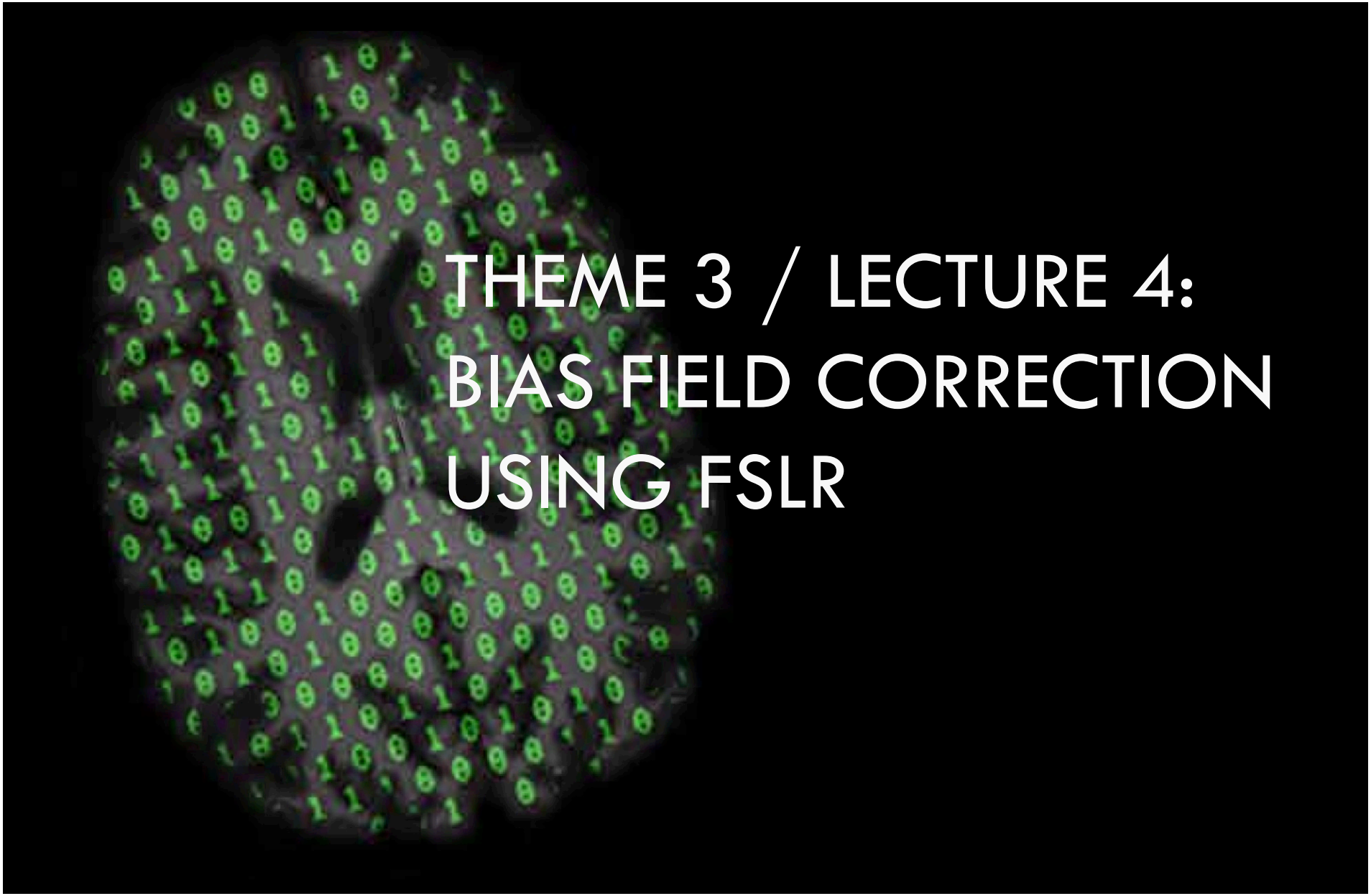
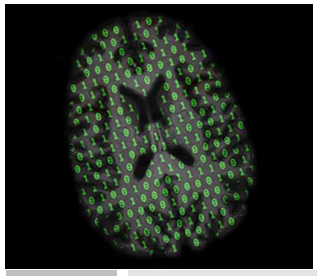


