

MCMC Diagnostics

Tables 3, 5, and 7 Parameter Estimates

Cameron Adams

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This document contains MCMC diagnostic results for parameter estimates reported in Tables 3, 5, and 7 presented in *Impact of individual-level characteristics and virus mitigation behaviors on SARS-CoV-2 infection and seroprevalence in a large Northern California Bay Area cohort*.

Table 3 presents study region prevalence estimates for:

- Cumulative antibody prevalence
- Cumulative antibody prevalence adjusted for test-bias (Se/Sp)
- Self-reported test positivity
- COVID-19 probable case

Table 4 presents results from analyses comparing the prevalence of antibodies to the SARS-CoV2-2 spike protein in Round 3. Presence of such antibodies is indicative of previous natural SARS-CoV-2 infection or COVID-19 vaccination. Since infection rates are so low in our study, almost all of the prevalence of spike antibodies can be attributed to vaccination in Round 3.

Table 7 presents study region prevalence differences and prevalence ratios for the population-adjusted association between the binary mitigation variable and antibody prevalence and self-reported test positivity.

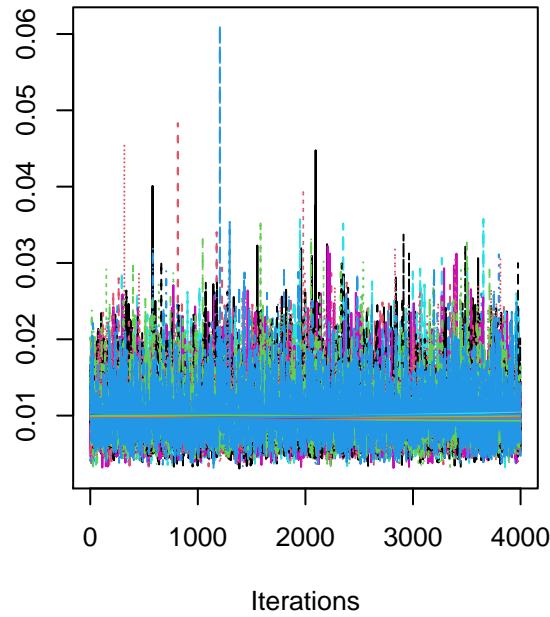
Table 3**Cumulative Antibody Prevlance****Effective Sample Size**

Table 1: Effective Sample Size: Antibody prevalence

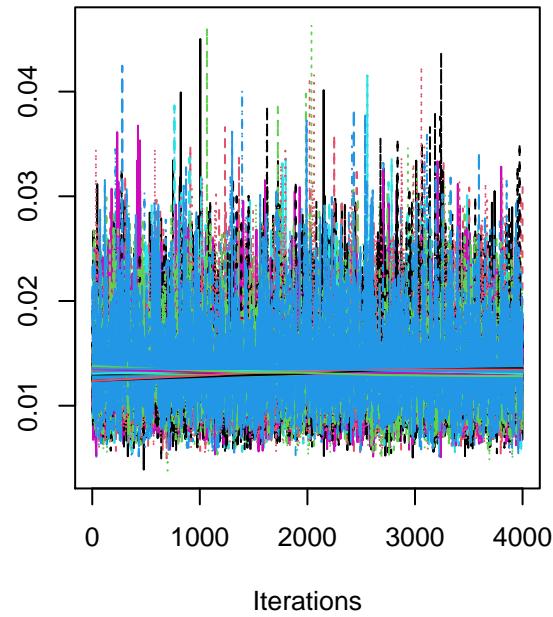
Round	ESS
Round 1	13100
Round 2	9706
Round 3	13300
Round 3 Spike	12830

Trace plots

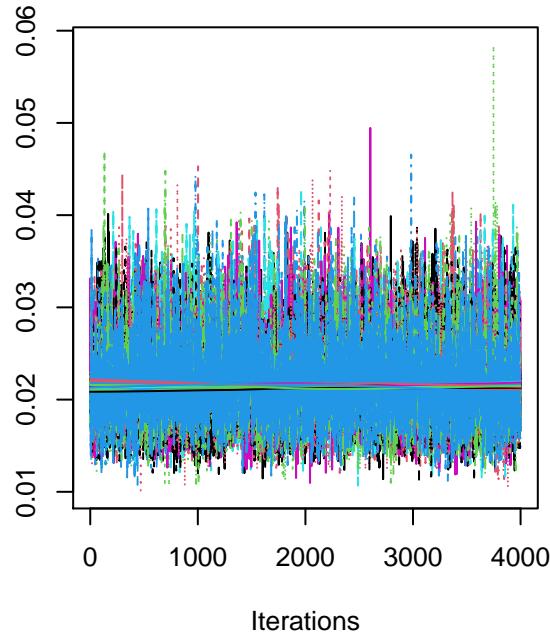
Antibody prev – Round 1



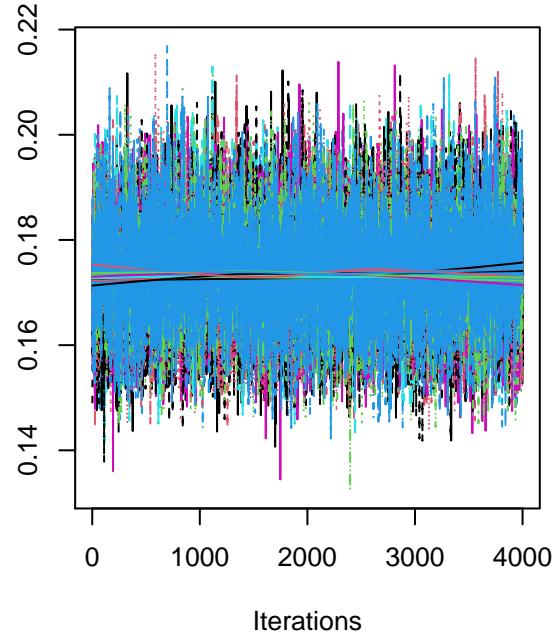
Antibody prev – Round 2



Antibody prev – Round 3

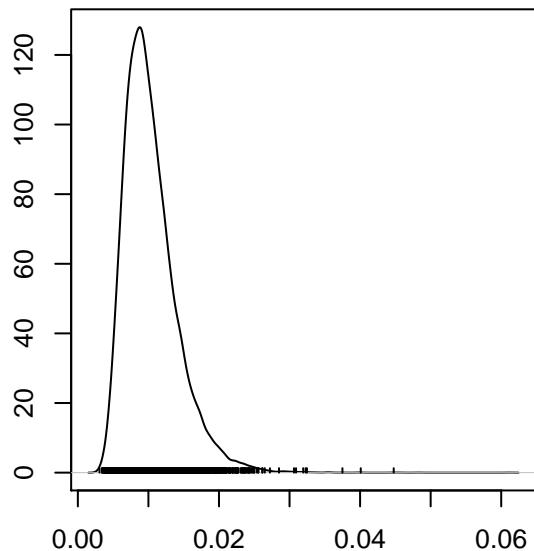


Antibody prev – Round 3 Spike



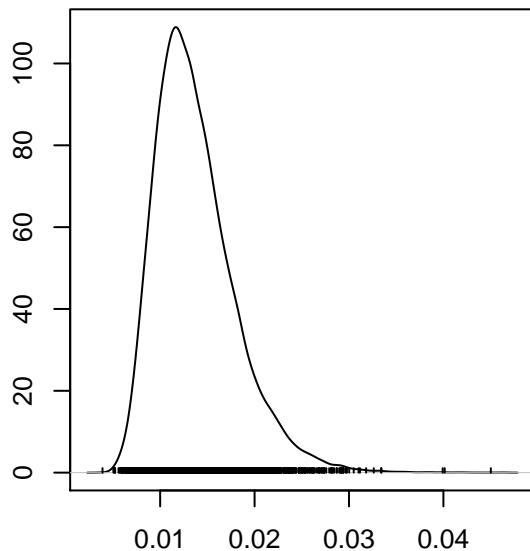
Density plots

Density plot: Antibody prev – Round



N = 4000 Bandwidth = 0.0004329

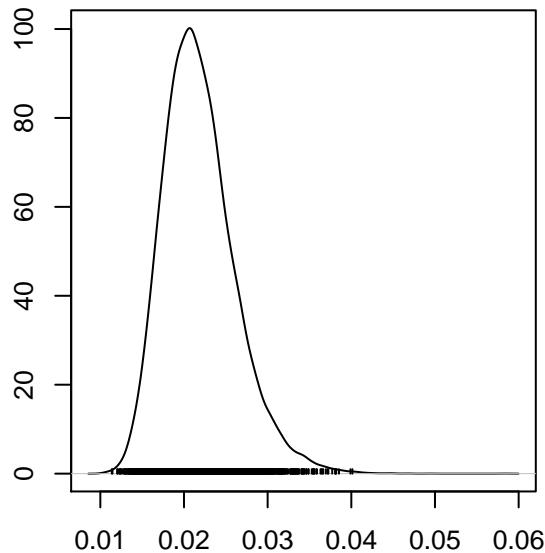
Density plot: Antibody prev – Round



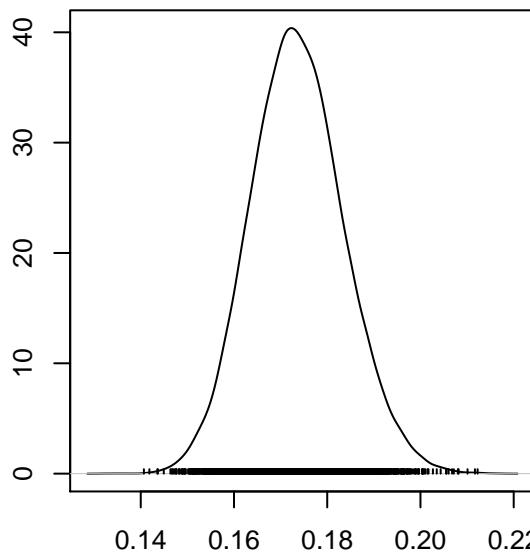
N = 4000 Bandwidth = 0.0005027

Density plot: Antibody prev – Round

Density plot: Antibody prev – Round 3 ξ

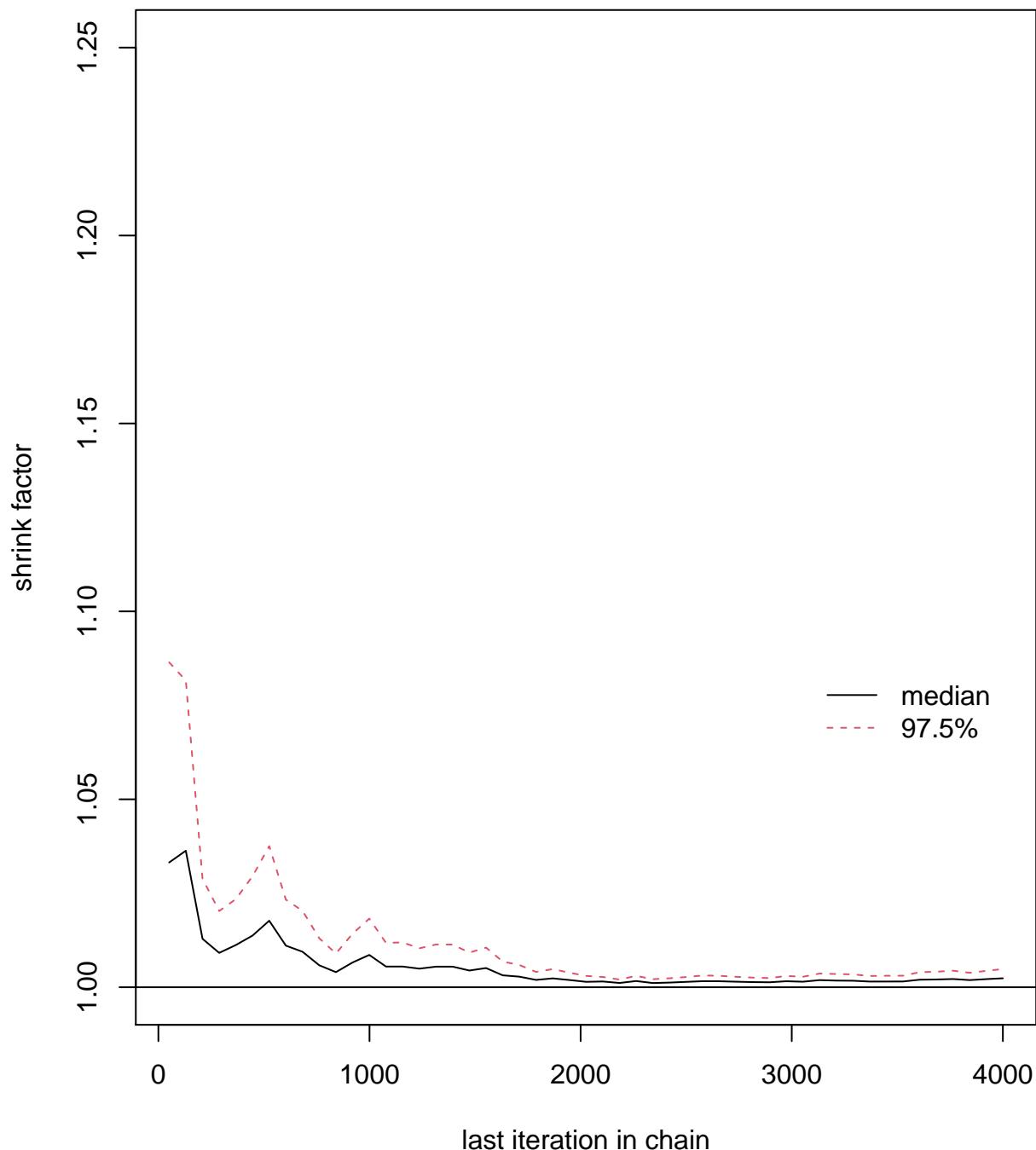


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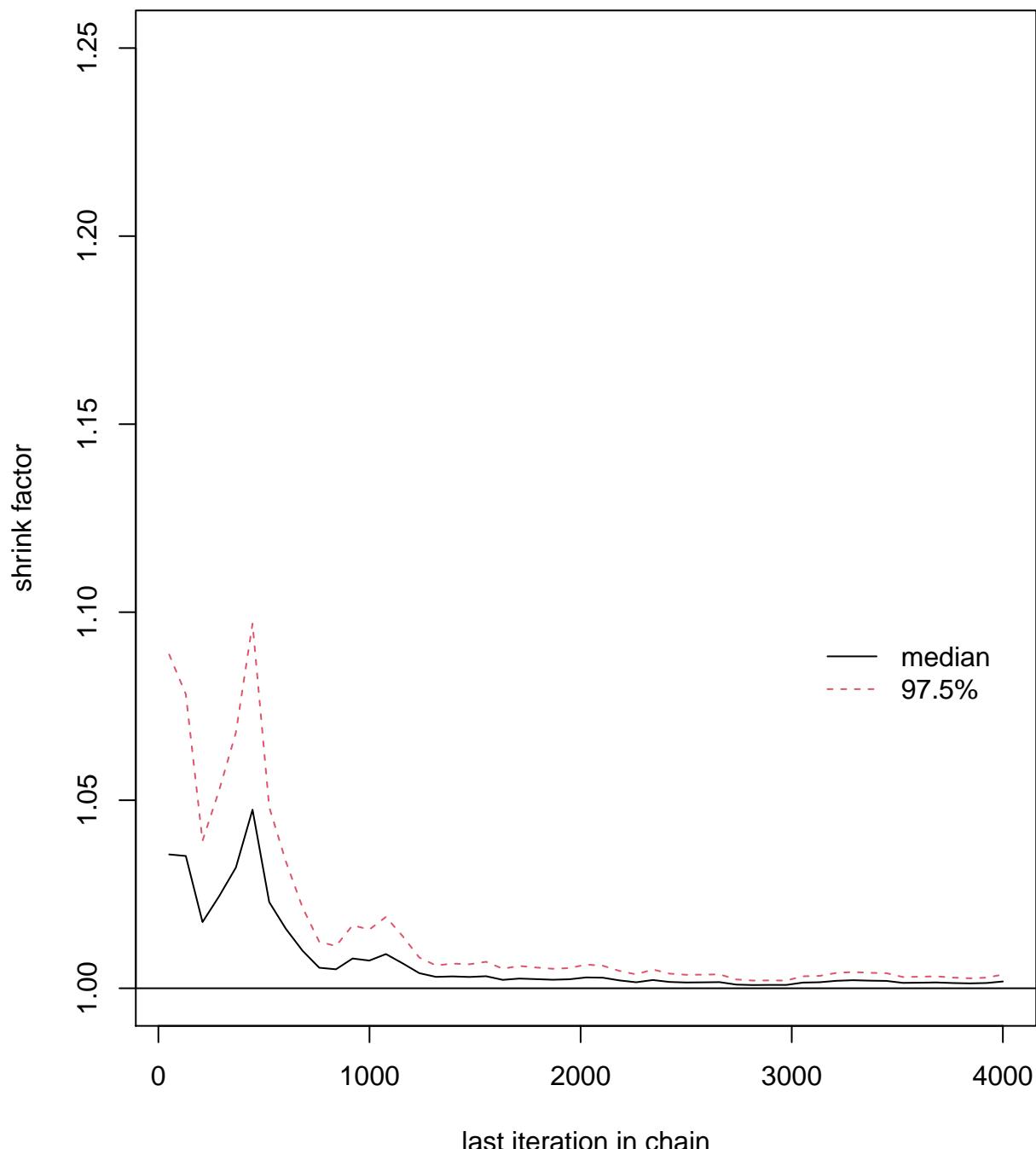


