  [1]  12.5  17.5  22.5  27.5  32.5  37.5  42.5  47.5  52.5  57.5  62.5
## [12]  67.5  72.5  77.5  82.5  87.5  92.5  97.5 102.5 107.5 112.5 117.5
## [23] 122.5 127.5 132.5 137.5
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
##
## [[9]]
## $breaks
##  [1]   0   5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80
## [18]  85  90  95 100 105 110 115 120 125 130
##
## $counts
##  [1] 26 49 39 32 20 19  7 14  2  4  5  2  2  0  1  0  2  0  0  1  1  0  1
## [24]  0  0  1
##
## $density
##  [1] 0.022807018 0.042982456 0.034210526 0.028070175 0.017543860
##  [6] 0.016666667 0.006140351 0.012280702 0.001754386 0.003508772
## [11] 0.004385965 0.001754386 0.001754386 0.000000000 0.000877193
## [16] 0.000000000 0.001754386 0.000000000 0.000000000 0.000877193
## [21] 0.000877193 0.000000000 0.000877193 0.000000000 0.000000000
## [26] 0.000877193
##
## $mids
##  [1]   2.5   7.5  12.5  17.5  22.5  27.5  32.5  37.5  42.5  47.5  52.5
## [12]  57.5  62.5  67.5  72.5  77.5  82.5  87.5  92.5  97.5 102.5 107.5
## [23] 112.5 117.5 122.5 127.5
##
## $xname
## [1] "pfas_female[, x]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```

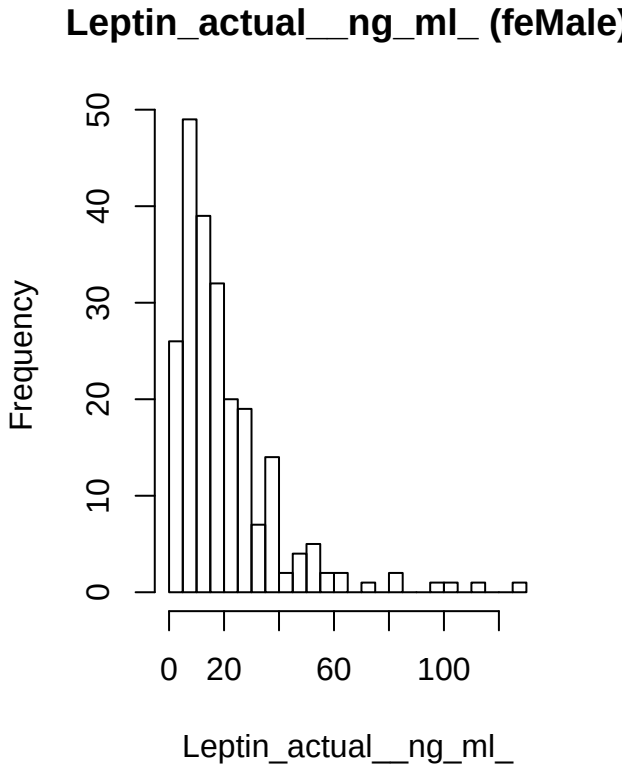
```
## log10 of feMale
lapply(Outcomes, function(x) {
    cpg_reg(log10(pfas_female[, x]), pfas_female, c(x, "Female log10"),
        15)
})
```

[[1]]
##
##
Table: Top10 CpGs for birth_weight by p.value (Sample Size = 280) Top10 CpGs for Female log10 by p.va
##
names   Estimate   Std.Error   t.statistic   p.value   FDR
---- ----------- --------- ---------- ------------ -------- -------
49   cg16725984   -0.0357   0.0082   -4.3657   0.0000   0.0000
27   cg17519749   0.0442   0.0121   3.6486   0.0003   0.0450
248   cg11196848   0.0449   0.0142   3.1669   0.0017   0.1700
71   cg16672637   0.0994   0.0343   2.8929   0.0041   0.3075
297   cg01607625   0.0613   0.0219   2.8053   0.0054   0.3240
222   cg27258399   0.0268   0.0101   2.6429   0.0087   0.3900
113   cg22685502   0.0521   0.0202   2.5839   0.0103   0.3900
87   cg10397322   0.0554   0.0216   2.5606   0.0110   0.3900
99   cg19708901   0.0547   0.0215   2.5380   0.0117   0.3900
240   cg16375541   0.0661   0.0273   2.4200   0.0162   0.4860
40   cg03198317   0.0431   0.0193   2.2302   0.0266   0.6060
185   cg07716131   -0.0481   0.0216   -2.2282   0.0267   0.6060
201   cg04591709   0.0584   0.0263   2.2250   0.0269   0.6060
209   cg24280832   0.0287   0.0131   2.1958   0.0290   0.6060
144   cg18537730   0.0326   0.0150   2.1779   0.0303   0.6060
##
[[2]]
##
##
Table: Top10 CpGs for ipv3_pp_fm_pct by p.value (Sample Size = 273) Top10 CpGs for Female log10 by p
##
names   Estimate   Std.Error   t.statistic   p.value   FDR
---- ----------- --------- ---------- ------------ -------- ----------
189   cg13382072   -0.1376   0.0490   -2.8066   0.0054   0.9748986
203   cg15066197   -0.2022   0.0748   -2.7044   0.0073   0.9748986
20   cg00210042   -0.2220   0.0881   -2.5211   0.0123   0.9748986
51   cg15642854   -0.0532   0.0222   -2.3931   0.0174   0.9748986
28   cg12872489   0.1030   0.0442   2.3320   0.0205   0.9748986
5   cg12657739   -0.1434   0.0639   -2.2419   0.0258   0.9748986
33   cg05431942   0.0742   0.0333   2.2293   0.0266   0.9748986
27   cg17519749   0.1039   0.0495   2.1012   0.0366   0.9748986
54   cg19529074   0.1712   0.0867   1.9758   0.0492   0.9748986
44   cg09420412   -0.1052   0.0545   -1.9295   0.0548   0.9748986
292   cg04804814   0.1567   0.0819   1.9148   0.0566   0.9748986