THEME 3 / LECTURE 4: BIAS FIELD CORRECTION USING FSLR



Bias Field Correction Using fslr

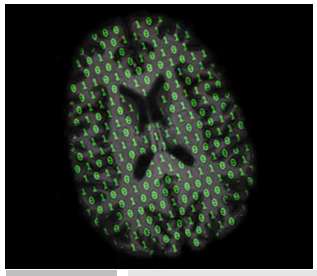
`fslr::fsl_biascorrect` calls `fast` from `FSL` which incorporates the bias field correction by Guillemaud and Brady

This takes a while: be patient

For N3 and N4 correction: use ANTsR

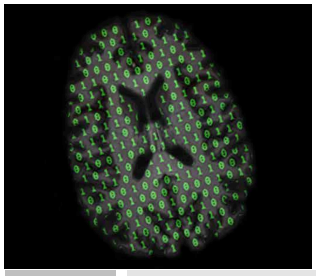
```
fast_img = fsl_biascorrect(nim, retimg=TRUE)
```

Regis Guillemaud and Michael Brady. Estimating the bias field of MR images. In: Medical Imaging, IEEE Transactions on 16.3 (1997), 238-251.

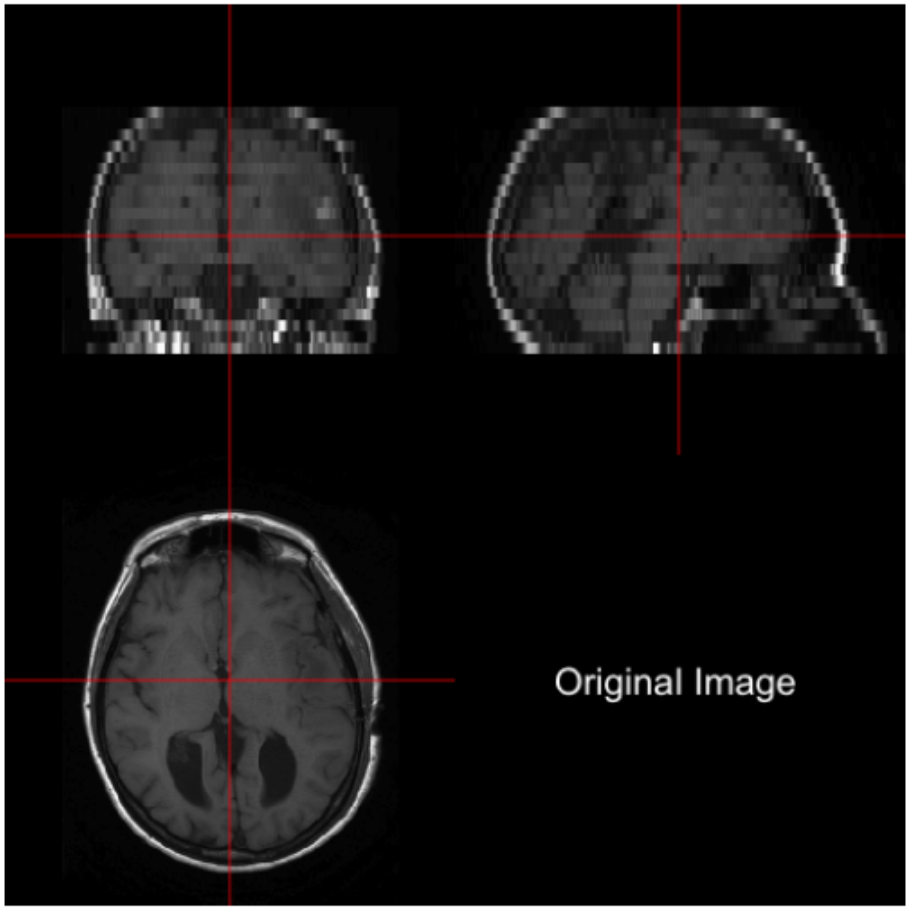


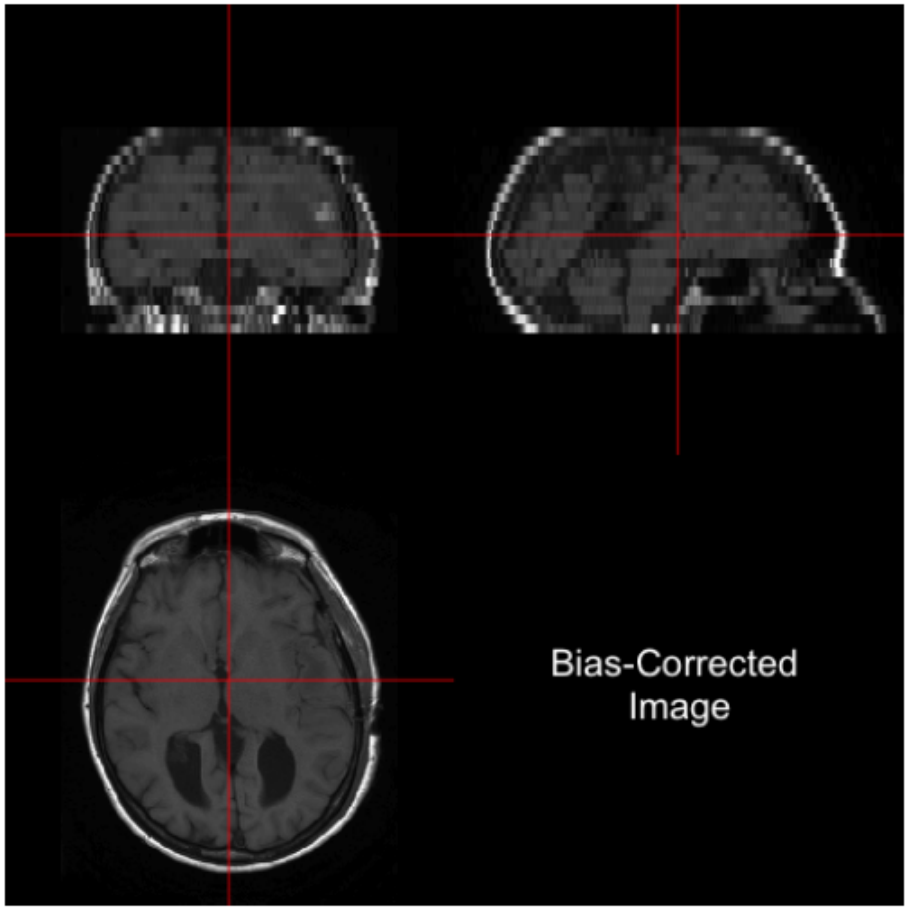
Plotting the Results in R

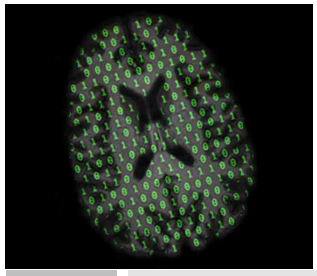
```
orthographic(nim)
orthographic(fast_img)
```