N = 4000 Bandwidth = 0.001263

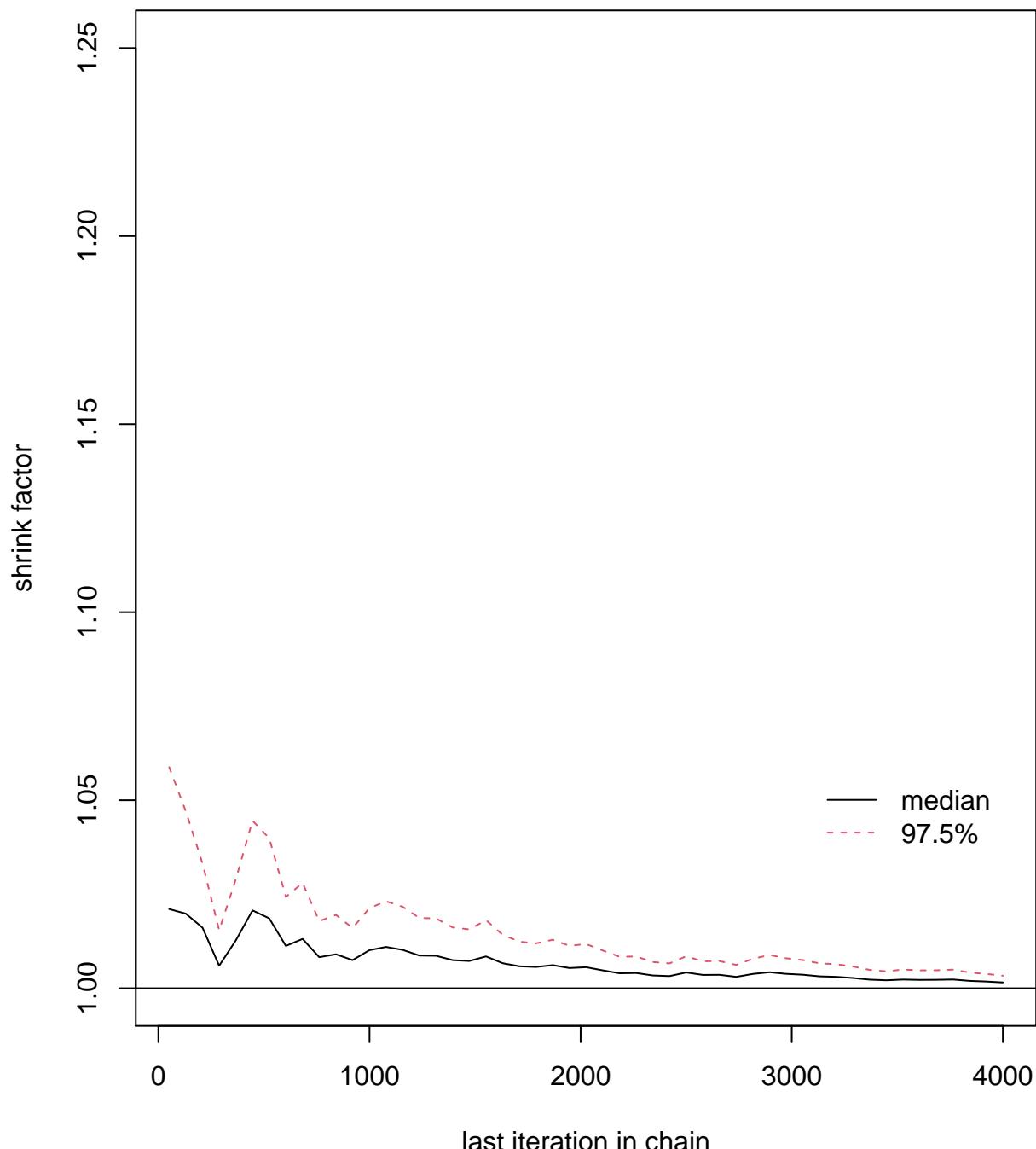
Antibody prev – Round 1



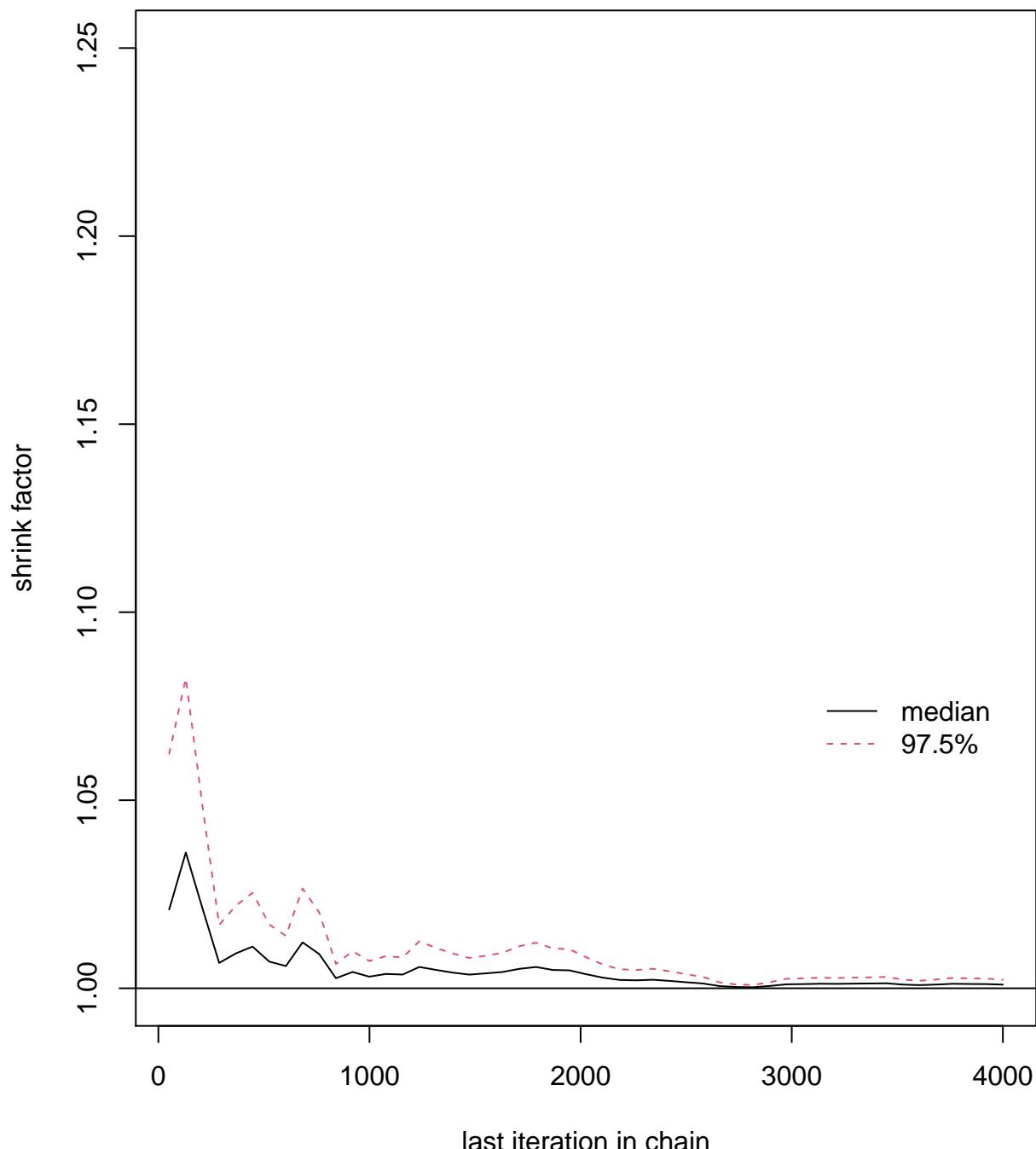
Antibody prev – Round 2



Antibody prev – Round 3

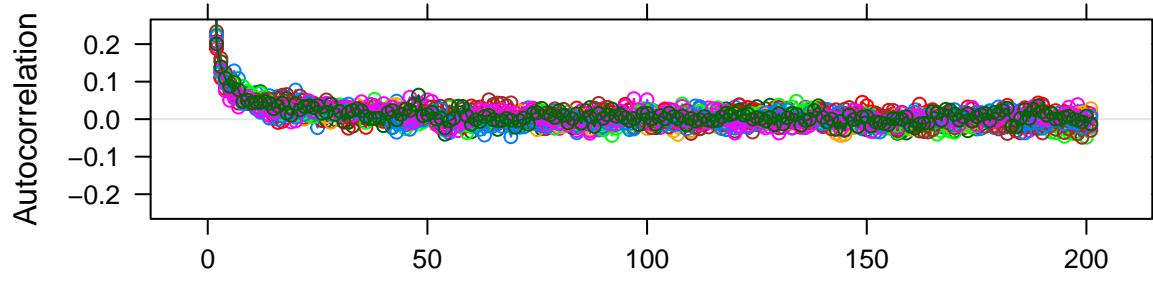


Antibody prev – Round 3 Spike

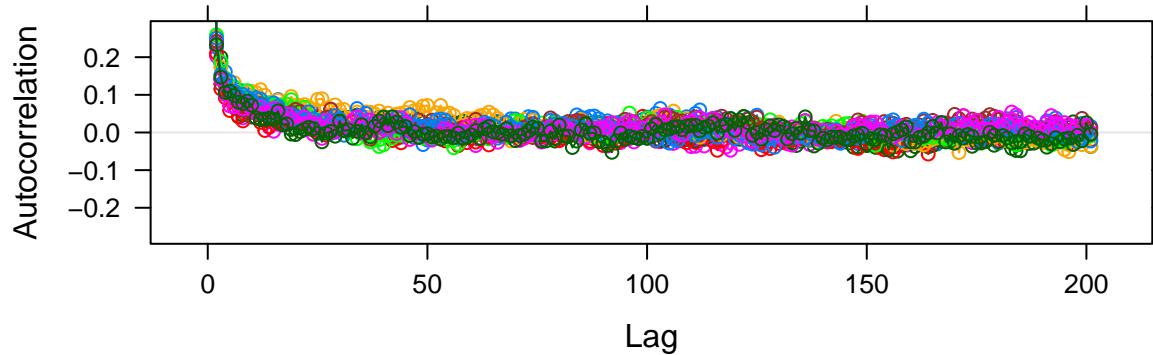


Autocorrelation plots

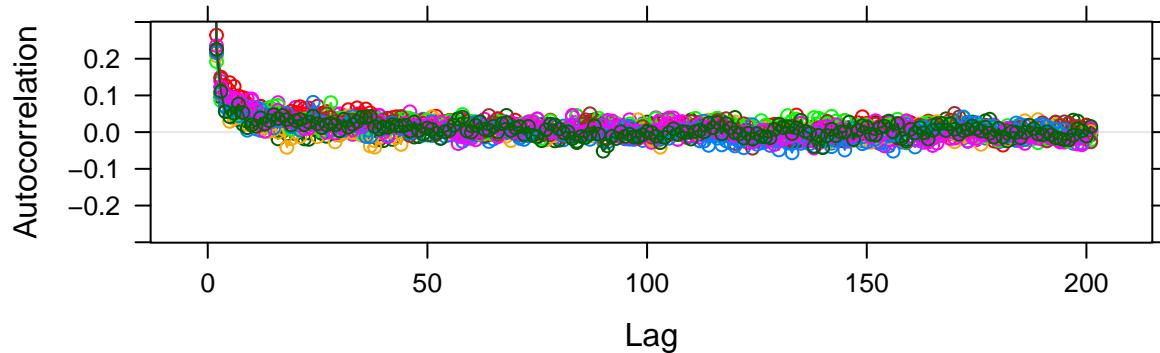
ACF plot: Antibody prev – Round 1



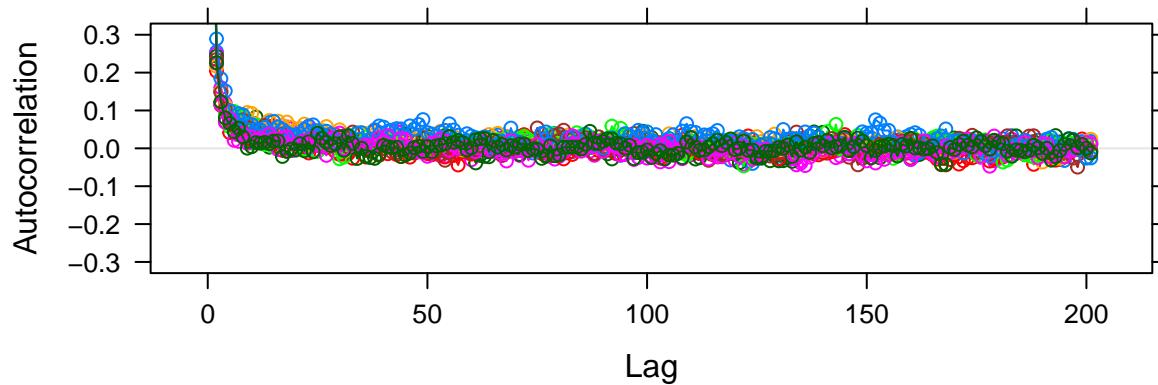
ACF plot: Antibody prev – Round 2



ACF plot: Antibody prev – Round 3



ACF plot: Antibody prev – Round 3 Spike



Cumulative antibody prevalence adjusted for test-bias (Se/Sp)

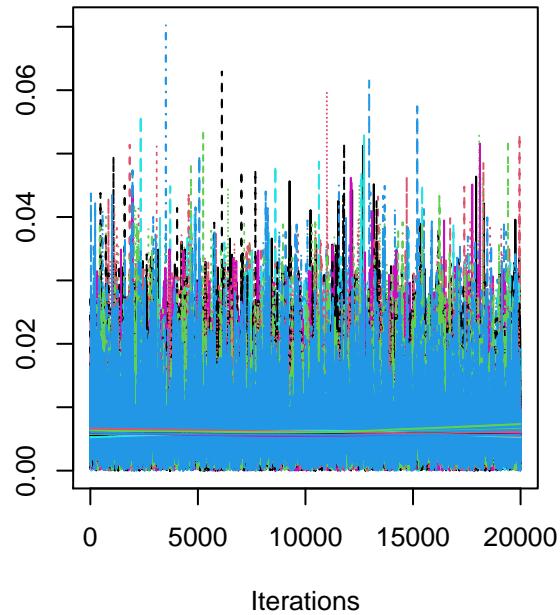
Effective Sample Size

Table 2: Effective Sample Size: Antibody prevalence test bias

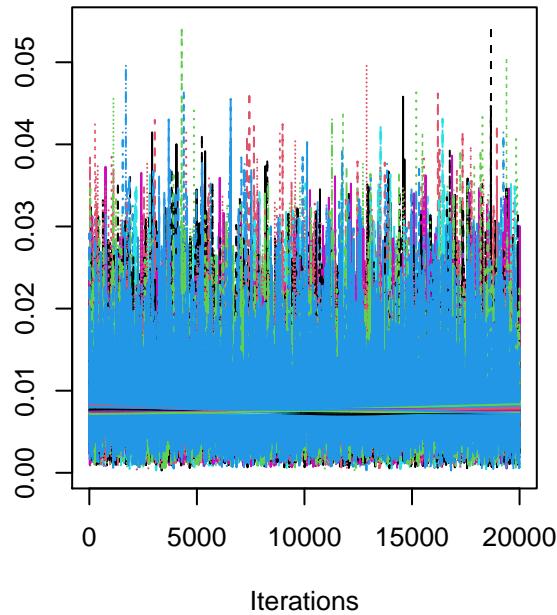
Round	ESS
Round 1	14147
Round 2	14609
Round 3	27250
Round 3 Spike	12830

Trace plots

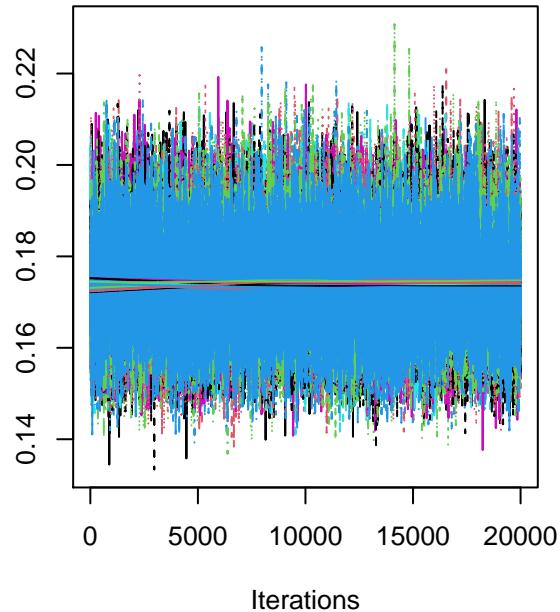
Antibody prev test bias – Round 1



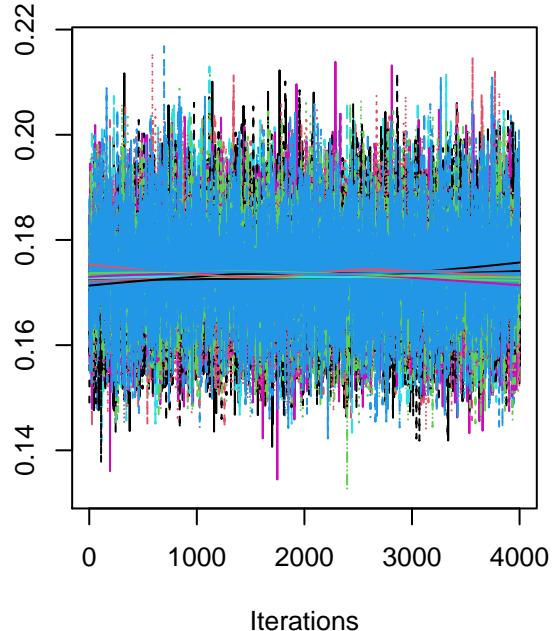
Antibody prev test bias – Round 2



Antibody prev test bias – Round 3

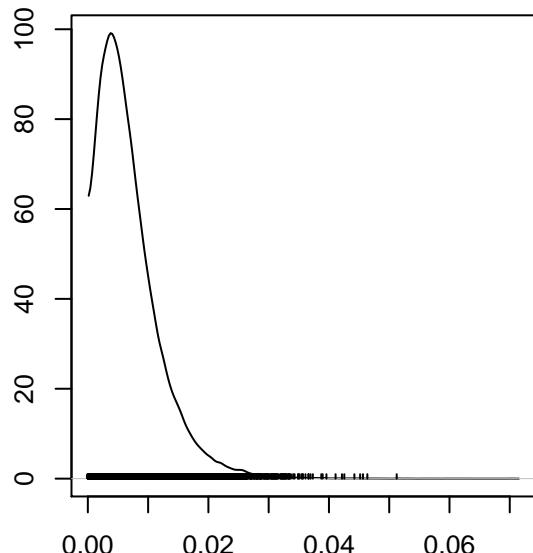


Antibody prev test bias – Round 3 Sp

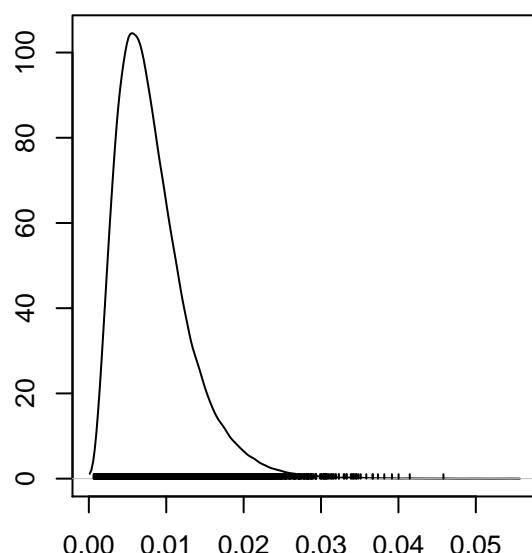


Density plots

Density plot: Antibody prev test bias – Rd

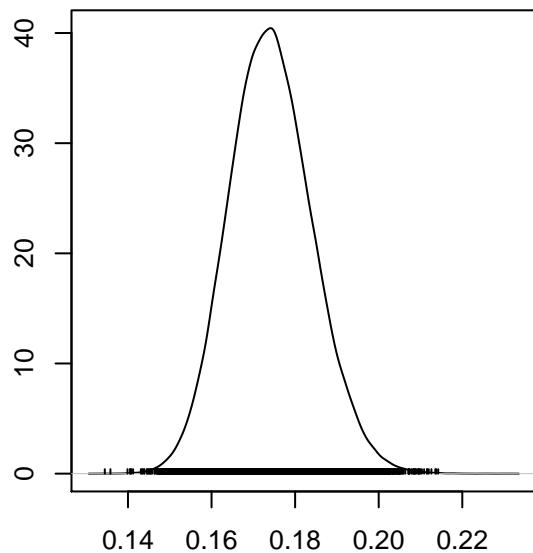


N = 20000 Bandwidth = 0.0004184

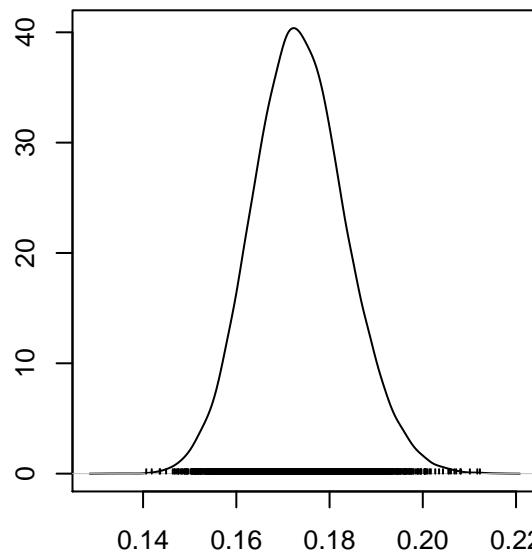


N = 20000 Bandwidth = 0.0003908

Density plot: Antibody prev test bias – Rnsity plot: Antibody prev test bias – Roun

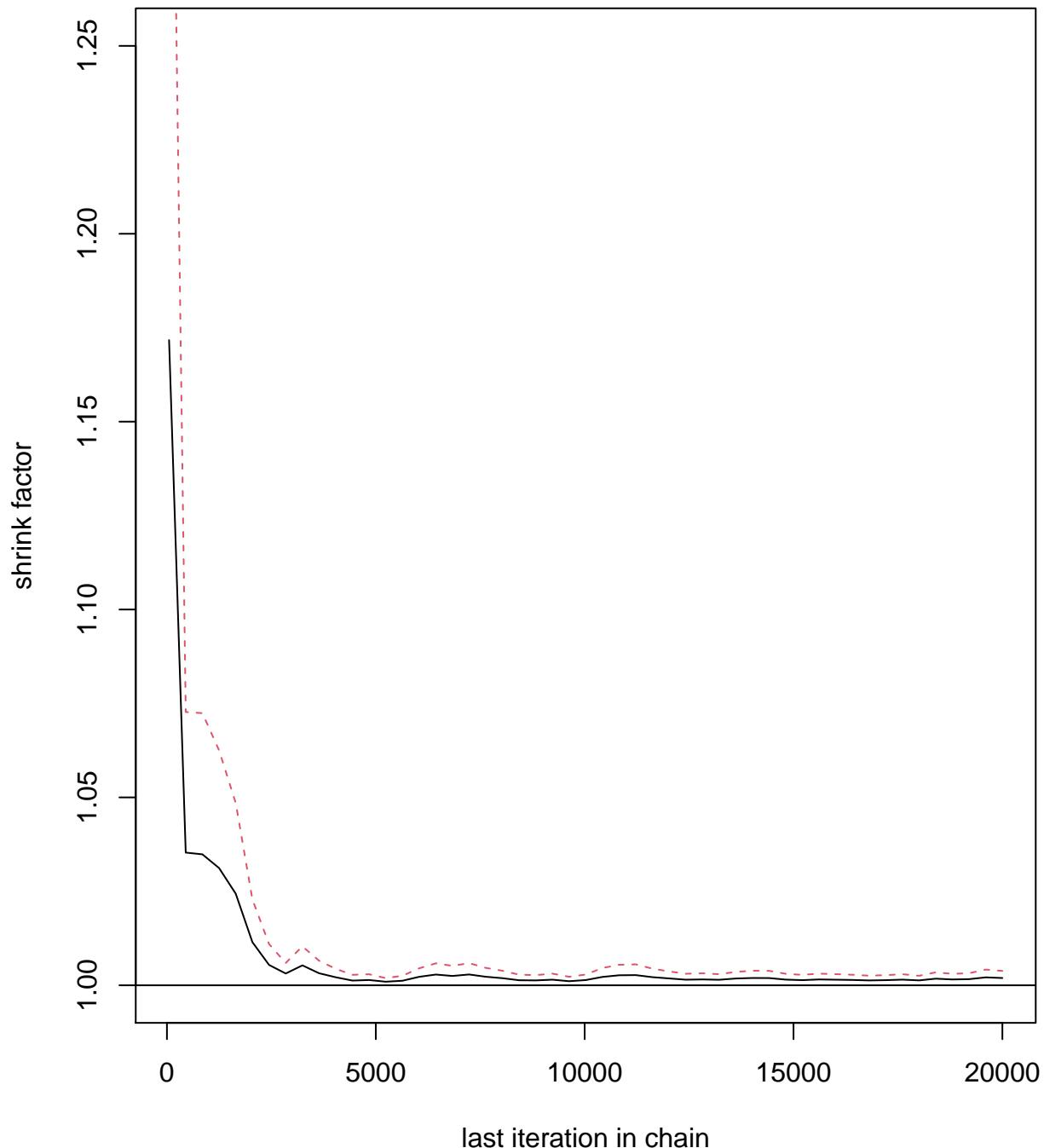


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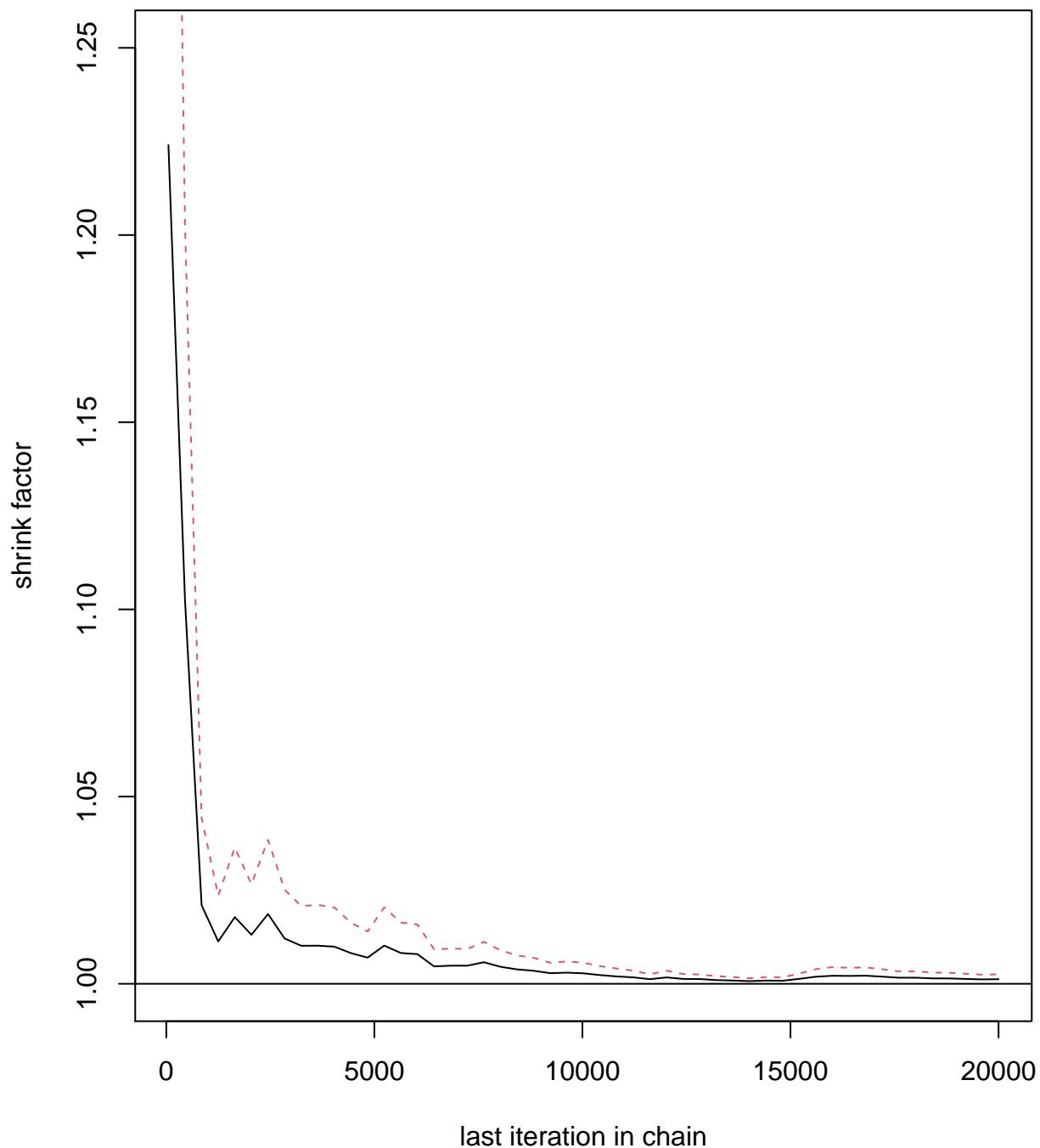