117   cg21209948   0.0950   0.0515   1.8466   0.0659   0.9748986
232   cg03991871   -0.0829   0.0455   -1.8229   0.0695   0.9748986
105   cg20626045   0.1062   0.0597   1.7810   0.0761   0.9748986
46   cg03228555   -0.1235   0.0697   -1.7717   0.0776   0.9748986
##
[[3]]
##
##
Table: Top10 CpGs for Chol_IPV3 by p.value (Sample Size = 259) Top10 CpGs for Female log10 by p.valu
##
names   Estimate   Std.Error   t.statistic   p.value   FDR
---- ----------- --------- ---------- ------------ -------- ----------
64   cg24469114   0.1557   0.0522   2.9850   0.0031   0.3360000

```
## 49    cg16725984      0.0572      0.0197        2.9034    0.0040   0.3360000
## 72    cg16659510     -0.1441      0.0499       -2.8864    0.0042   0.3360000
## 60    cg26381452      0.0495      0.0174        2.8528    0.0047   0.3360000
## 142   cg21501241     -0.1371      0.0491       -2.7929    0.0056   0.3360000
## 235   cg25017403      0.0627      0.0231        2.7190    0.0070   0.3428571
## 11    cg02233835     -0.1196      0.0448       -2.6717    0.0080   0.3428571
## 267   cg22138002     -0.0928      0.0364       -2.5505    0.0114   0.4166667
## 193   cg01541565     -0.0881      0.0350       -2.5151    0.0125   0.4166667
## 45    cg16422816      0.1512      0.0620        2.4388    0.0154   0.4375000
## 300   cg27166921     -0.1089      0.0455       -2.3949    0.0174   0.4375000
## 297   cg01607625     -0.1285      0.0538       -2.3914    0.0175   0.4375000
## 209   cg24280832     -0.0722      0.0308       -2.3450    0.0198   0.4564286
## 224   cg14604000     -0.0850      0.0367       -2.3182    0.0213   0.4564286
## 257   cg16529483      0.0577      0.0269        2.1456    0.0329   0.6388235
##
## [[4]]
##
##
## Table: Top10 CpGs for FFA_IPV3 by p.value (Sample Size = 239) Top10 CpGs for Female log10 by p.value
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  ----------  ---------  ----------  ------------  --------  ----------
## 167   cg16495448     -0.1659      0.0665       -2.4932    0.0134   0.9515455
## 171   cg09461851      0.2031      0.0848        2.3959    0.0174   0.9515455
## 14    cg09473264     -0.1309      0.0560       -2.3361    0.0204   0.9515455
## 20    cg00210042      0.2126      0.0938        2.2671    0.0243   0.9515455
## 281   cg22946159      0.2345      0.1047        2.2400    0.0261   0.9515455
## 268   cg05119480      0.1389      0.0624        2.2244    0.0271   0.9515455
## 272   cg17269633     -0.1229      0.0574       -2.1404    0.0334   0.9515455
## 290   cg00798281     -0.1169      0.0549       -2.1306    0.0342   0.9515455
## 230   cg22950210     -0.1087      0.0527       -2.0641    0.0402   0.9515455
## 142   cg21501241      0.1854      0.0903        2.0535    0.0412   0.9515455
## 215   cg11417025     -0.0931      0.0466       -1.9964    0.0471   0.9515455
## 212   cg02078758     -0.1430      0.0748       -1.9107    0.0573   0.9515455
## 276   cg15115757      0.0444      0.0237        1.8698    0.0628   0.9515455
## 123   cg21962013      0.1554      0.0833        1.8652    0.0635   0.9515455
## 38    cg10533331      0.2086      0.1133        1.8408    0.0670   0.9515455
##
## [[5]]
##
##
## Table: Top10 CpGs for Gluc_IPV3 by p.value (Sample Size = 265) Top10 CpGs for Female log10 by p.valu
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  ----------  ---------  ----------  ------------  --------  ----------