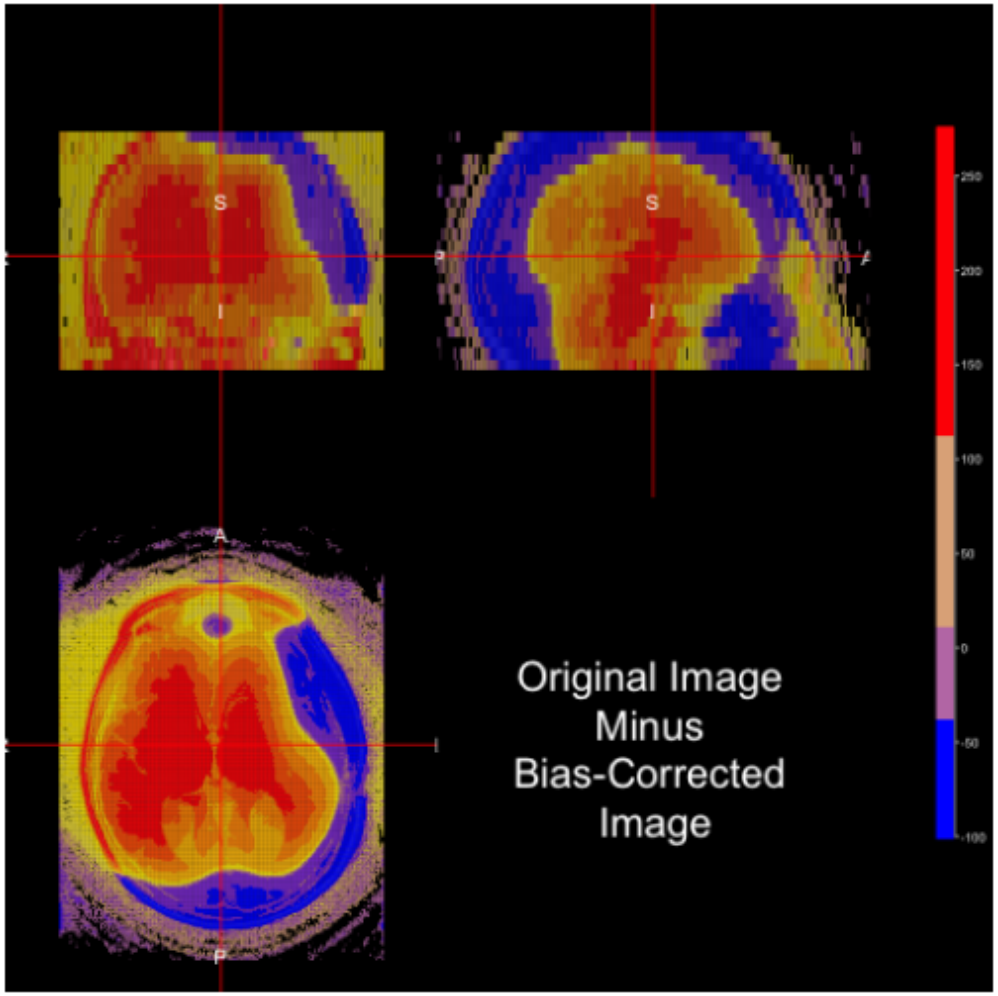
fslr: Bias Field Correction

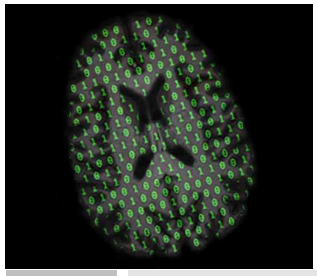






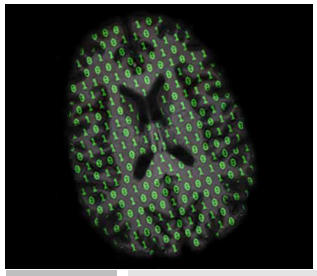
fslr: Original-Bias Field Corrected Image