N = 4000 Bandwidth = 0.001263

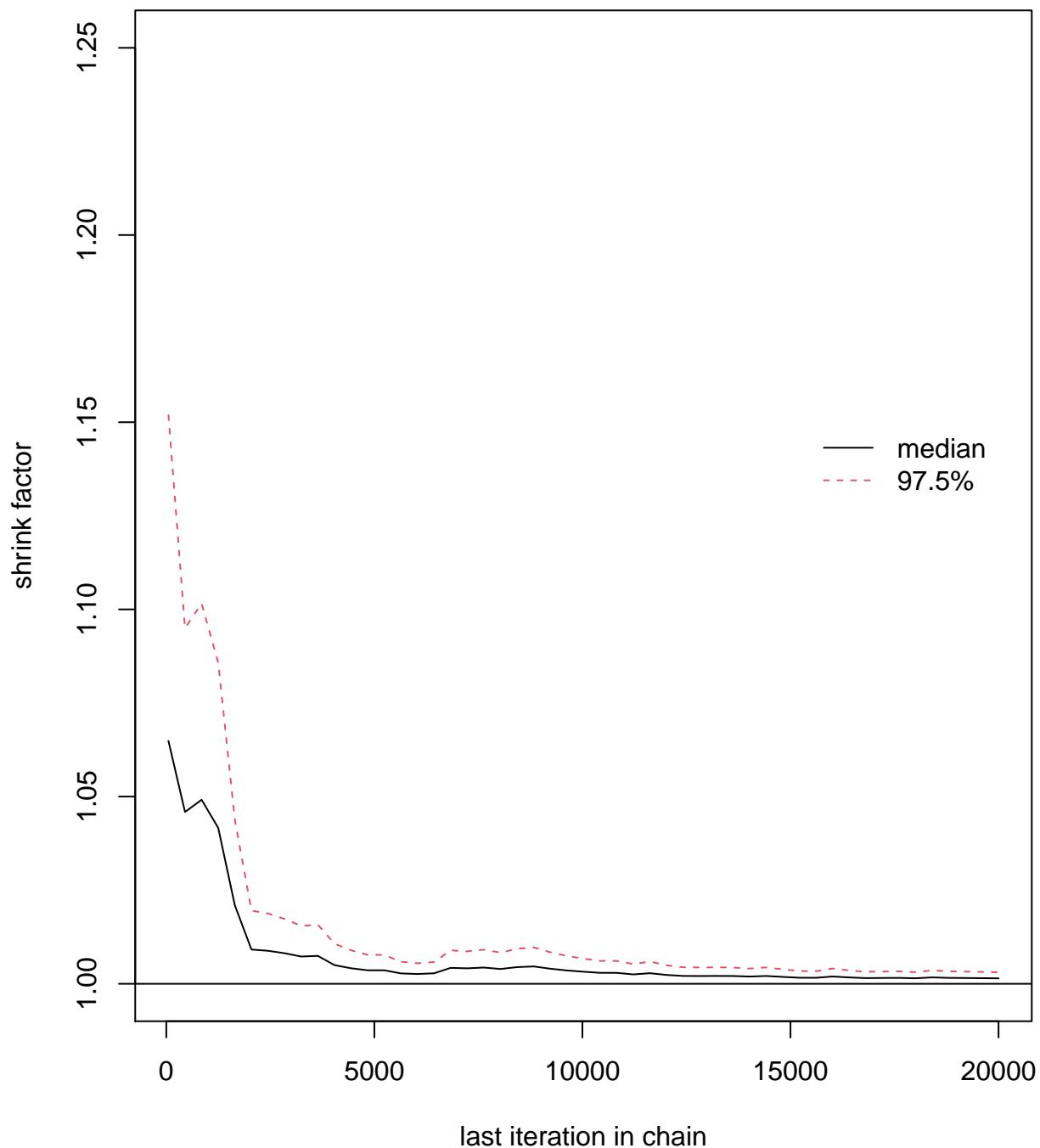
Antibody prev test bias – Round 1



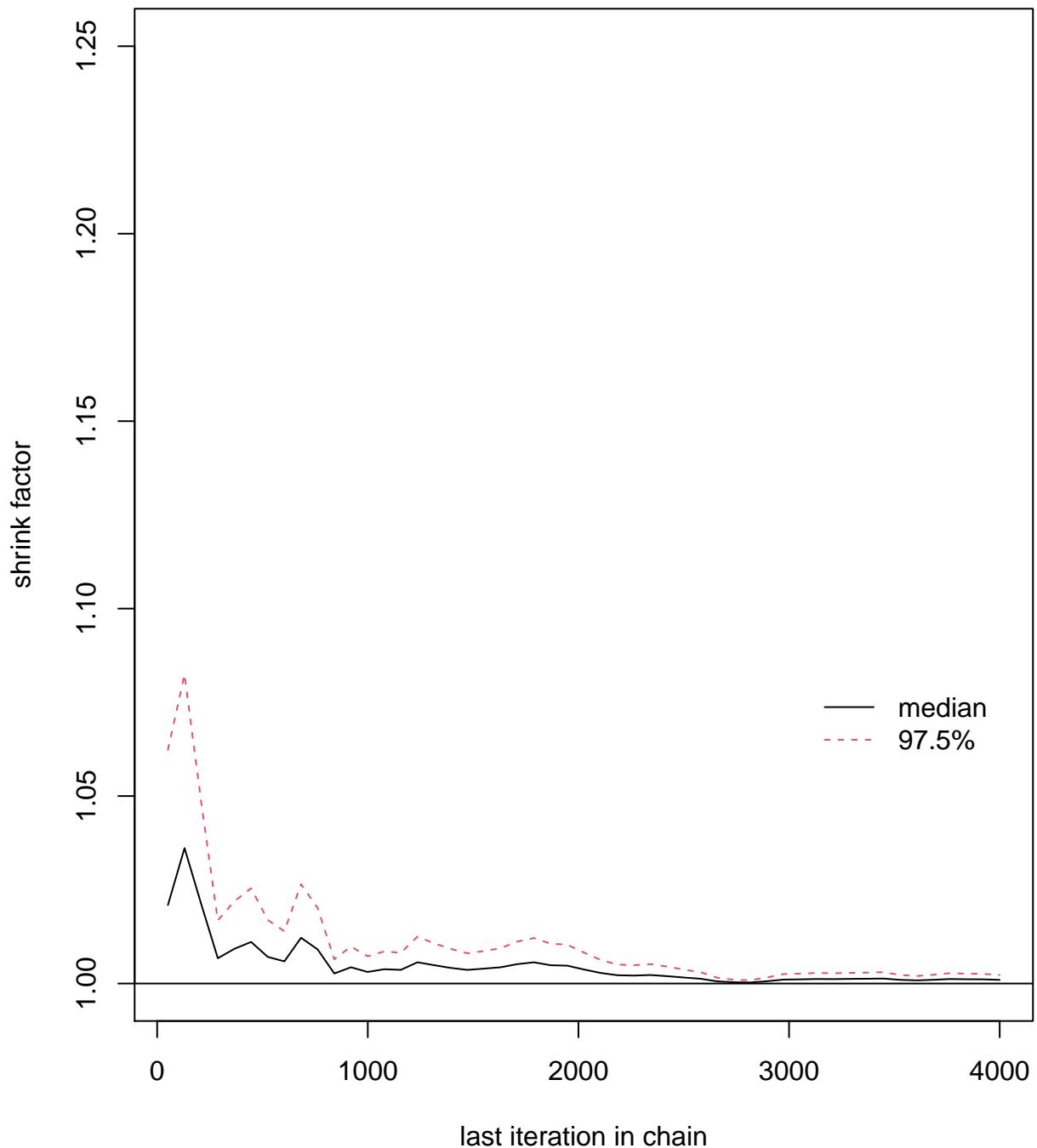
Antibody prev test bias – Round 2



Antibody prev test bias – Round 3

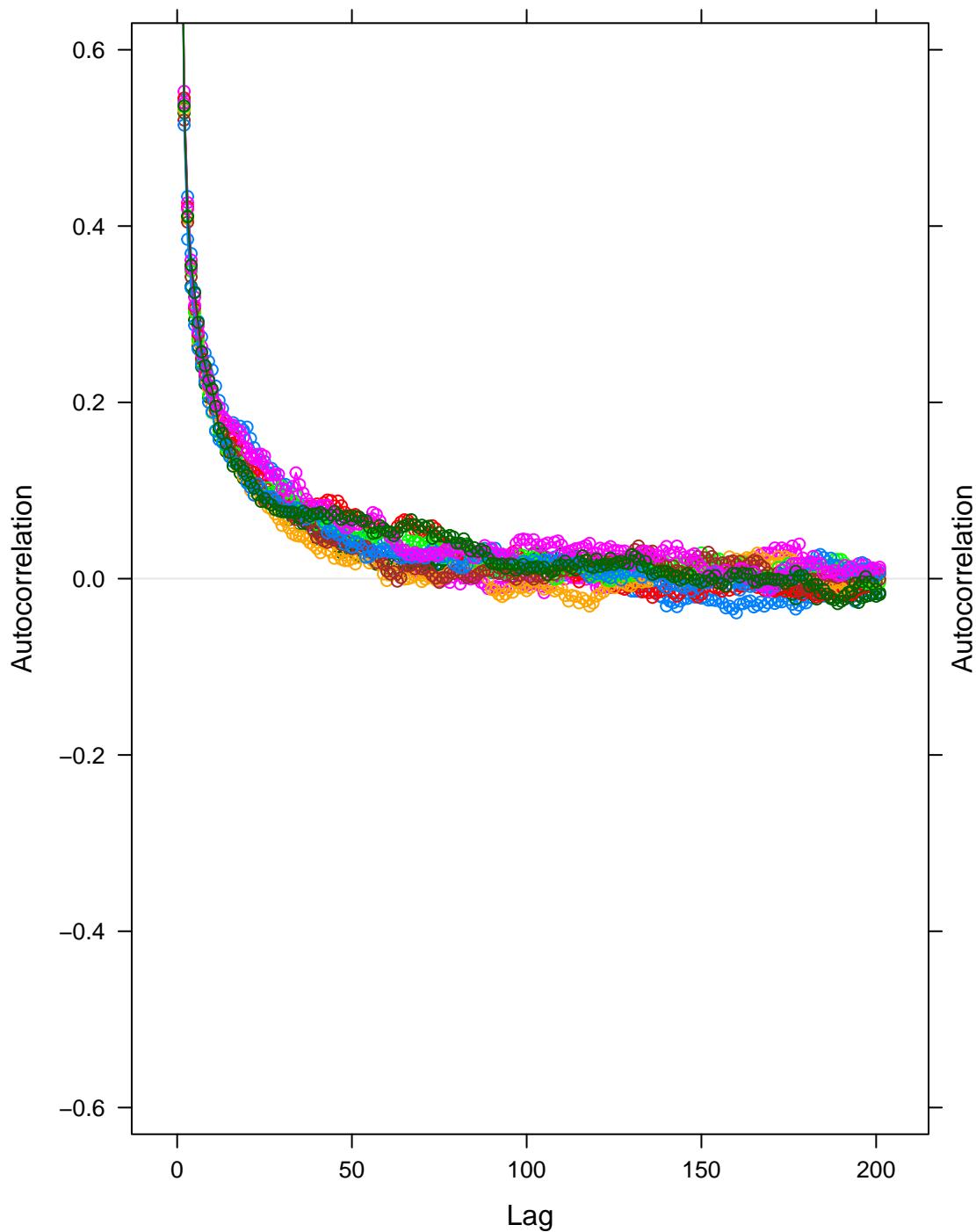


Antibody prev test bias – Round 3 Spike

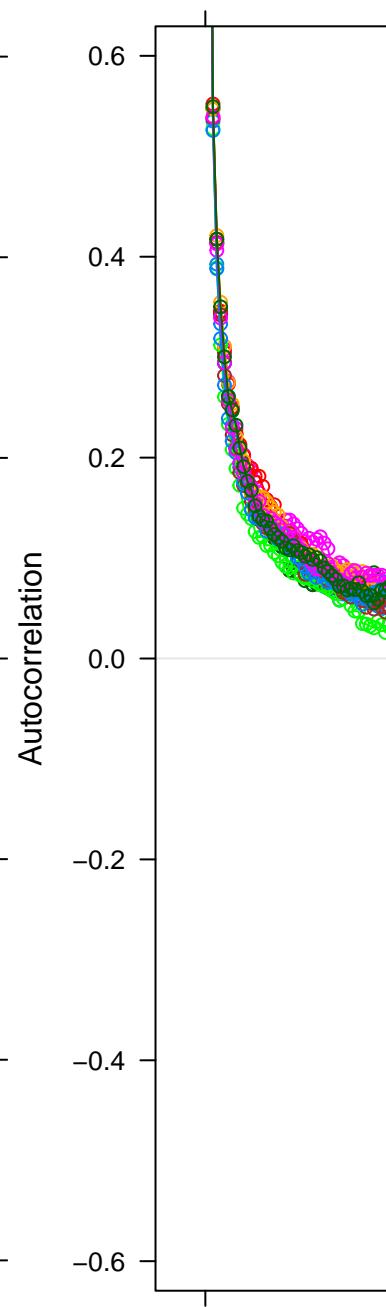


Autocorrelation plots

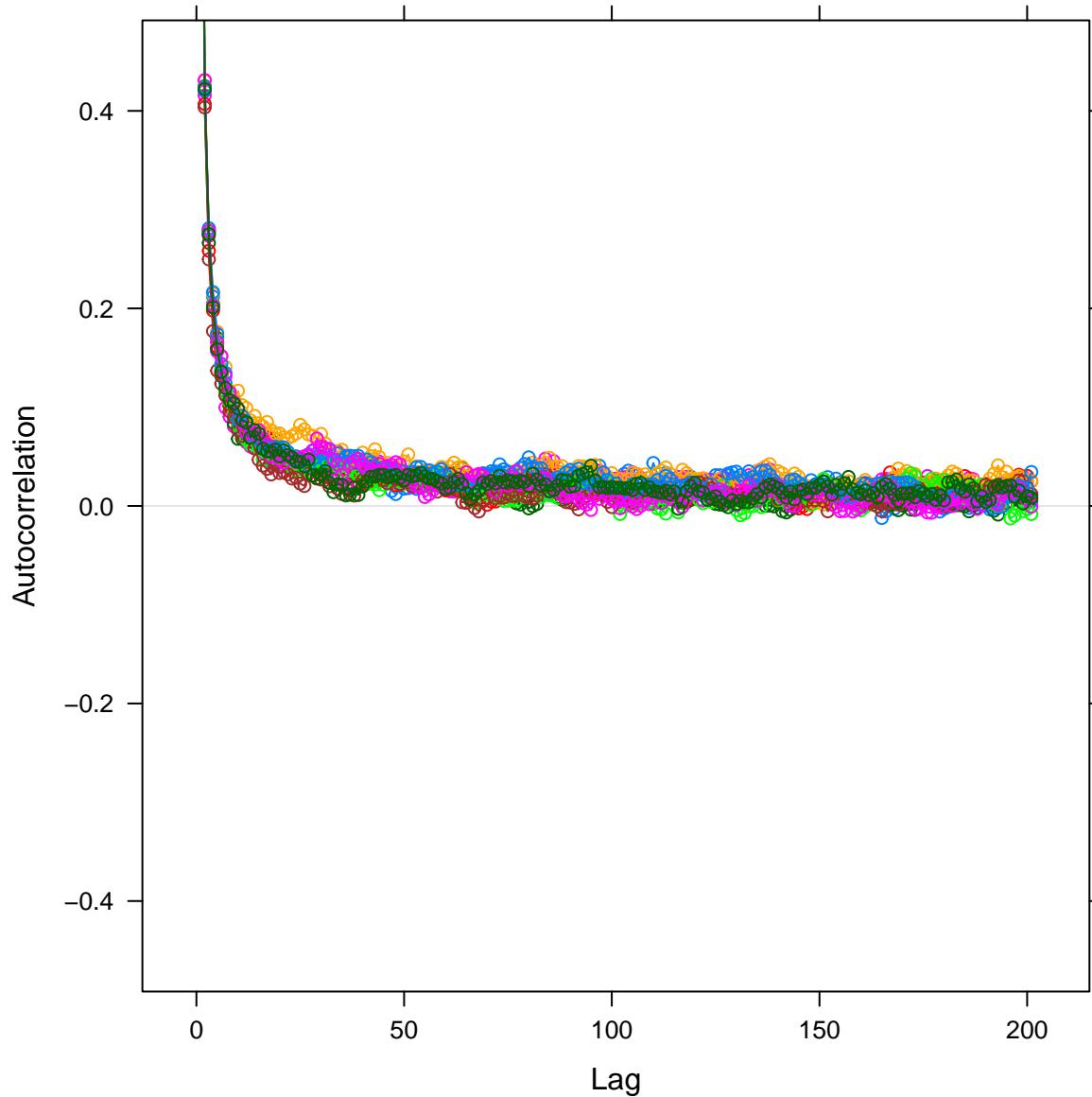
ACF plot: Antibody prev test bias – Round 1



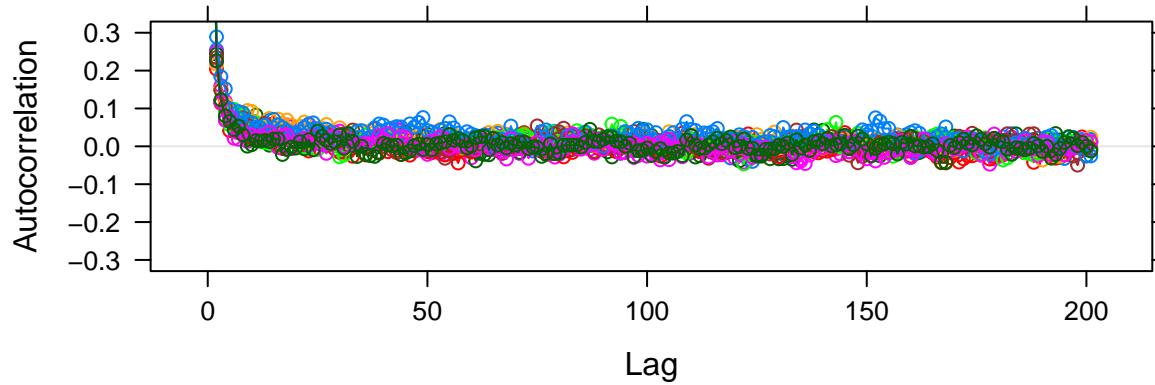
ACF plot: An



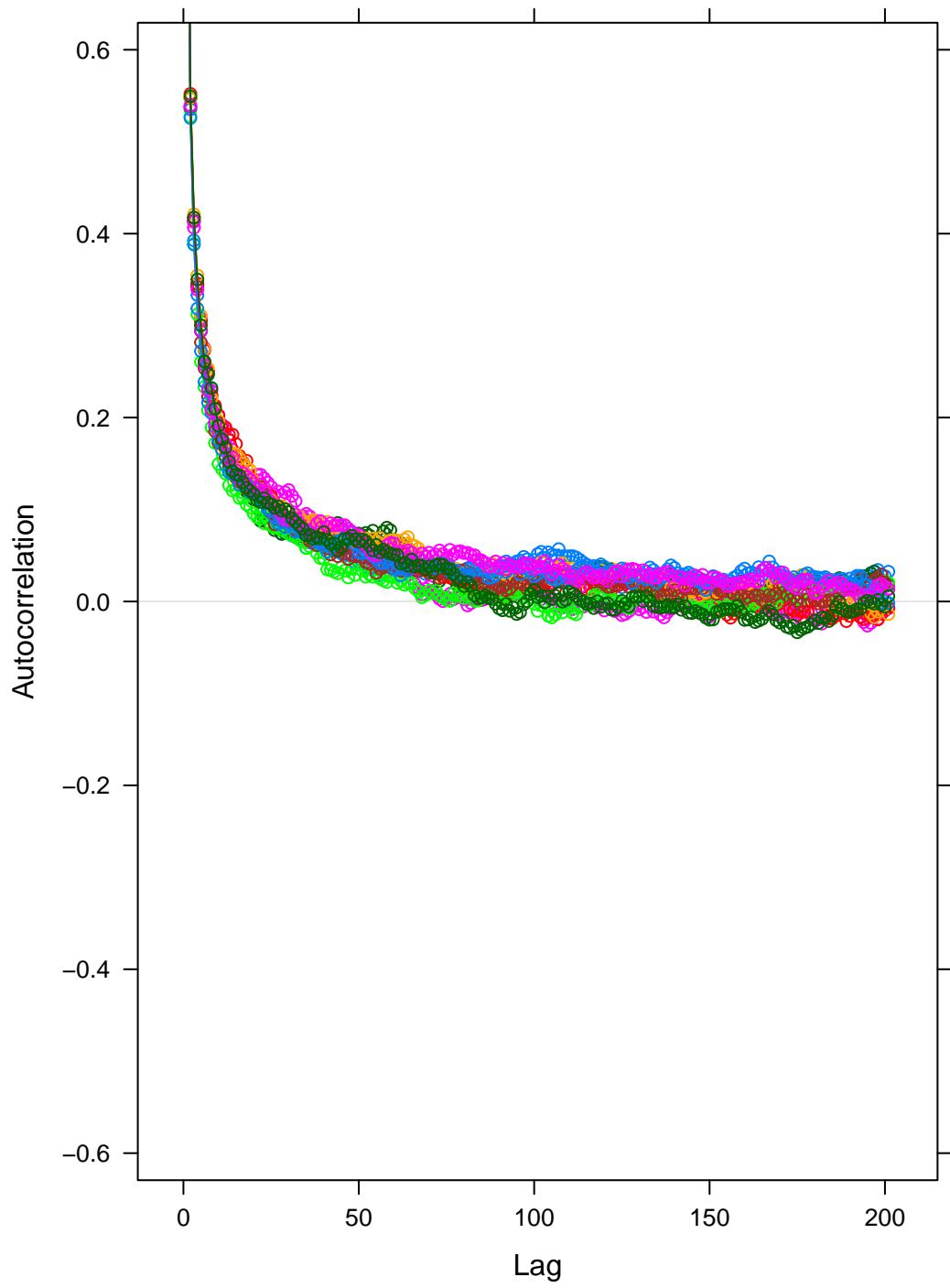
ACF plot: Antibody prev test bias – Round 3