## 168   cg12680424     -0.1797      0.0629       -2.8556    0.0047   0.8034783
## 260   cg17284440      0.1495      0.0568        2.6324    0.0090   0.8034783
## 262   cg05888037     -0.1592      0.0614       -2.5917    0.0101   0.8034783
## 288   cg10848522      0.0457      0.0197        2.3202    0.0211   0.8034783
## 6     cg26724375     -0.0679      0.0296       -2.2934    0.0227   0.8034783
## 167   cg16495448     -0.0599      0.0265       -2.2583    0.0248   0.8034783
## 173   cg23506842     -0.0584      0.0258       -2.2585    0.0248   0.8034783
## 216   cg06230206     -0.0546      0.0243       -2.2449    0.0256   0.8034783
## 285   cg27535677      0.0452      0.0203        2.2287    0.0267   0.8034783
```

```
## 3     cg07551200     -0.1330      0.0615       -2.1638    0.0314   0.8034783
## 40    cg03198317      0.0695      0.0326        2.1312    0.0340   0.8034783
## 224   cg14604000      0.0555      0.0263        2.1154    0.0354   0.8034783
## 17    cg13699963     -0.0859      0.0413       -2.0783    0.0387   0.8034783
## 188   cg17500055     -0.0438      0.0214       -2.0488    0.0415   0.8034783
## 30    cg25714096     -0.1073      0.0528       -2.0314    0.0433   0.8034783
##
## [[6]]
##
##
## Table: Top10 CpGs for HDL_IPV3 by p.value (Sample Size = 244) Top10 CpGs for Female log10 by p.value
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  ----------  ---------  ----------  ------------  --------  ----------
## 113   cg22685502     -0.1266      0.0470       -2.6932    0.0076   0.5945455
## 291   cg09630142     -0.0830      0.0314       -2.6396    0.0089   0.5945455
## 11    cg02233835     -0.1158      0.0444       -2.6048    0.0098   0.5945455
## 185   cg07716131     -0.1296      0.0501       -2.5854    0.0103   0.5945455
## 222   cg27258399     -0.0606      0.0235       -2.5769    0.0106   0.5945455
## 277   cg05227616     -0.0937      0.0372       -2.5194    0.0124   0.5945455
## 147   cg03604367      0.0898      0.0376        2.3909    0.0176   0.5945455
## 72    cg16659510     -0.1131      0.0486       -2.3272    0.0208   0.5945455
## 50    cg27124293      0.0554      0.0239        2.3185    0.0213   0.5945455
## 60    cg26381452      0.0394      0.0170        2.3144    0.0215   0.5945455
## 235   cg25017403      0.0536      0.0232        2.3100    0.0218   0.5945455
## 193   cg01541565     -0.0767      0.0343       -2.2343    0.0264   0.6530769
## 91    cg13771313     -0.0444      0.0201       -2.2064    0.0283   0.6530769
## 261   cg07638935      0.1368      0.0643        2.1291    0.0343   0.7140000
## 194   cg16966520     -0.0735      0.0348       -2.1126    0.0357   0.7140000
##
## [[7]]
##
##
## Table: Top10 CpGs for Insu_IPV3 by p.value (Sample Size = 257) Top10 CpGs for Female log10 by p.valu
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  ----------  ---------  ----------  ------------  --------  ----------
## 139   cg08743751      0.3038      0.0706        4.3039    0.0000   0.0000000
## 254   cg22692511      0.1903      0.0379        5.0208    0.0000   0.0000000
## 88    cg19667731     -0.2838      0.0892       -3.1819    0.0017   0.1700000
## 237   cg21380181     -0.1687      0.0625       -2.7019    0.0074   0.5040000
## 239   cg01969701      0.1485      0.0559        2.6565    0.0084   0.5040000
## 77    cg23478547     -0.1187      0.0460       -2.5793    0.0105   0.5228571
## 236   cg04061372     -0.0638      0.0253       -2.5263    0.0122   0.5228571
## 295   cg09114153      0.1837      0.0745        2.4637    0.0144   0.5400000
## 28    cg12872489      0.1180      0.0498        2.3706    0.0185   0.6166667
## 205   cg12149692     -0.1381      0.0611       -2.2625    0.0245   0.7254545
## 82    cg18373158      0.1368      0.0613        2.2310    0.0266   0.7254545
## 262   cg05888037     -0.3541      0.1672       -2.1184    0.0352   0.8800000
## 299   cg17217478     -0.0441      0.0217       -2.0304    0.0434   0.9157576
## 130   cg10922264     -0.1301      0.0671       -1.9379    0.0538   0.9157576
## 20    cg00210042     -0.1985      0.1033       -1.9228    0.0557   0.9157576
##
## [[8]]
```