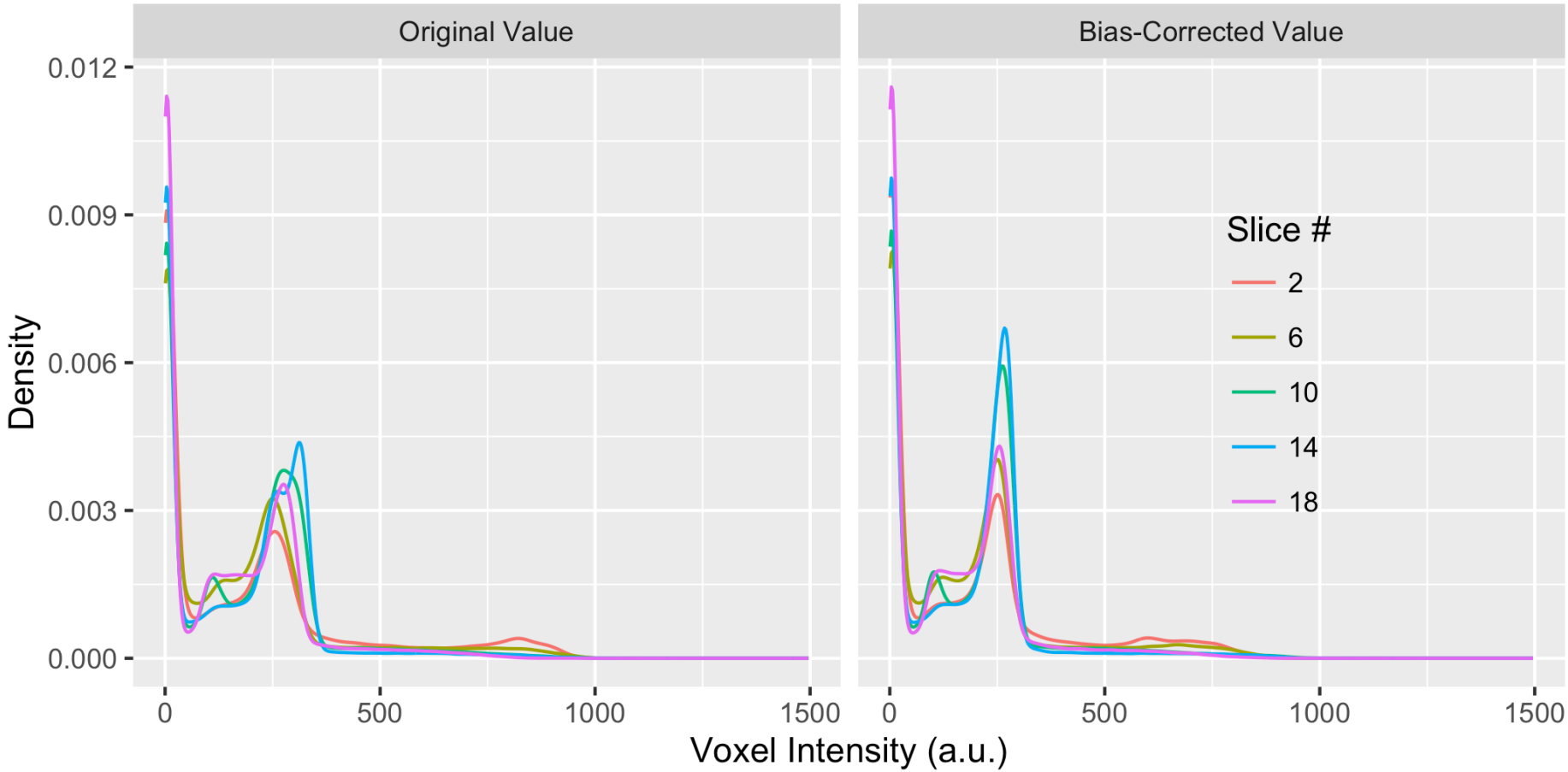


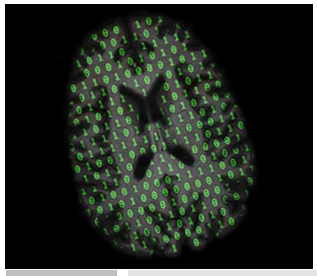
Plotting the Results in R

```
sub.bias <- niftiarr(nim, nim-fast_img)

# quantile the difference image using these as breaks
q=quantile(sub.bias[sub.bias !=0],probs = seq(0,1,by=0.1))

#
install.packages("scales")
library(scales)

# get a diverging gradient palette
fcol=div_gradient_pal(low="blue",mid="yellow",high ="red")


ortho2(nim,sub.bias,col.y = alpha(fcol(seq(0,1, length=10)),
0.5), ybreaks = q, ycolorbar=TRUE, text = paste0("Original
Image Minus N4", "\n Bias-Corrected Image"))
```



Histogram of Correction





Code for Plotting Histogram

```
slices = c(2, 6, 10, 14, 18)
vals = lapply(slices, function(x) {
    cbind(img = c(nim[,,x]), fast = c(fast_img[,,x]),
          slice = x)
})
vals = do.call("rbind", vals)
vals = data.frame(vals)
vals = vals[ vals$img > 0 & vals$fast > 0, ]
colnames(vals)[1:2] = c("Original Value", "Bias-Corrected Value")
v = melt(vals, id.vars = "slice")
g = ggplot(aes(x = value,
               colour = factor(slice)),
           data = v) + geom_line(stat = "density") +
  facet_wrap(~ variable)
g = g + scale_colour_discrete(name = "Slice #")
```