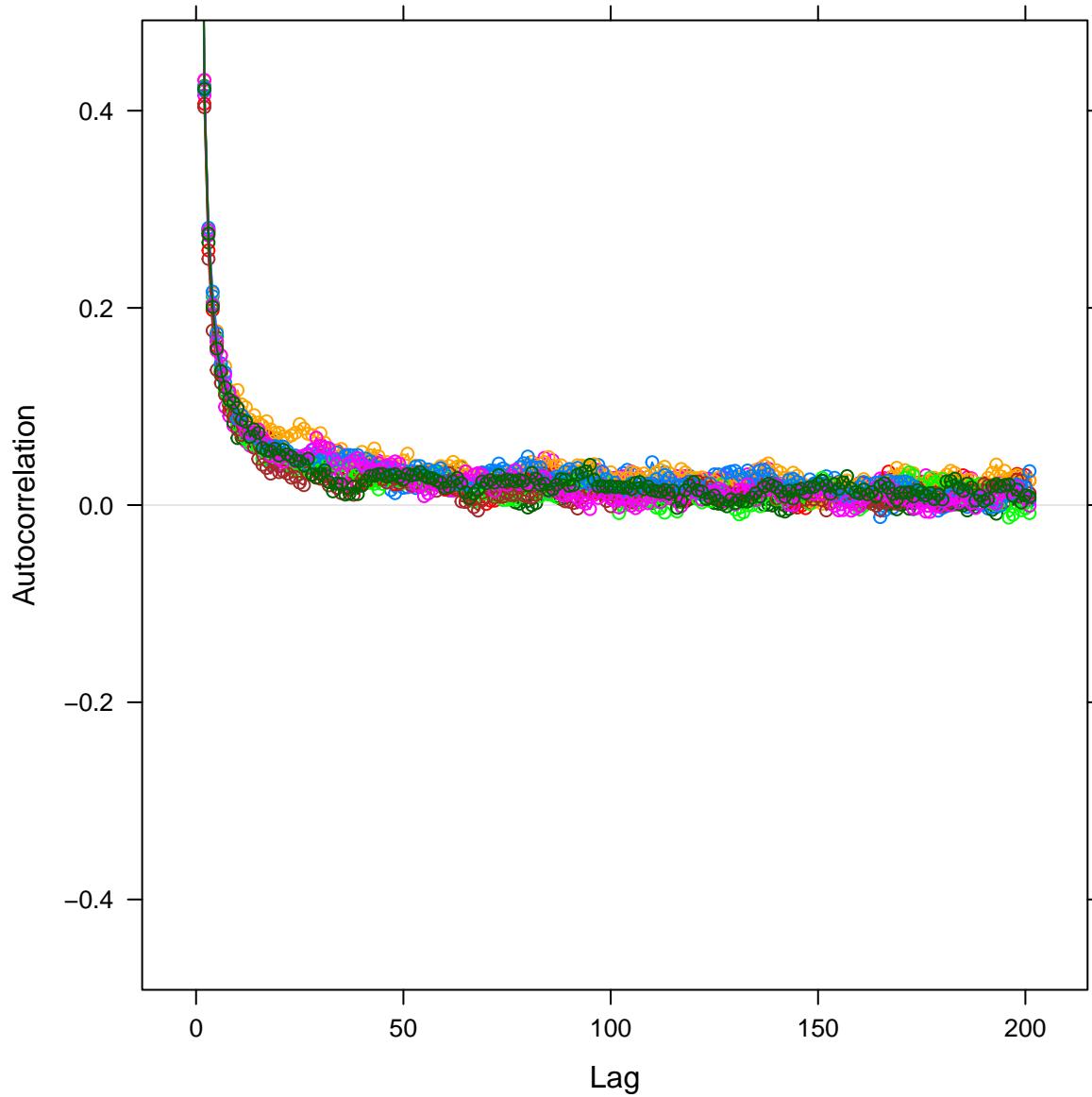
ACF plot: Antibody prev test bias – Round 3 Spike



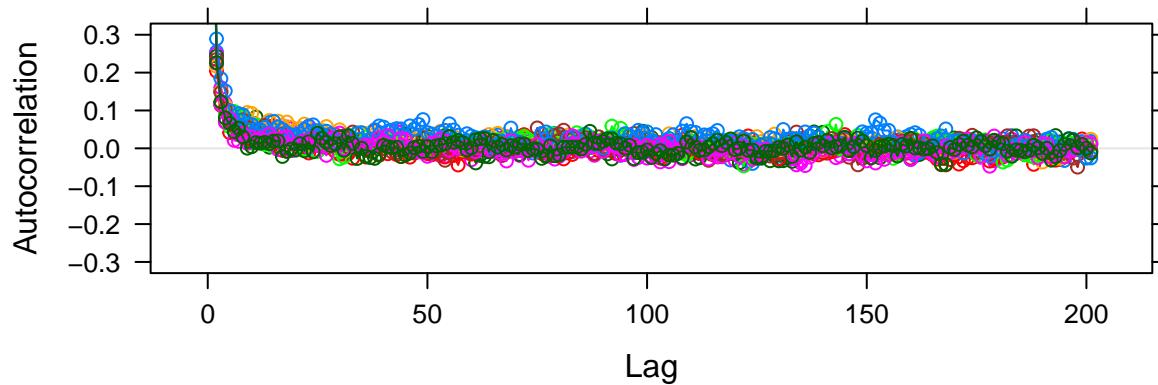
ACF plot: Antibody prev test bias – Round 2



ACF plot: Antibody prev test bias – Round 3



ACF plot: Antibody prev test bias – Round 3 Spike



Self-reported test positivity

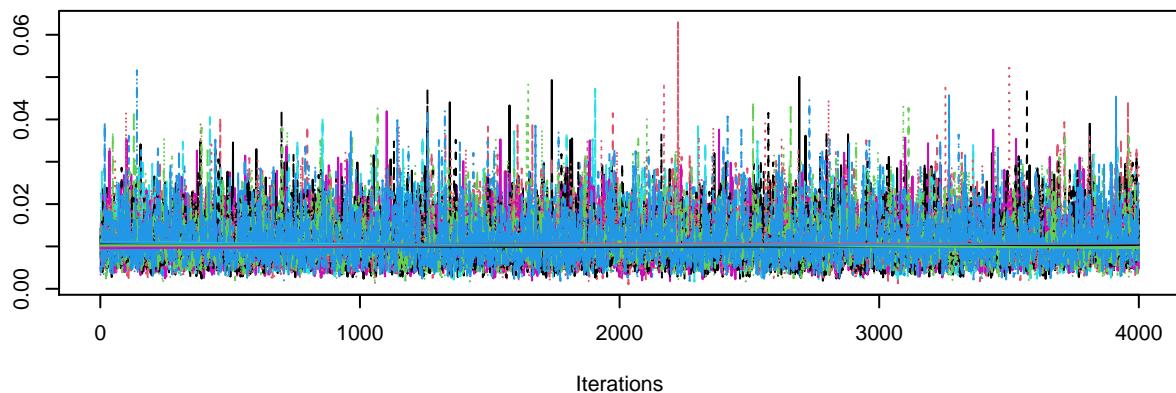
Effective Sample Size

Table 3: Effective Sample Size: Self-reported test positivity

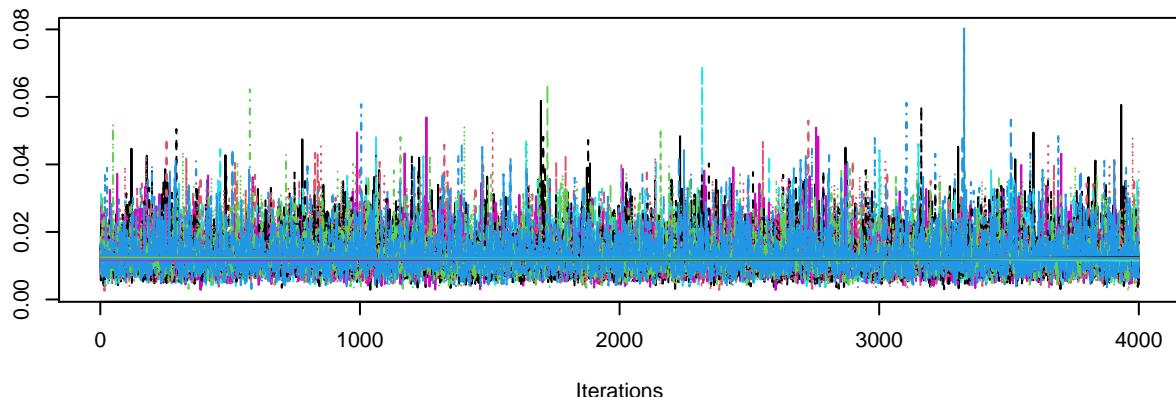
Round	ESS
Round 1	15144
Round 2	16921
Round 3	13432

Trace plots

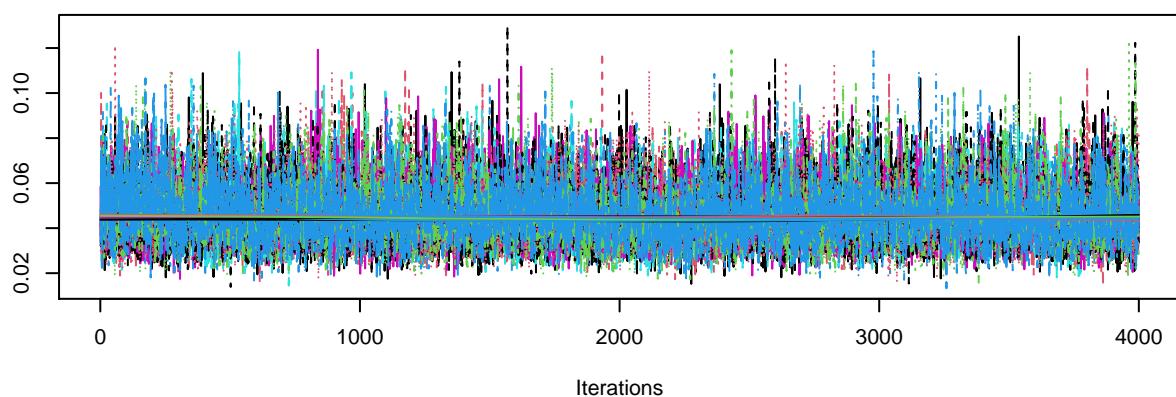
Self-reported test positivity – Round 1



Self-reported test positivity – Round 2

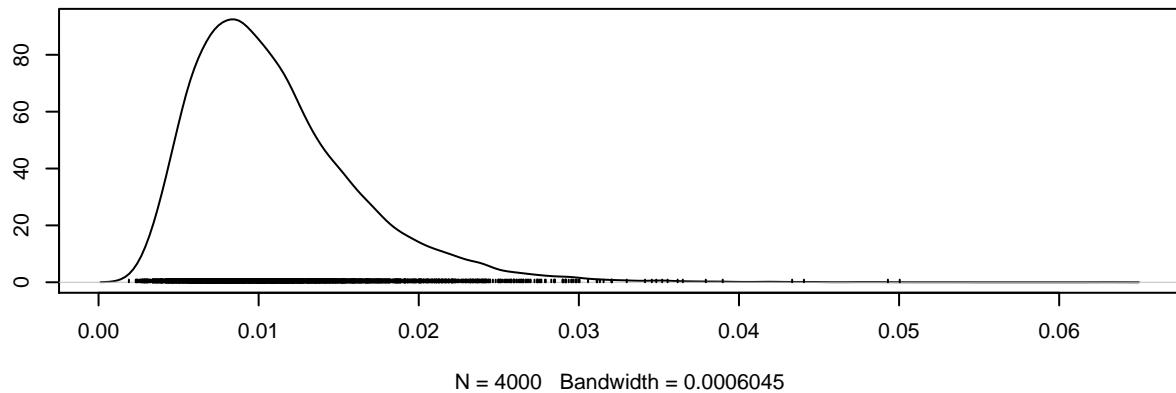


Self-reported test positivity – Round 3

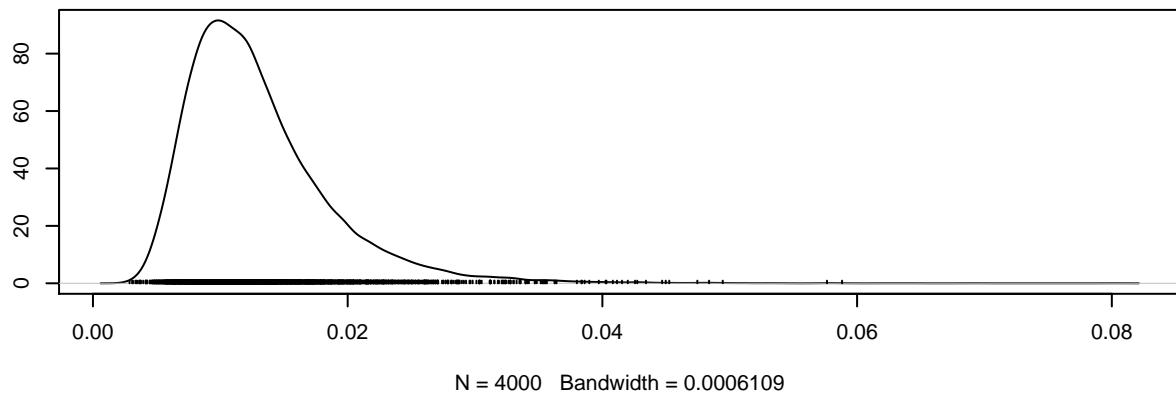


Density plots

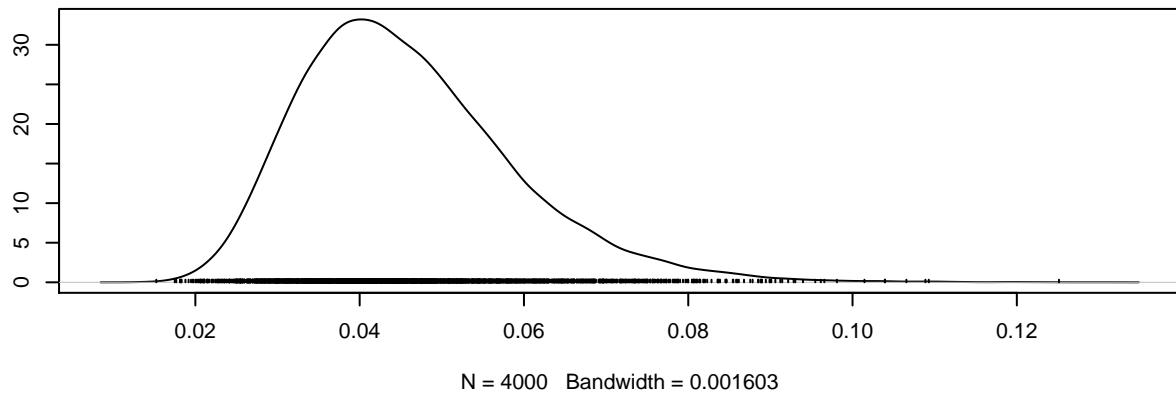
Density plot: Self-reported test positivity – Round 1



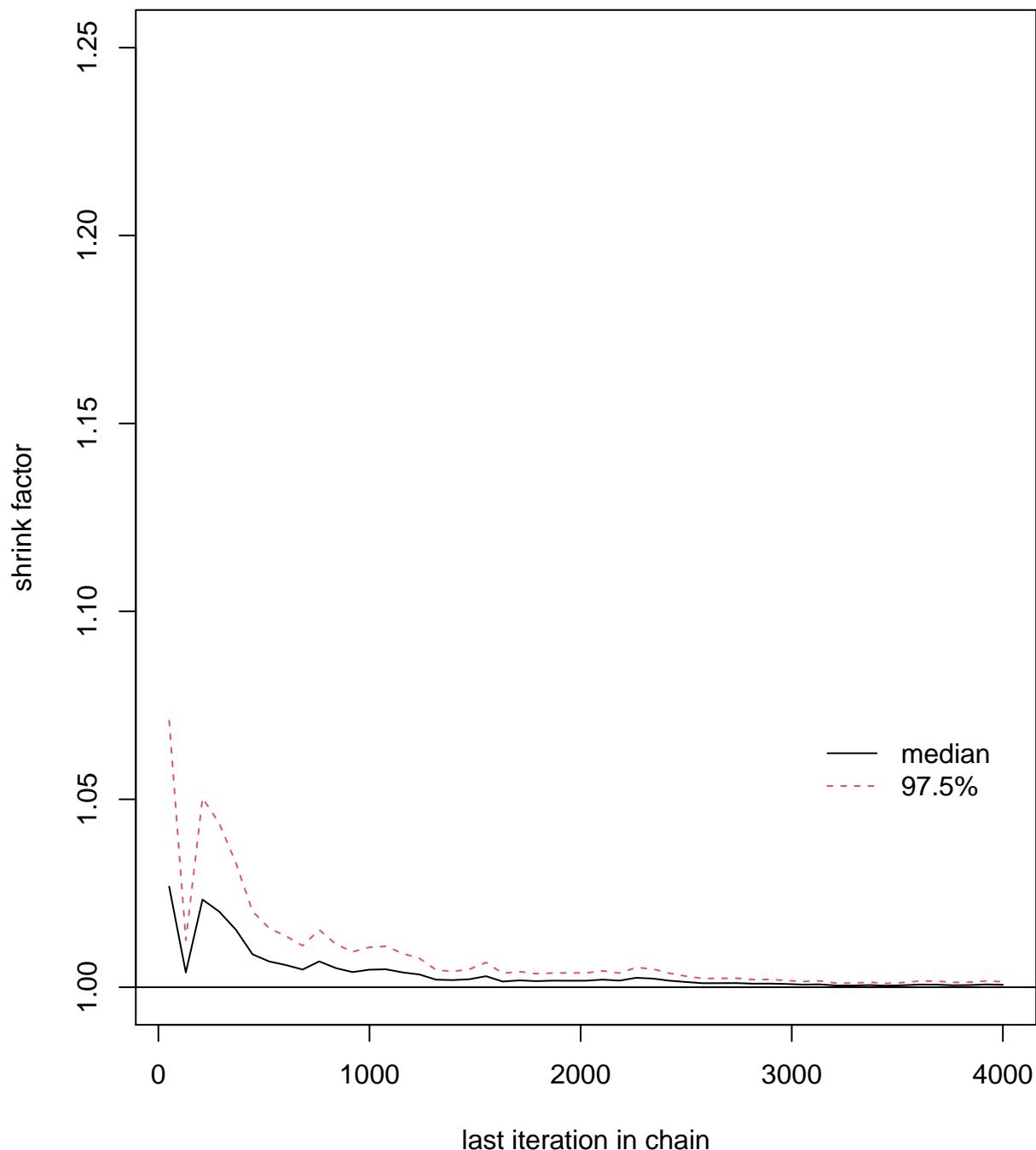
Density plot: Self-reported test positivity – Round 2