```
##
##
## Table: Top10 CpGs for Trig_IPV3 by p.value (Sample Size = 254) Top10 CpGs for Female log10 by p.valu
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  -----------  ---------  ----------  ------------  --------  ----------
## 109   cg22120094     -0.1016      0.0415       -2.4465    0.0151   0.8519048
## 58    cg09887862      0.0730      0.0305        2.3921    0.0175   0.8519048
## 172   cg07812715     -0.2085      0.0880       -2.3686    0.0186   0.8519048
## 297   cg01607625     -0.2029      0.0867       -2.3396    0.0201   0.8519048
## 13    cg21451869     -0.1872      0.0804       -2.3264    0.0208   0.8519048
## 155   cg15727287      0.0840      0.0367        2.2874    0.0230   0.8519048
## 154   cg06243084      0.1900      0.0839        2.2647    0.0244   0.8519048
## 298   cg14801692      0.0668      0.0308        2.1669    0.0312   0.8519048
## 17    cg13699963     -0.2031      0.0941       -2.1585    0.0319   0.8519048
## 116   cg21183455      0.0739      0.0369        2.0038    0.0462   0.8519048
## 169   cg17501712     -0.1503      0.0761       -1.9753    0.0494   0.8519048
## 183   cg07105947     -0.0500      0.0257       -1.9490    0.0525   0.8519048
## 140   cg24408706     -0.1837      0.0947       -1.9403    0.0535   0.8519048
## 38    cg10533331      0.1912      0.1007        1.8974    0.0590   0.8519048
## 150   cg14163408      0.0976      0.0520        1.8770    0.0617   0.8519048
##
## [[9]]
##
##
## Table: Top10 CpGs for Leptin_actual__ng_ml_ by p.value (Sample Size = 228) Top10 CpGs for Female log
##
##       names         Estimate   Std.Error   t.statistic   p.value         FDR
## ----  -----------  ---------  ----------  ------------  --------  ----------
## 62    cg04523661     -0.4140      0.1311       -3.1584    0.0018   0.3000000
## 204   cg15045292      0.1846      0.0589        3.1322    0.0020   0.3000000
## 126   cg05390685     -0.2410      0.0814       -2.9598    0.0034   0.3400000
## 232   cg03991871     -0.2242      0.0804       -2.7890    0.0058   0.3660000
## 45    cg16422816     -0.4719      0.1703       -2.7704    0.0061   0.3660000
## 144   cg18537730      0.2819      0.1065        2.6471    0.0087   0.4157143
## 82    cg18373158      0.2451      0.0939        2.6104    0.0097   0.4157143
## 199   cg21261158      0.4638      0.1885        2.4606    0.0147   0.4800000
## 49    cg16725984     -0.1483      0.0614       -2.4150    0.0166   0.4800000
## 44    cg09420412     -0.2414      0.1004       -2.4055    0.0170   0.4800000
## 209   cg24280832      0.2239      0.0947        2.3636    0.0190   0.4800000
## 148   cg13598480      0.3170      0.1343        2.3599    0.0192   0.4800000
## 60    cg26381452      0.1169      0.0513        2.2793    0.0236   0.5446154
## 70    cg10438649      0.4503      0.2021        2.2280    0.0269   0.5600000
## 237   cg21380181     -0.2145      0.0970       -2.2127    0.0280   0.5600000
```


Leptin_actual__ng_ml_ (feMale)
Frequency
0
10
20
30
40
50
0
20
60
100
Leptin_actual__ng_ml_