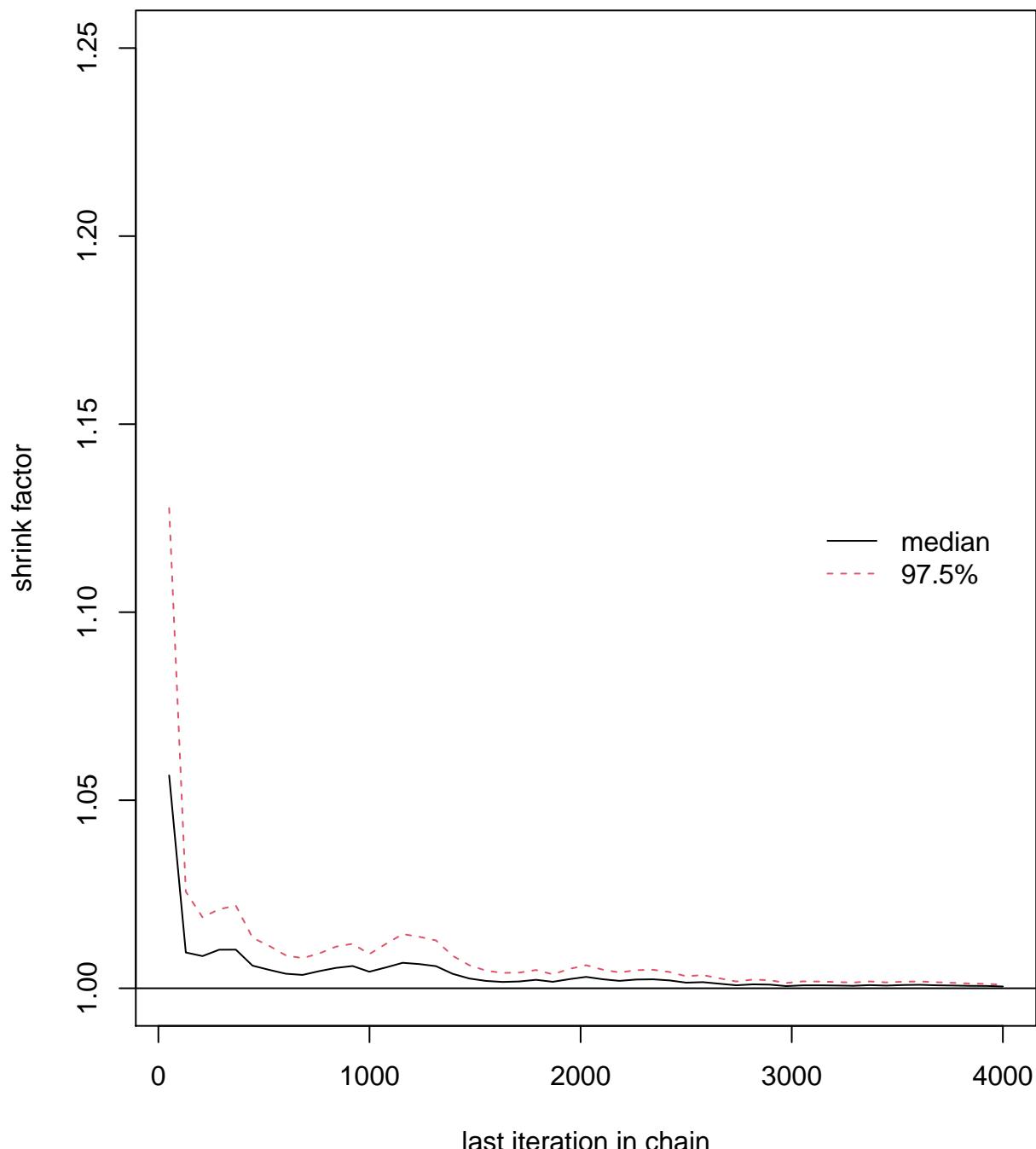
Density plot: Self-reported test positivity – Round 3



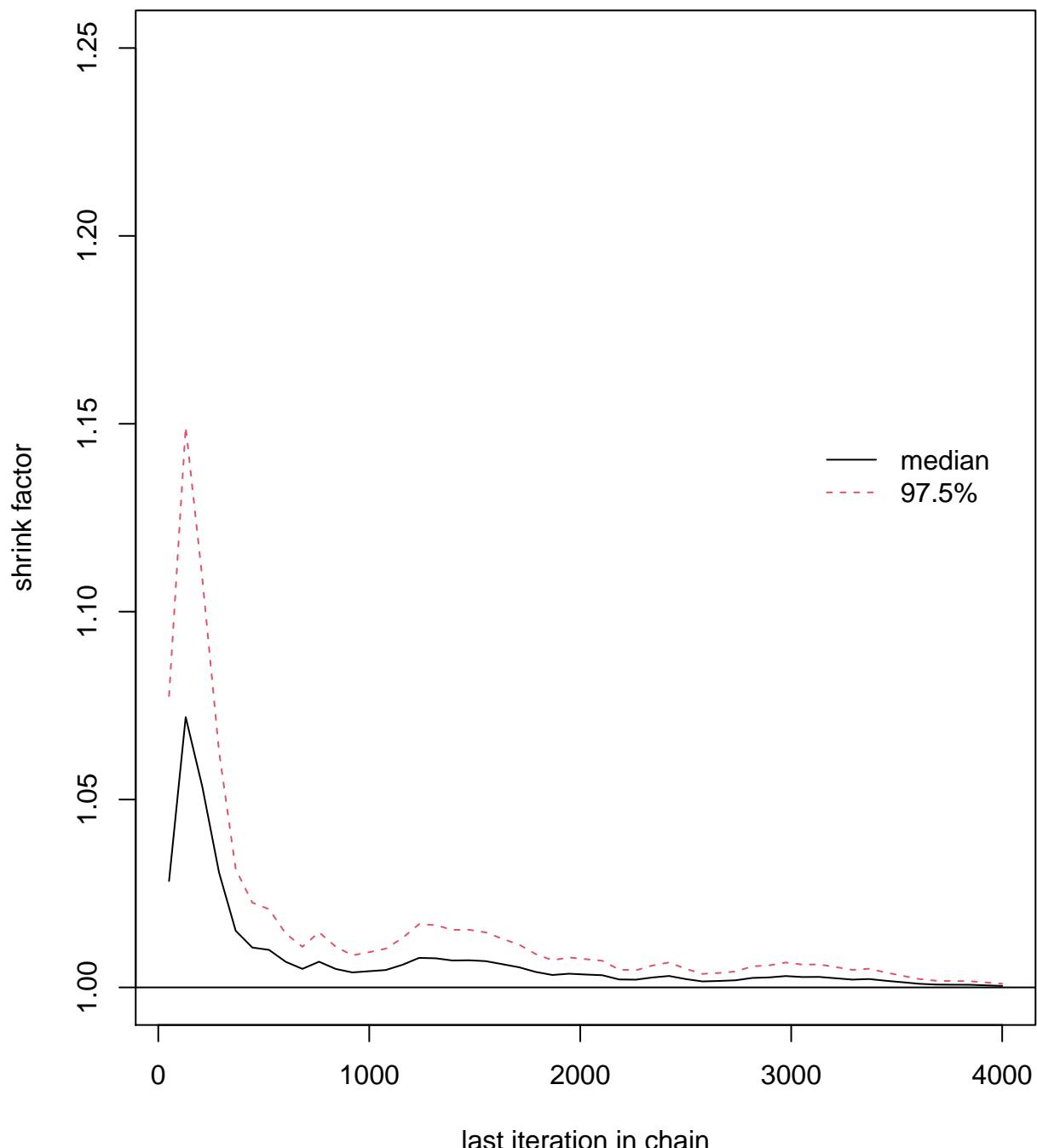
Self-reported test positivity – Round 1



Self-reported test positivity – Round 2

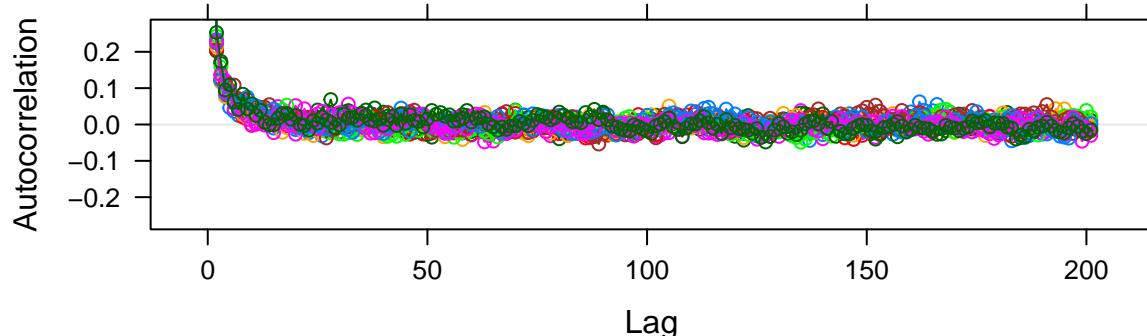


Self-reported test positivity – Round 3

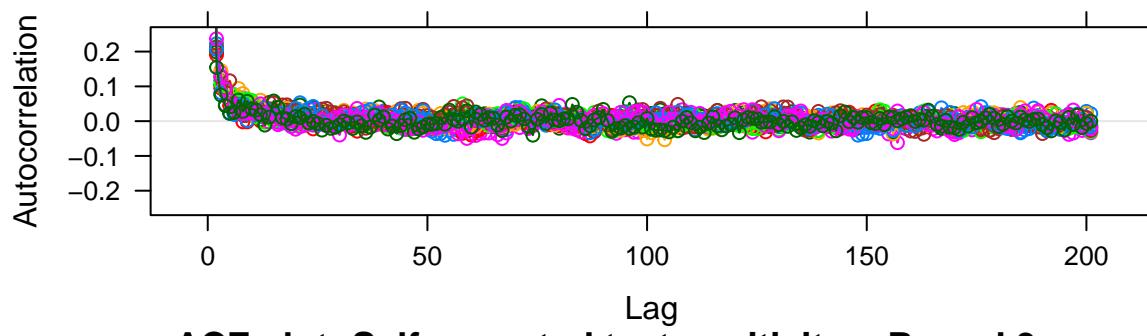


Autocorrelation plots

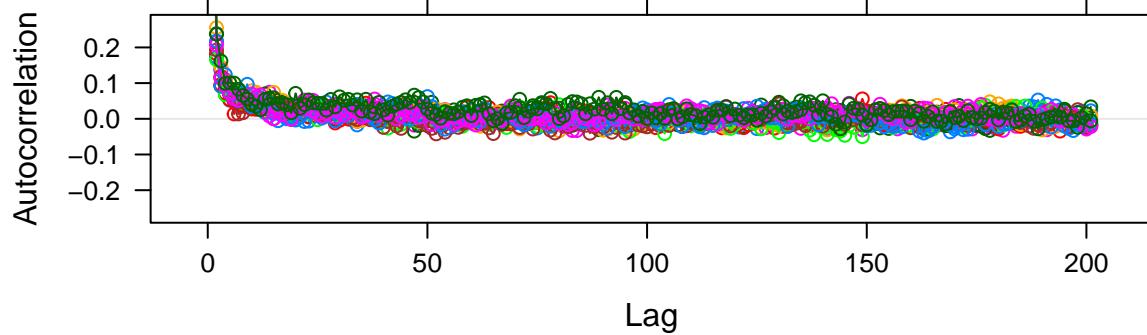
ACF plot: Self-reported test positivity – Round 1



ACF plot: Self-reported test positivity – Round 2



ACF plot: Self-reported test positivity – Round 3



COVID-19 probable case

Effective Sample Size

\begin{table}[H]

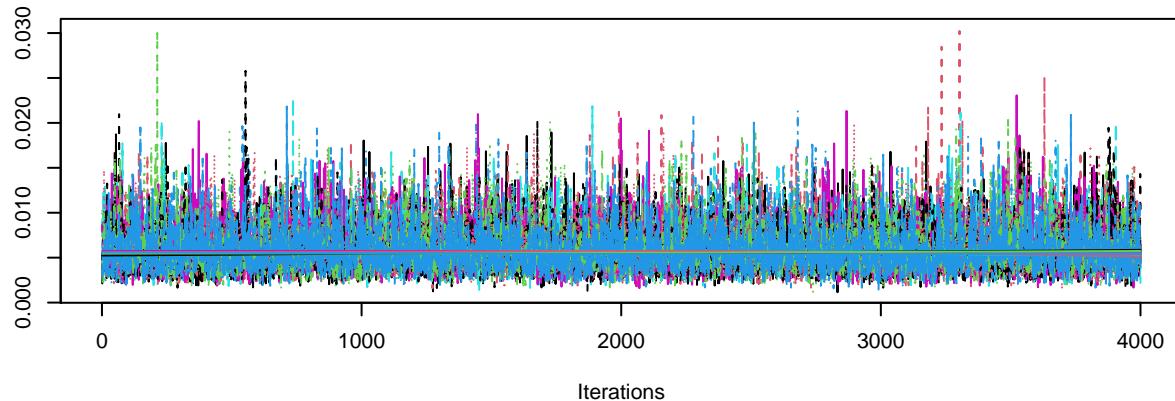
\caption{Effective Sample Size: covid_prob test positivity}

Round	ESS
Round 1	13070
Round 2	11940
Round 3	11317

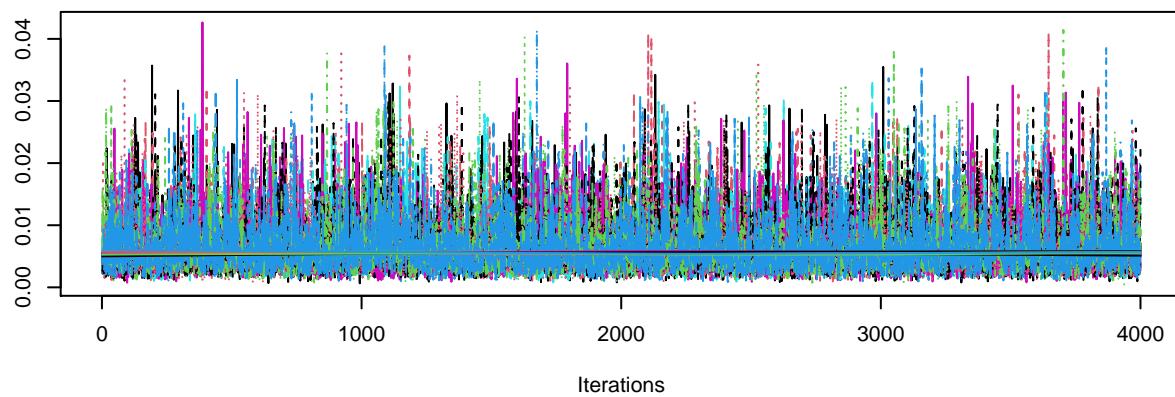
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Trace plots

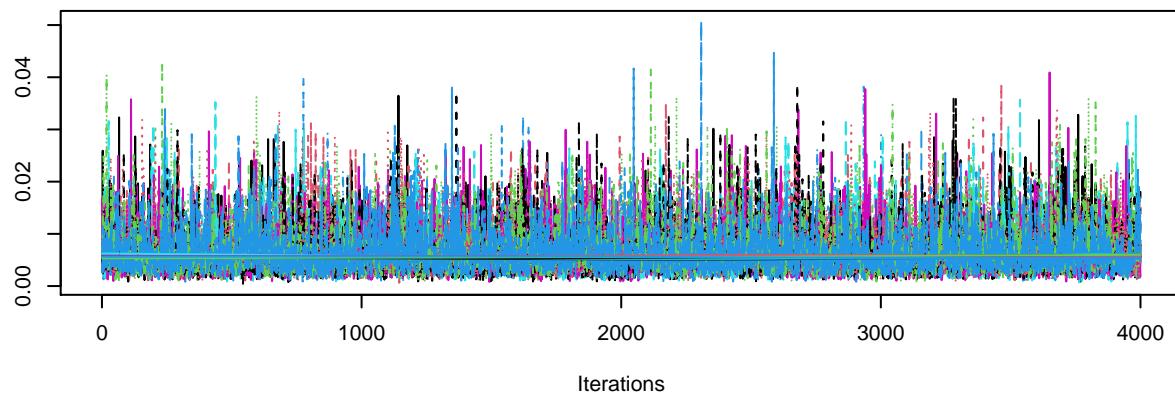
covid_prob test positivity – Round 1



covid_prob test positivity – Round 2

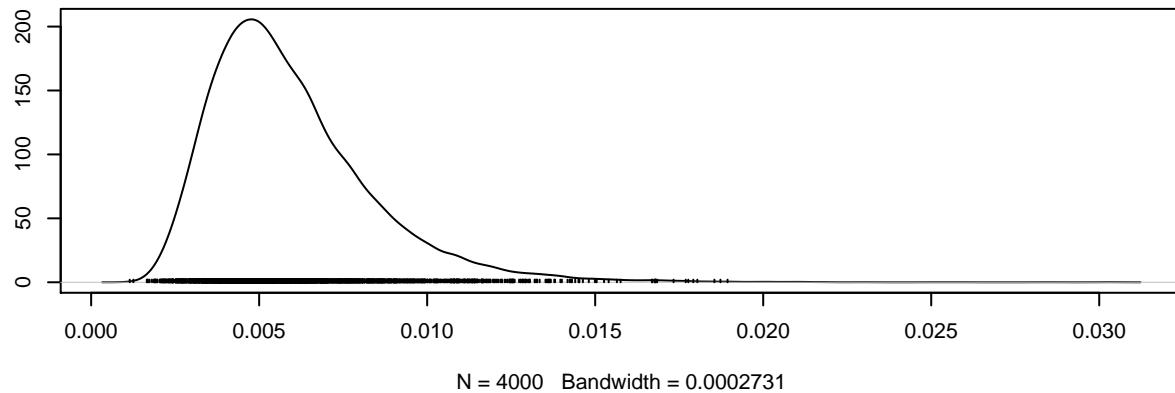


covid_prob test positivity – Round 3

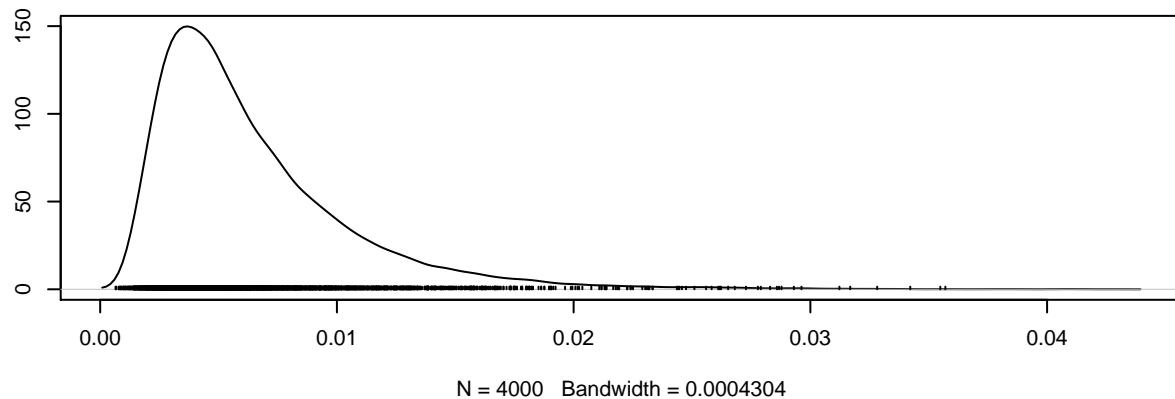


Density plots

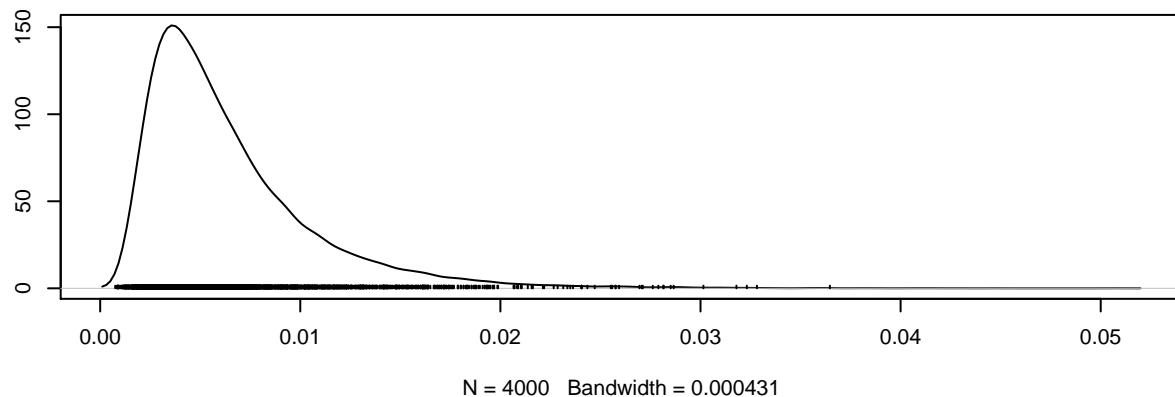
Density plot: covid_prob test positivity – Round 1



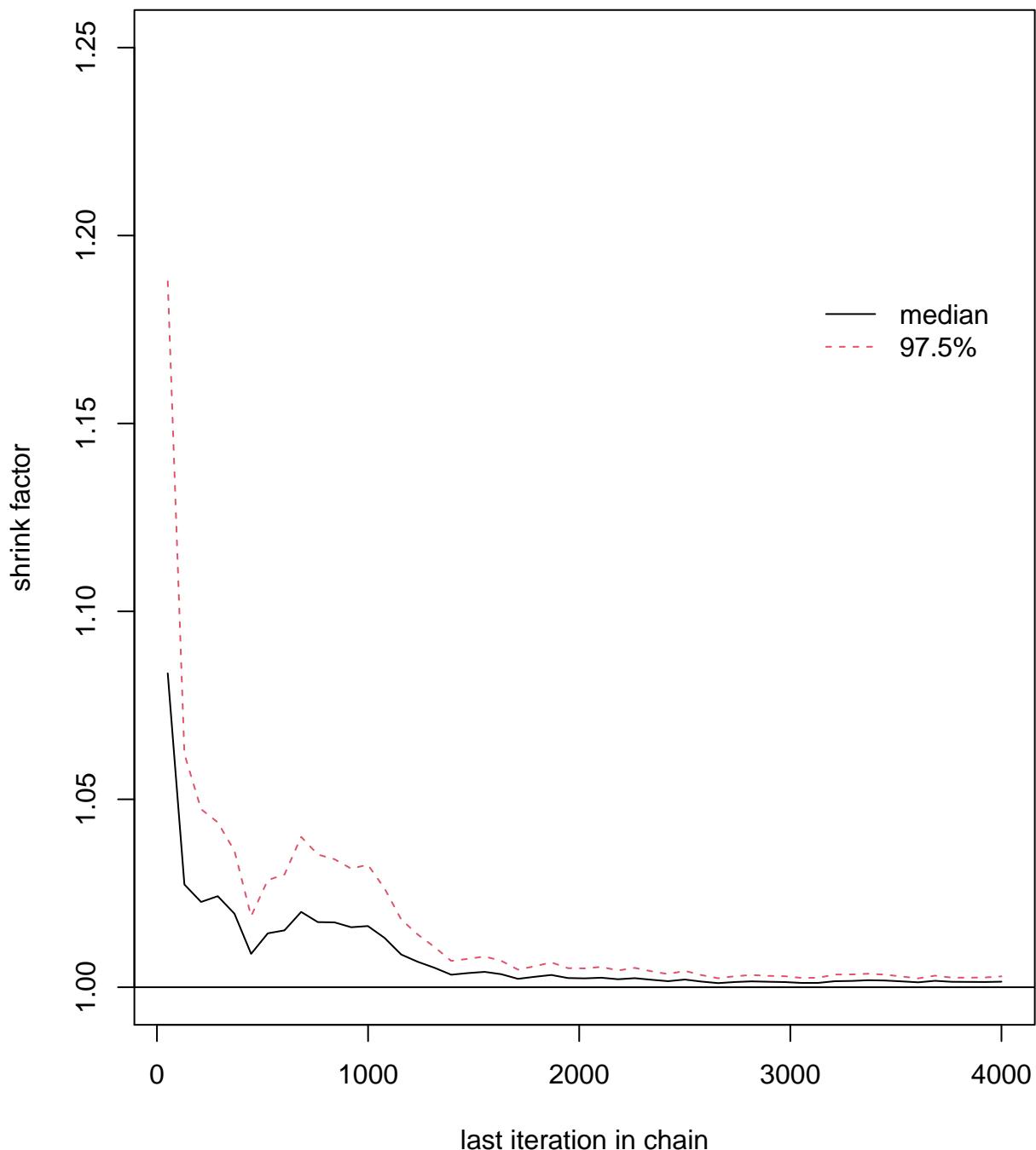
Density plot: covid_prob test positivity – Round 2



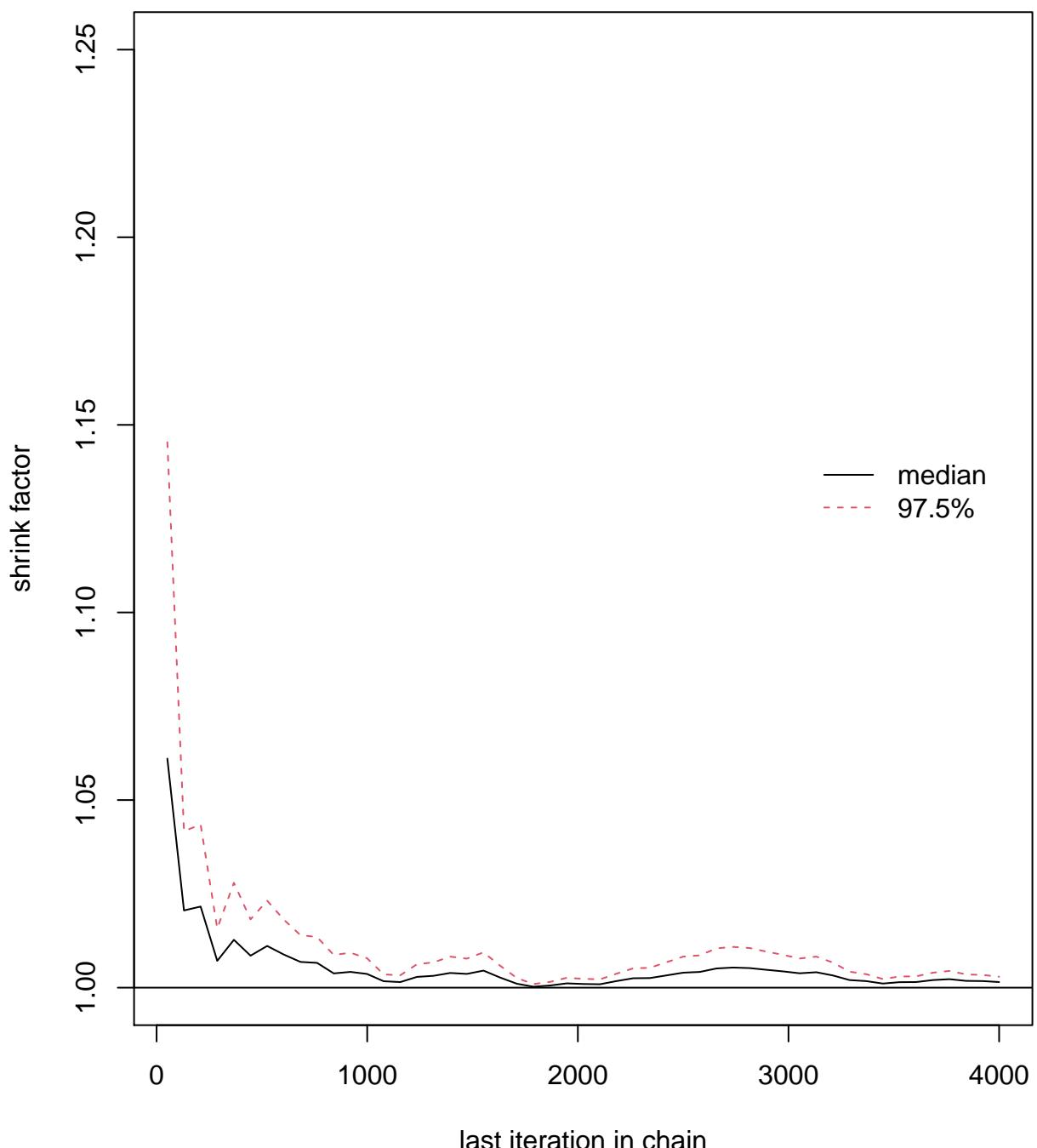
Density plot: covid_prob test positivity – Round 3



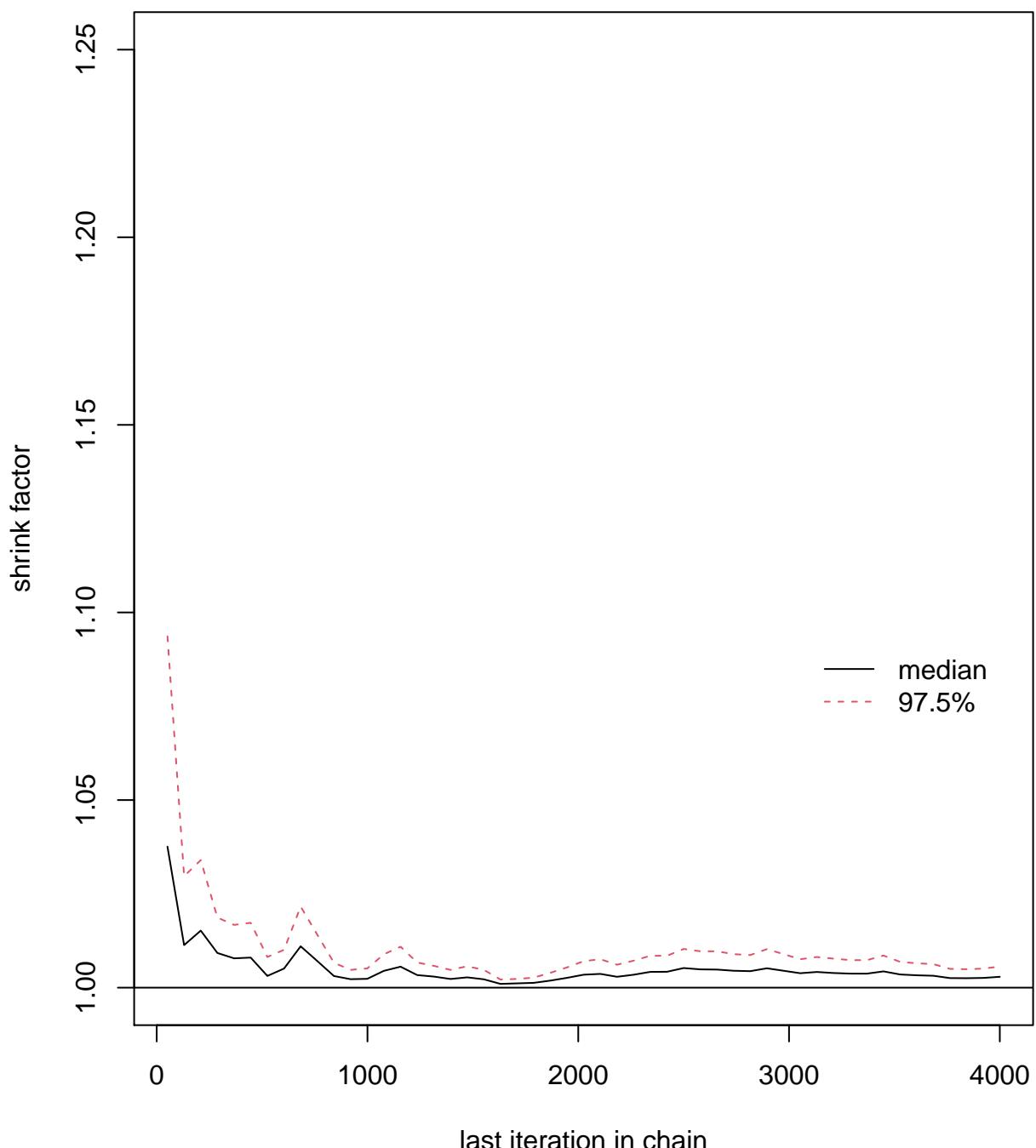
Gelman Diagnostic
covid_prob test positivity – Round 1



covid_prob test positivity – Round 2

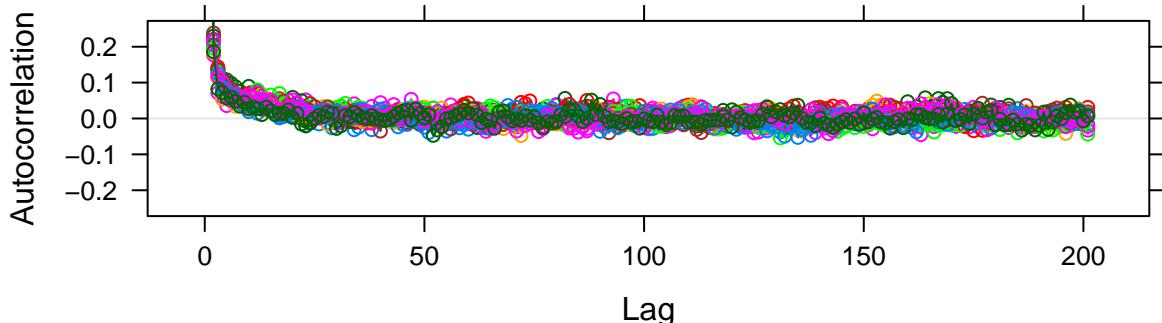


covid_prob test positivity – Round 3

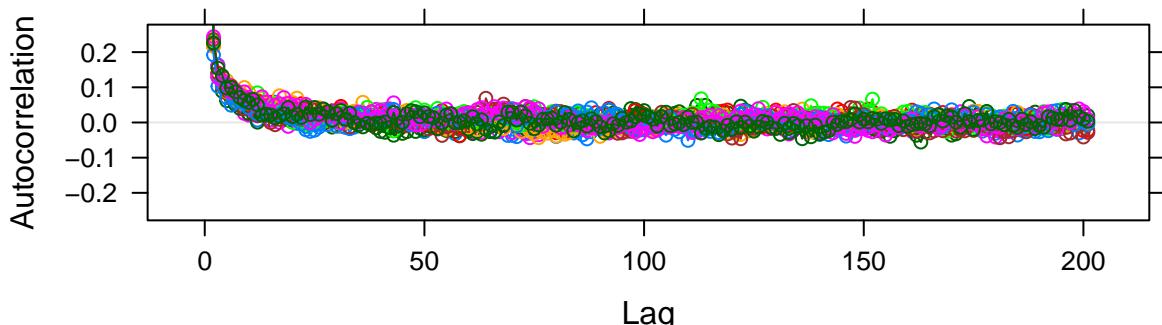


Autocorrelation plots

ACF plot: covid_prob test positivity – Round 1



ACF plot: covid_prob test positivity – Round 2



ACF plot: covid_prob test positivity – Round 3

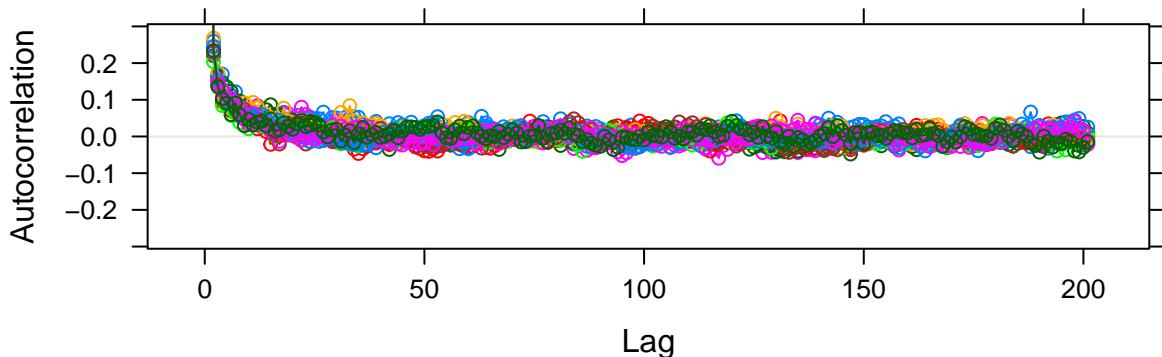


Table 4

Table 4 presents results from analyses comparing the prevalence of antibodies to the SARS-CoV2-2 spike protein in Round 3. Presence of such antibodies is indicative of previous natural infection or vaccination. Since infection rates are so low, almost all of the prevalence in spike antibodies can be attributed to vaccination in Round 3.

PD between non-whites and whites

The first part of table 4 presents prevalence differences between each non-white race/ethnic group and whites, and all non-whites groups compared to whites:

- Prevalence differences
 - Two or more races vs. whites
 - Asian or Pacific Islander (api) vs. whites
 - American Indian or Alaskan Native or Other (ami_other) vs. whites
 - Hispanic vs. whites
 - African-American or Black (aa_black) vs. whites
 - All non-whites vs. whites

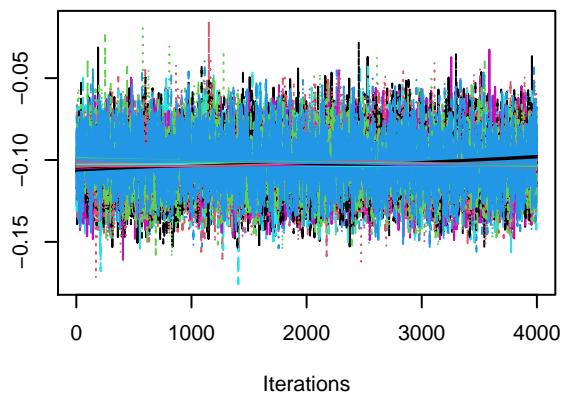
Effective Sample Size

Table 4: Effective Sample Size: Round 3 Spike PD between race/eth groups and whites

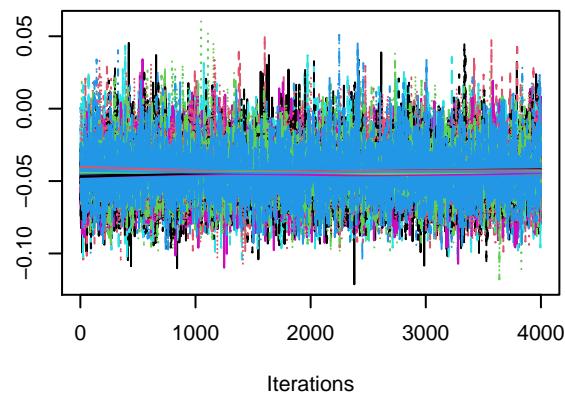
Race.eth	ESS
two_or_more	11069
api	15532
ami_other	7754
hispanic	20634
aa_black	6014
non_white	10229

Trace plots

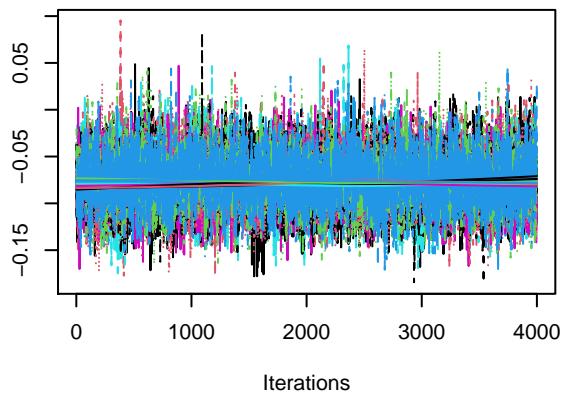
Trace of two_or_more



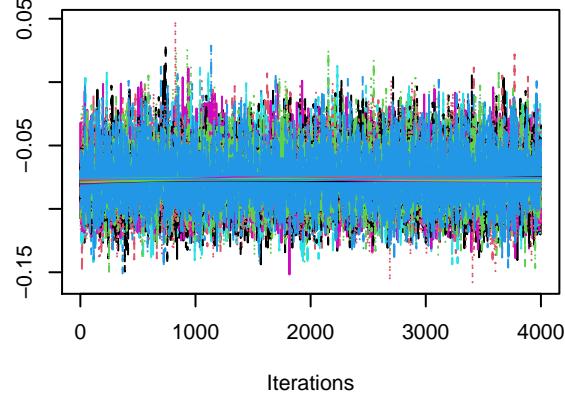
Trace of api



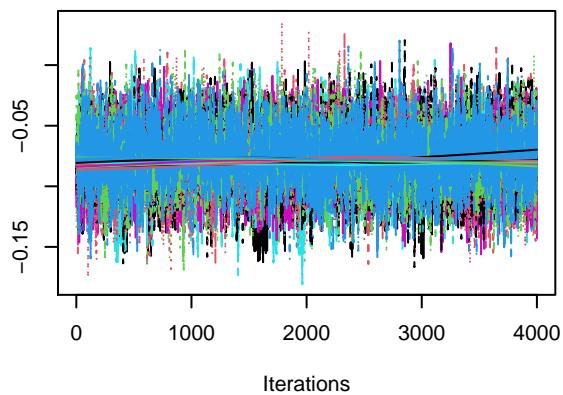
Trace of ami_other



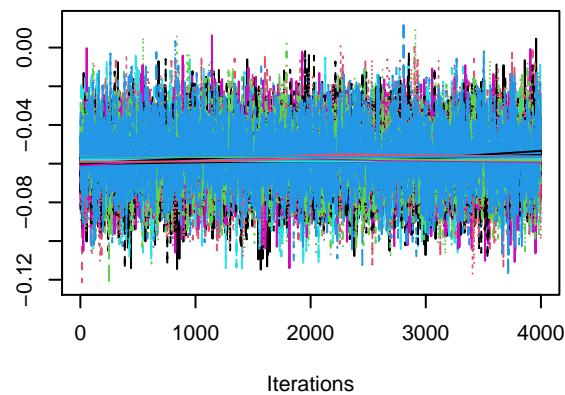
Trace of hispanic



Trace of aa_black

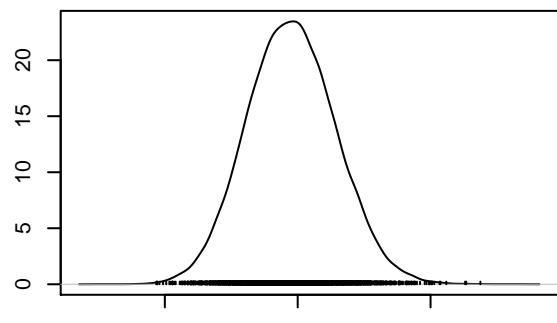


Trace of non_white



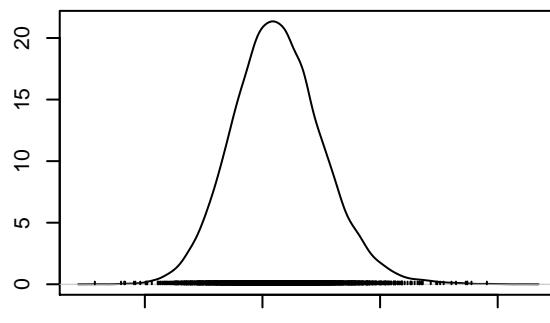
Density plots

Density of two_or_more



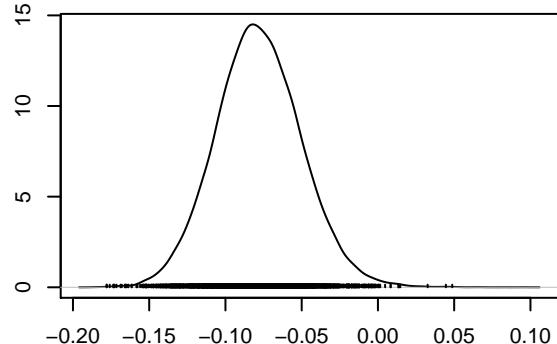
N = 4000 Bandwidth = 0.002124

Density of api



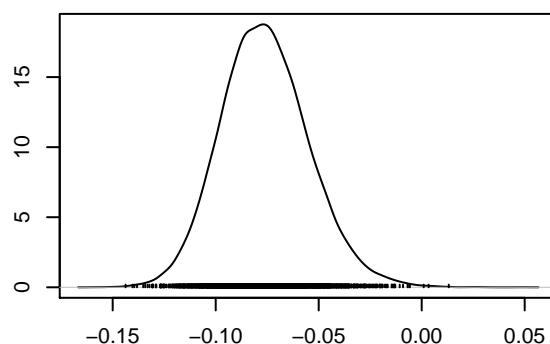
N = 4000 Bandwidth = 0.00237

Density of ami_other



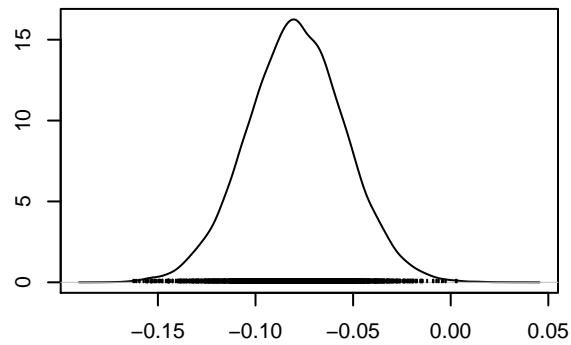
N = 4000 Bandwidth = 0.003523

Density of hispanic



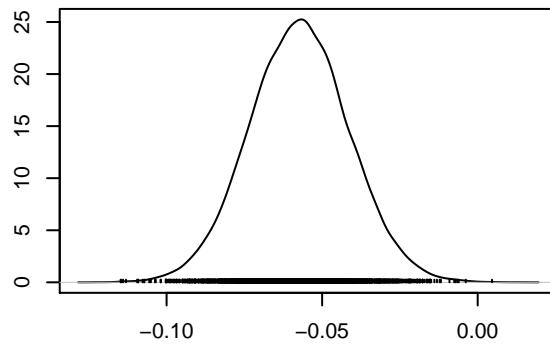
N = 4000 Bandwidth = 0.002692

Density of aa_black



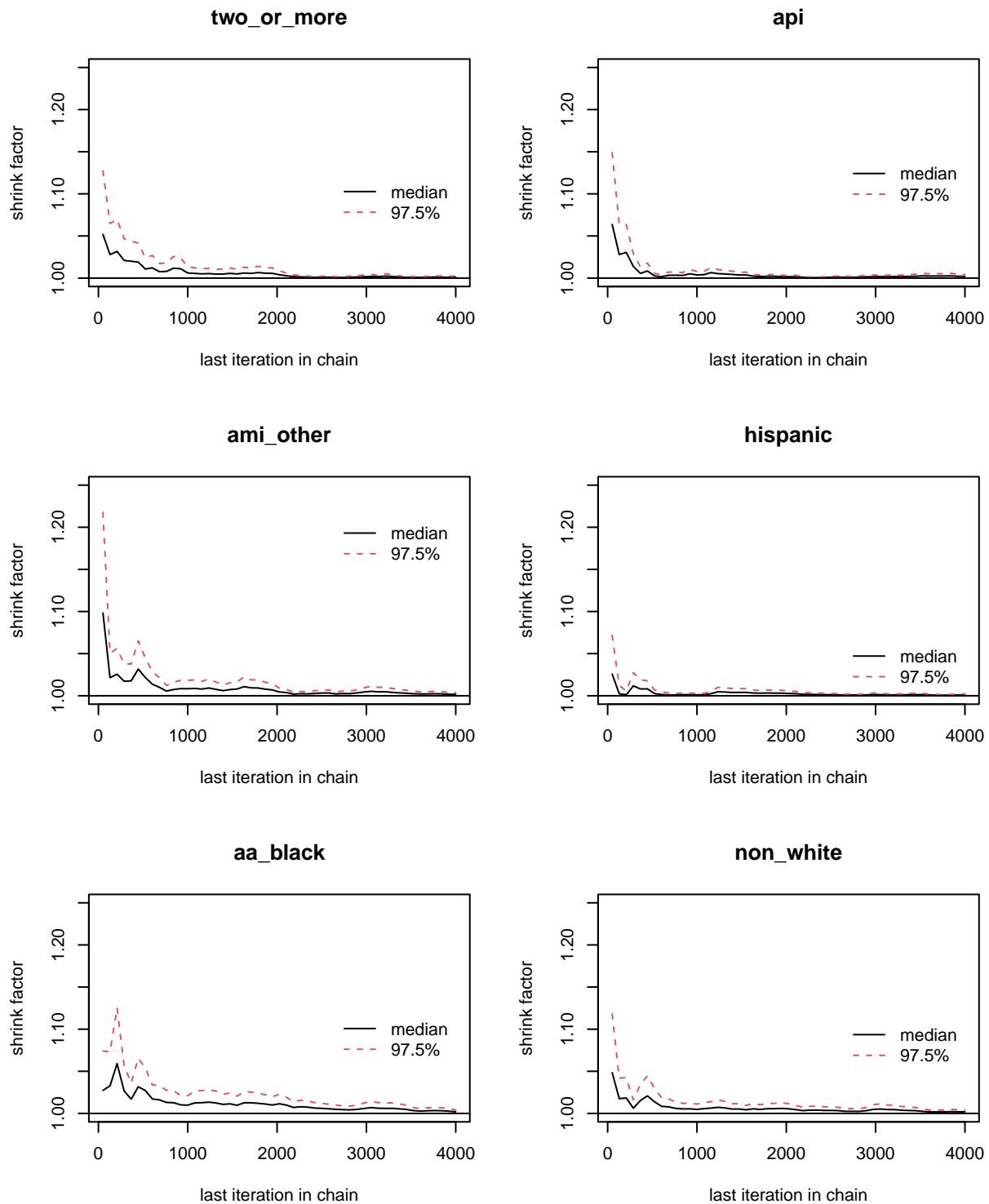
N = 4000 Bandwidth = 0.003161

Density of non_white



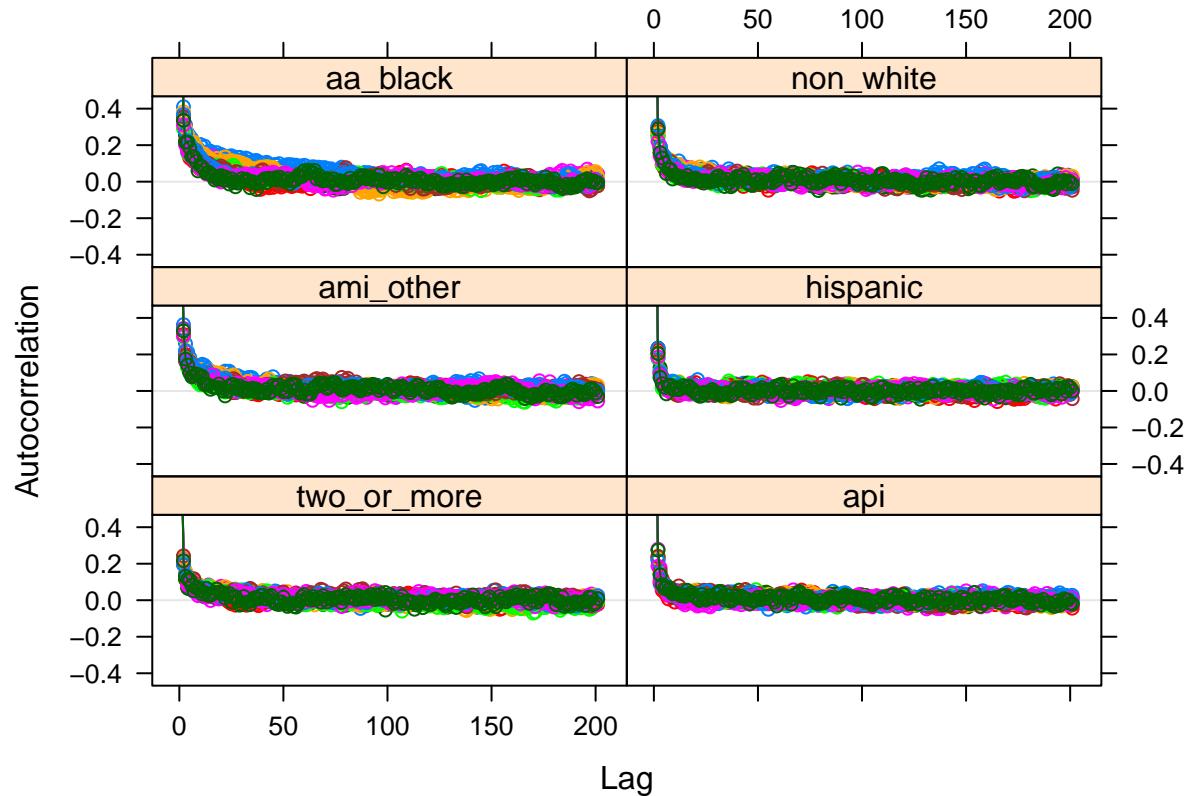
N = 4000 Bandwidth = 0.002024

Gelman Diagnostic



Autocorrelation plots

ACF plot: Round 3 Spike PD between race/eth groups and whites



PD between non-whites and whites within age-groups

The second part of table 4 presents prevalence differences between each non-white and whites (ref) within those aged race/ethnic group and whites, and all non-whites groups compared to whites within each age group:

- Prevalence difference - non_white compared to white (ref) within age groups
 - 18-29 years
 - 30-44 years
 - 45-64 years
 - 65-74 years
 - 75 or more years

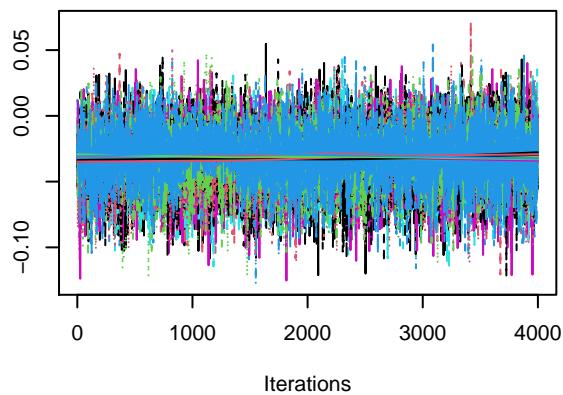
Effective Sample Size

Table 5: Effective Sample Size: Round 3 Spike PD between race/eth groups and whites

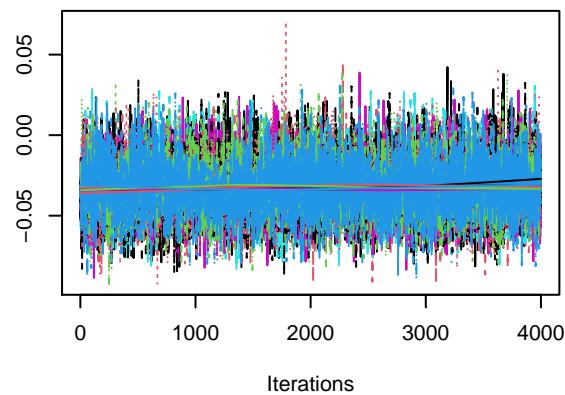
Race.eth	ESS
non_white_18_30	15222
non_white_30_45	9911
non_white_45_65	6821
non_white_65_75	5683
non_white_75	7425

Trace plots

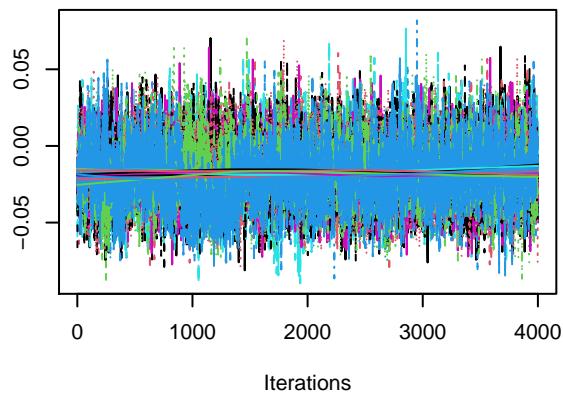
Trace of non_white_18_30



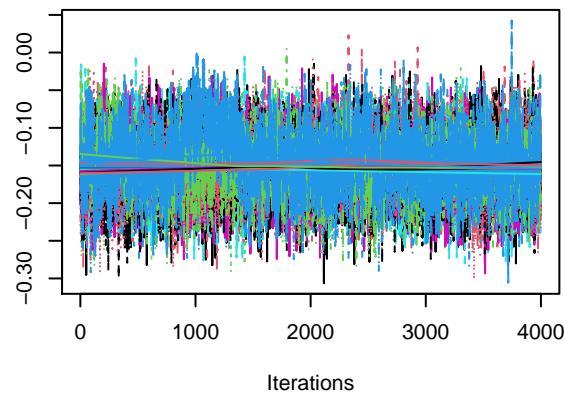
Trace of non_white_30_45



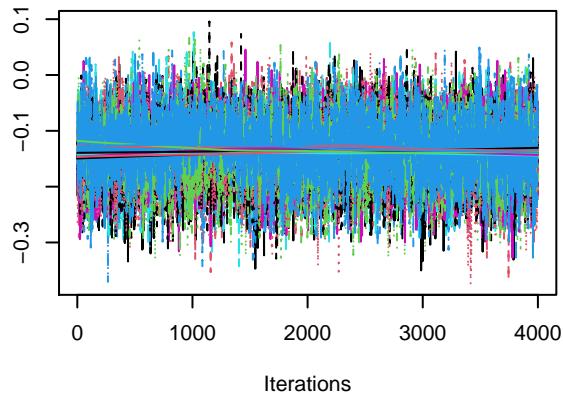
Trace of non_white_45_65



Trace of non_white_65_75

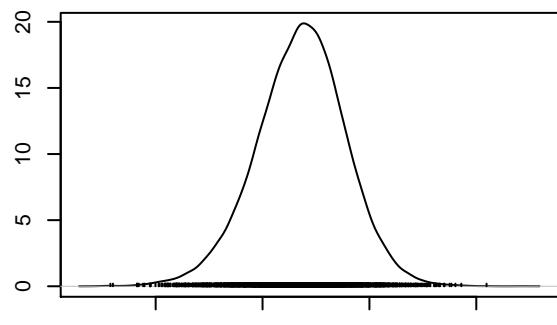


Trace of non_white_75



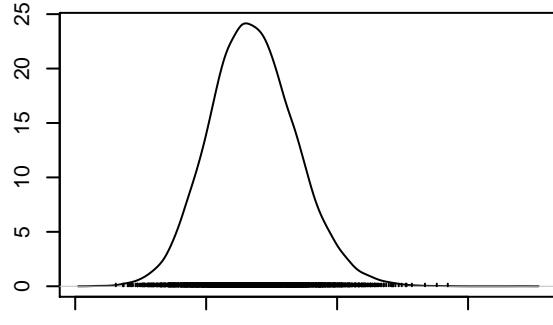
Density plots

Density of non_white_18_30



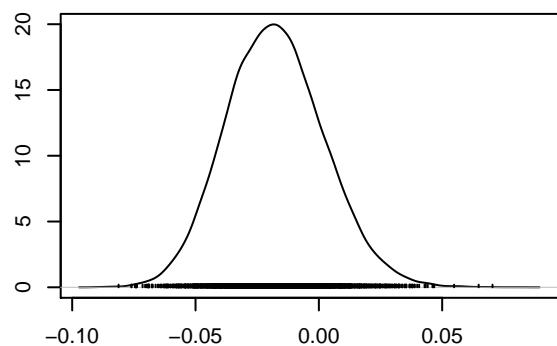
N = 4000 Bandwidth = 0.002582

Density of non_white_30_45



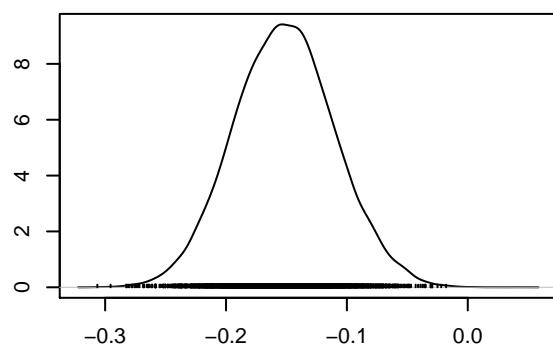
N = 4000 Bandwidth = 0.002095

Density of non_white_45_65



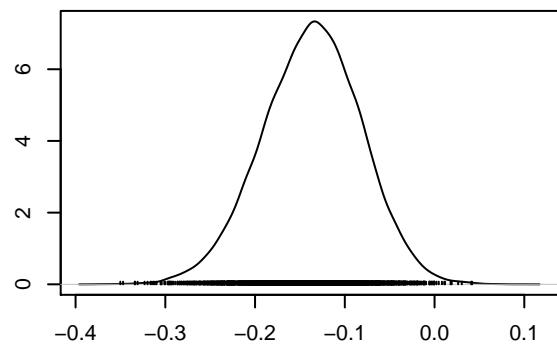
N = 4000 Bandwidth = 0.002527

Density of non_white_65_75



N = 4000 Bandwidth = 0.005298

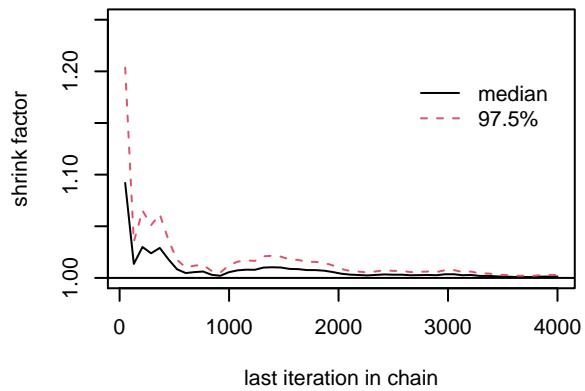
Density of non_white_75



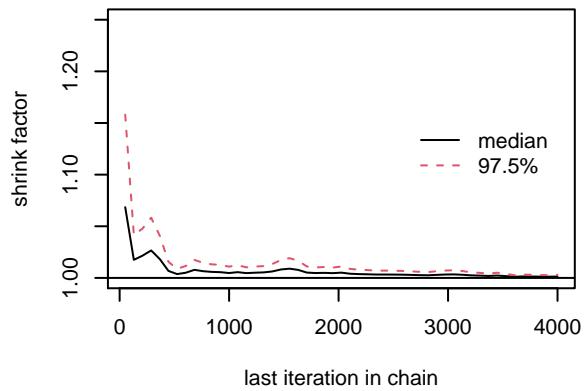
N = 4000 Bandwidth = 0.007017

Gelman Diagnostic

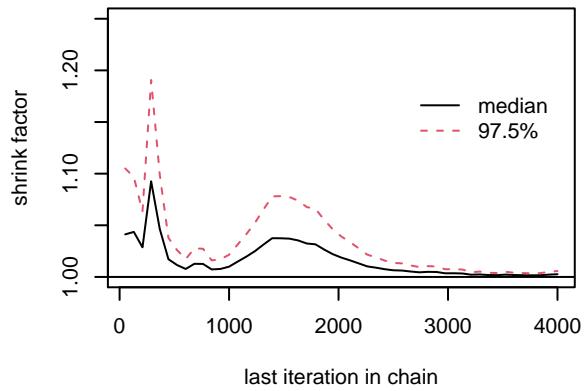
non_white_18_30



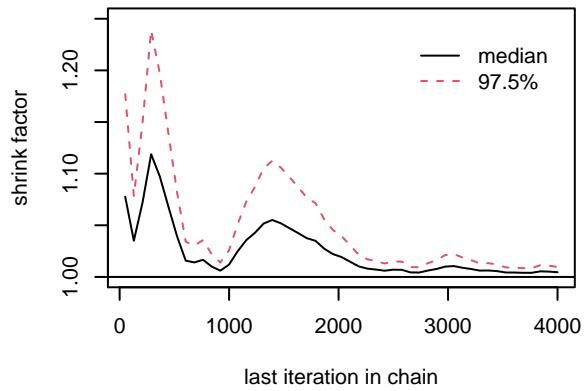
non_white_30_45



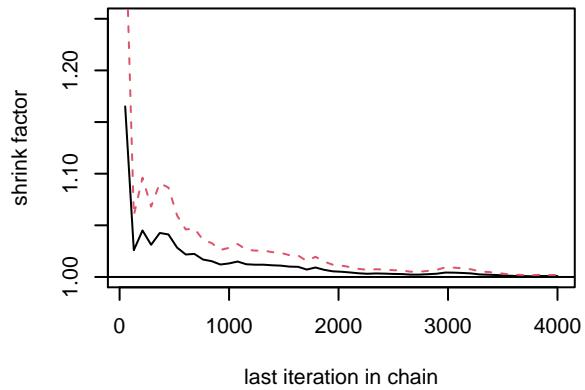
non_white_45_65



non_white_65_75



non_white_75



Autocorrelation plots

plot: Round 3 Spike PD between non-whites and whites within age groups

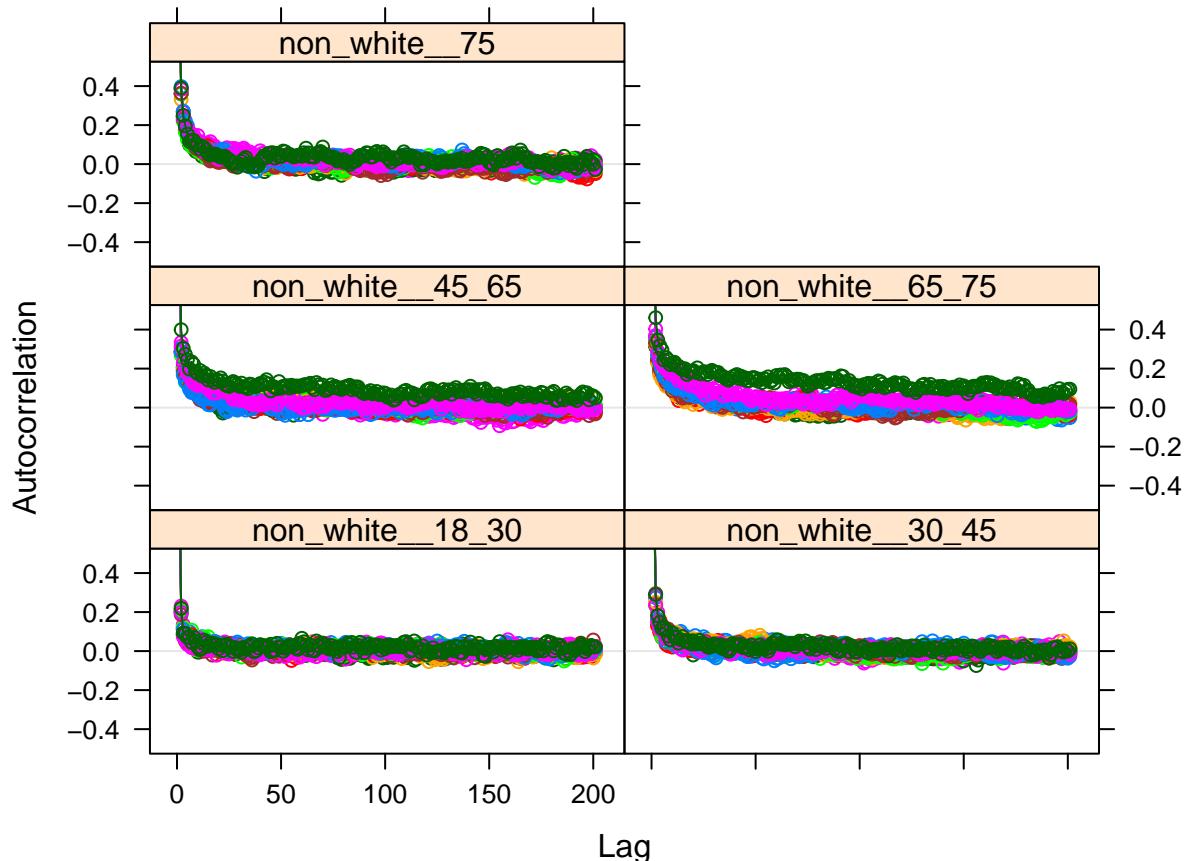


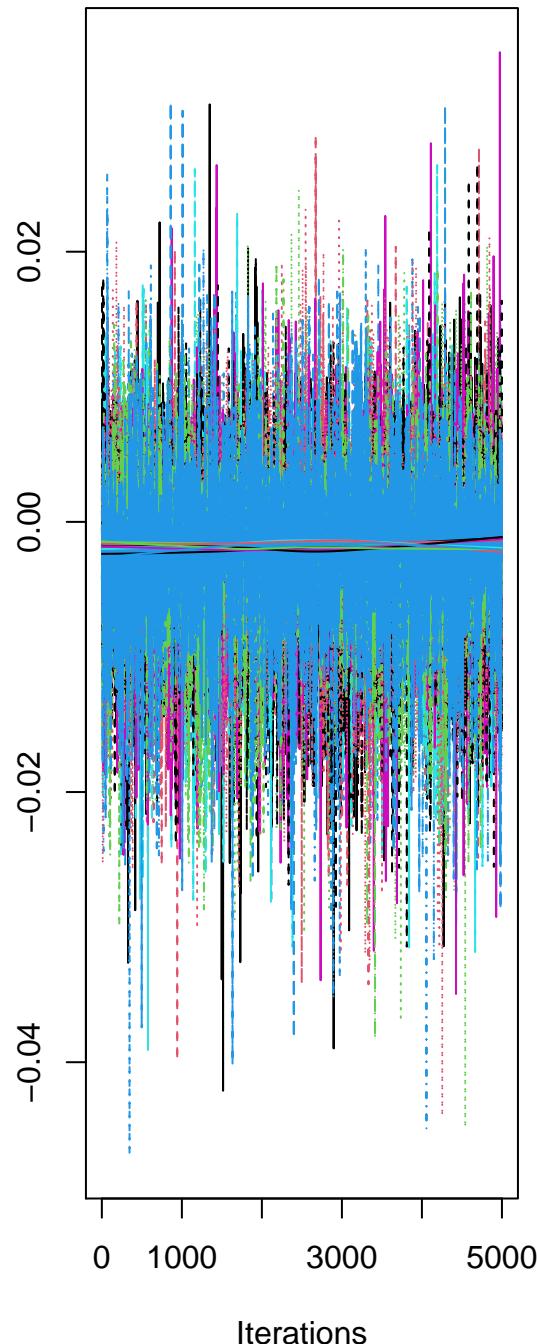
Table 7
Antibody prevalence and mitigation
Effective Sample Size

Table 6: Effective Sample Size: Antibody prev Mitigation

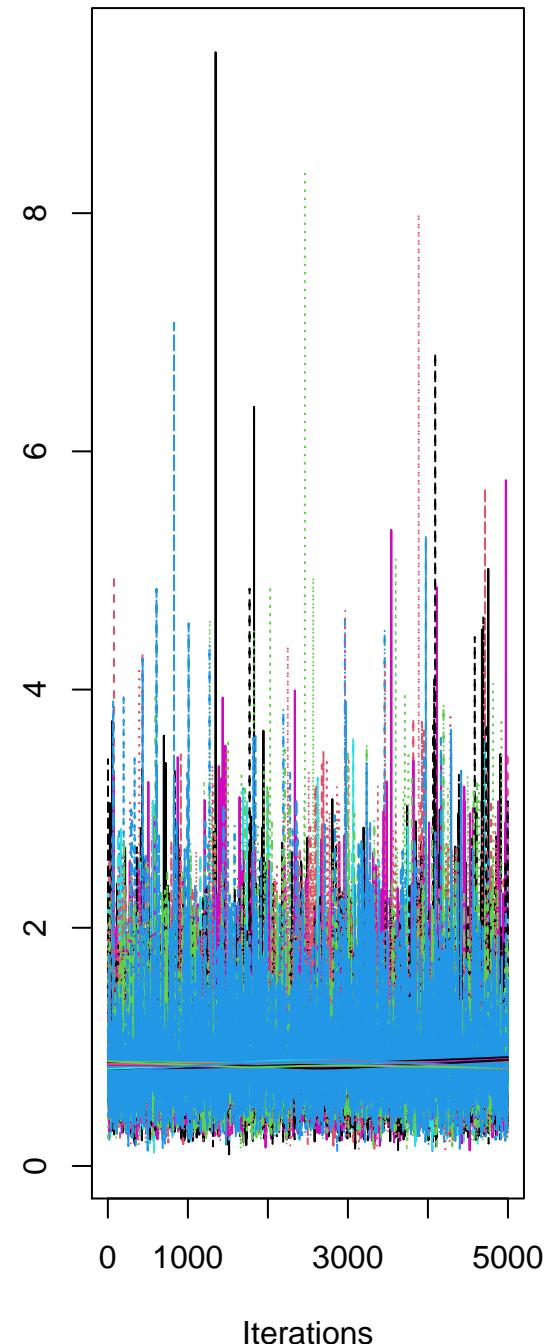
Round	Prev..Diff	Prev..Ratio
Round 1	14248	16276
Round 2	8120	10151
Round 3	13358	14106

Trace plots

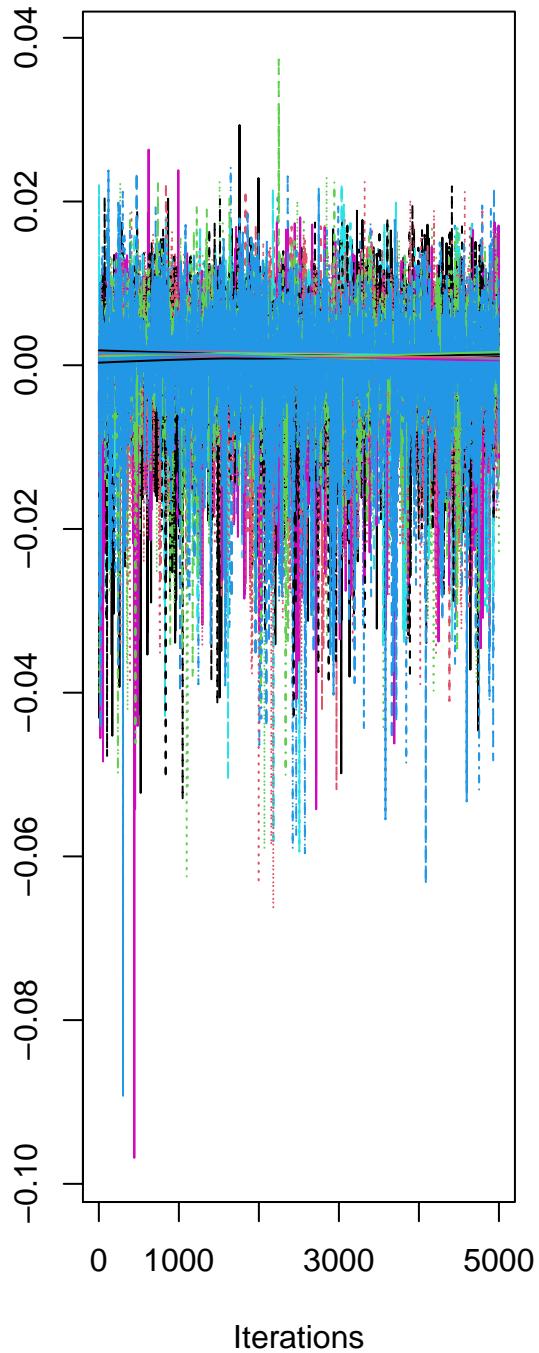
Round 1
Trace of p_avg_mit_PD



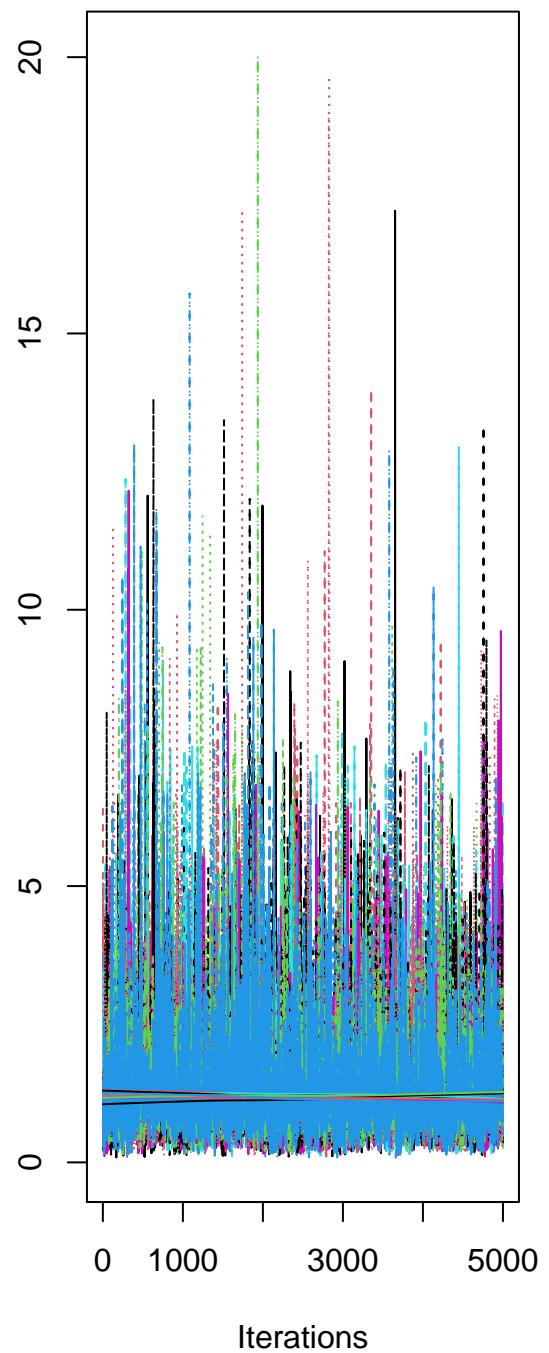
Trace of p_avg_mit_PR



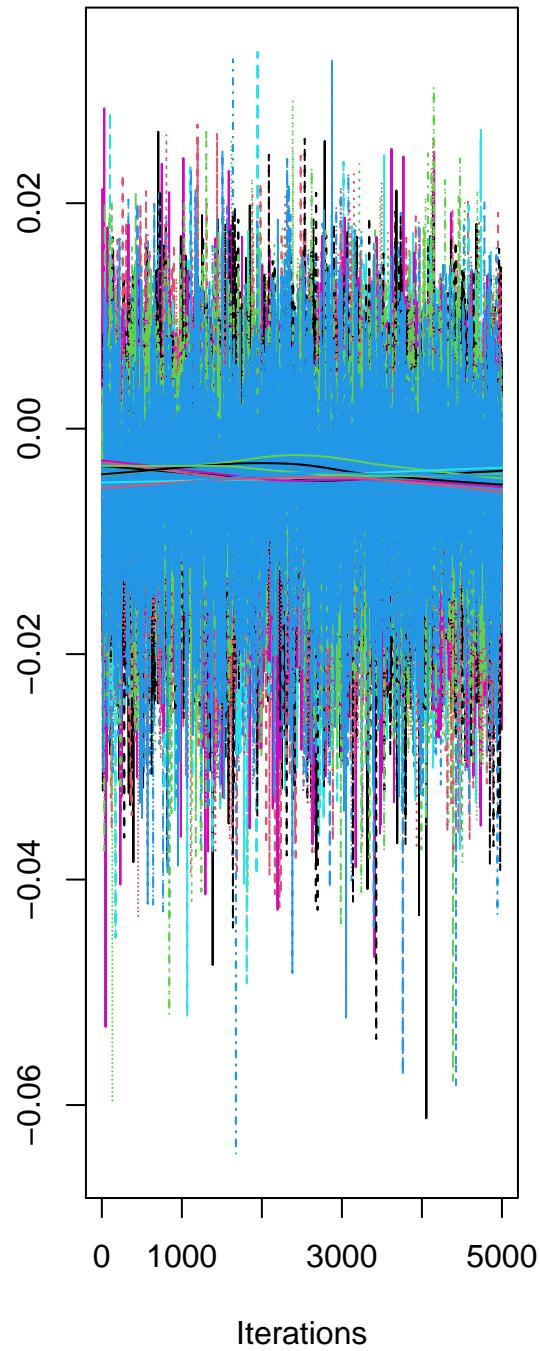
Round 2
Trace of p_avg_mit_PD



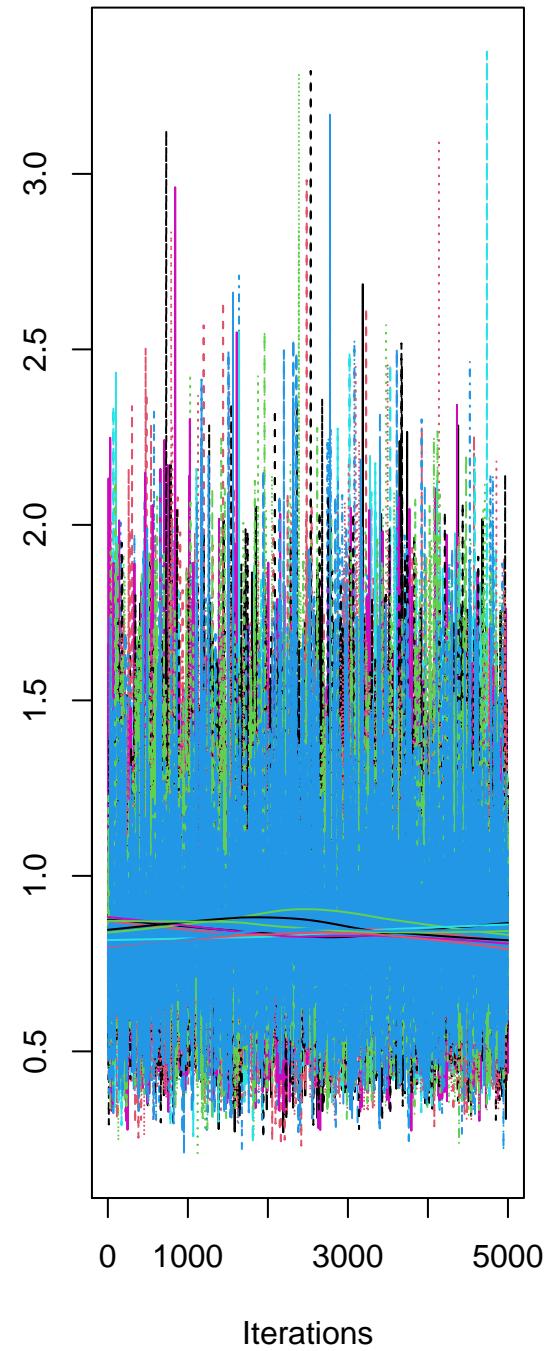
Trace of p_avg_mit_PR



Round 3
Trace of p_avg_mit_PD



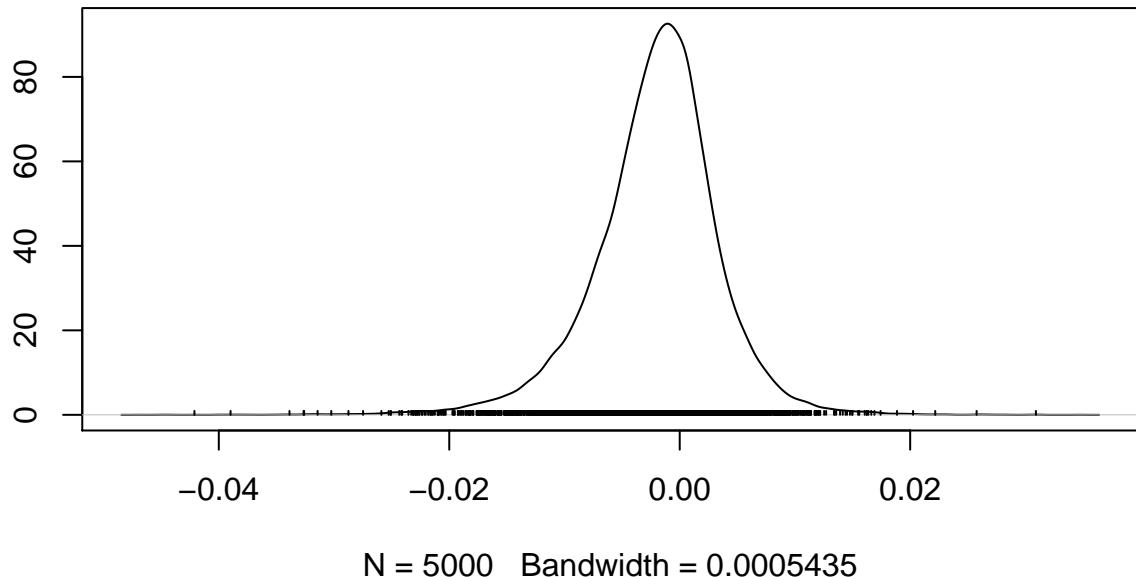
Trace of p_avg_mit_PR



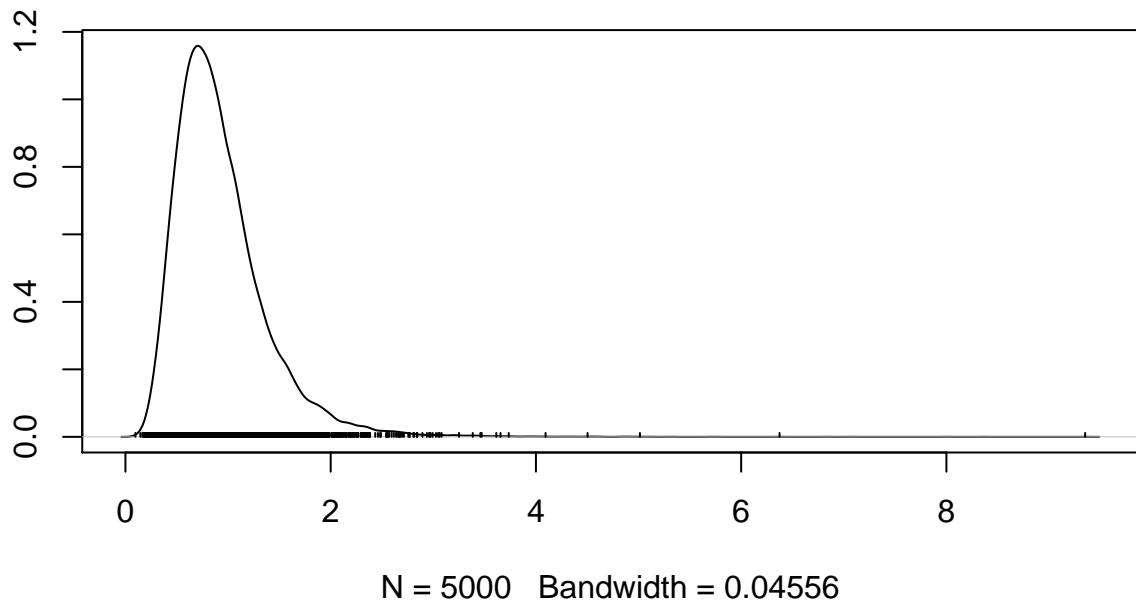
Density plots

Round 1

Density of p_avg_mit_PD

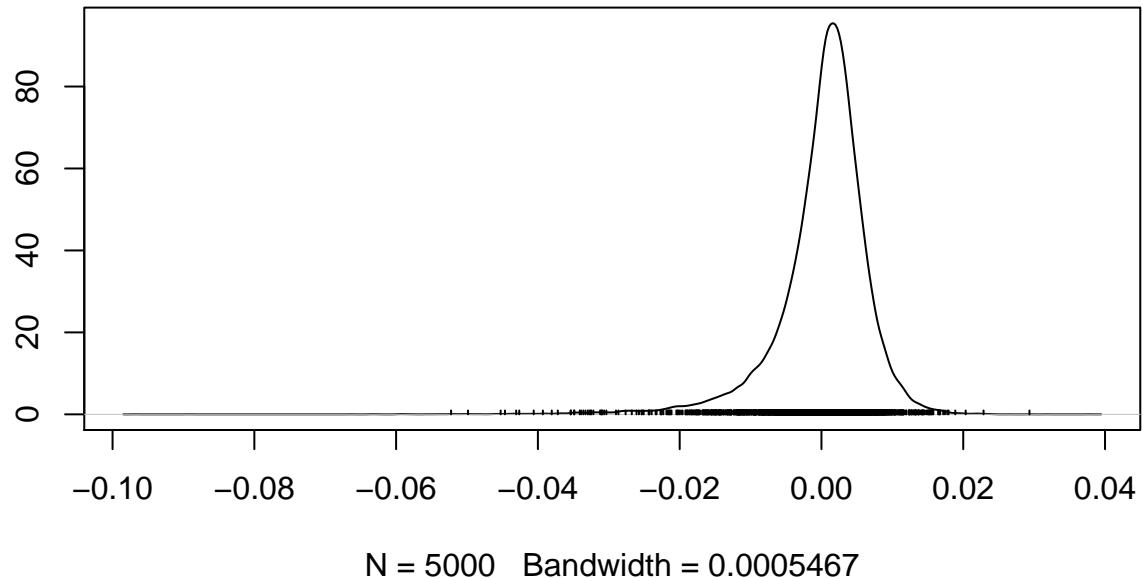


Density of p_avg_mit_PR

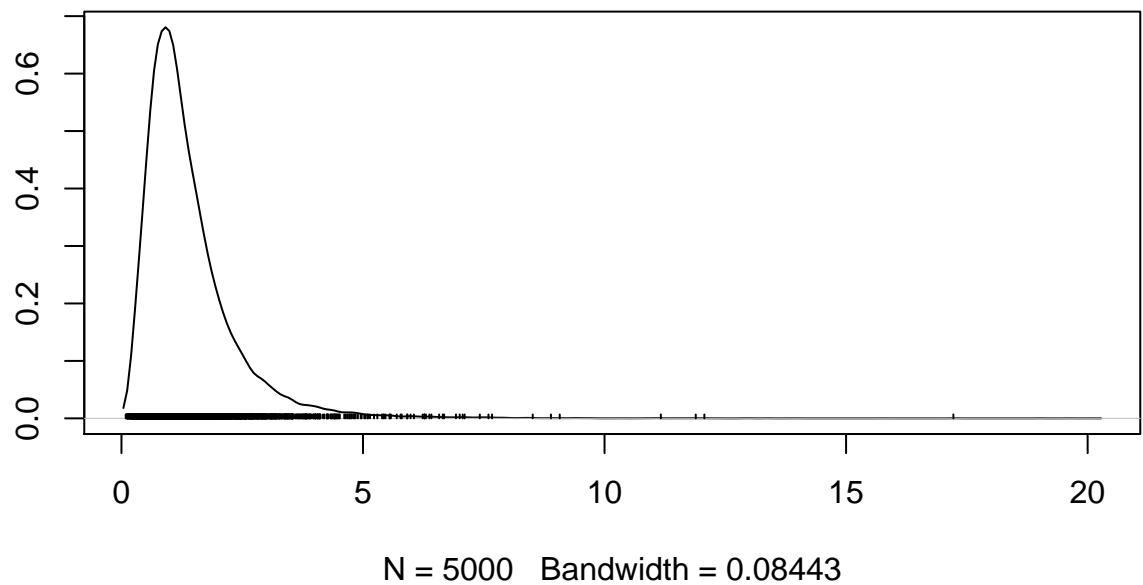


Round 2

Density of p_avg_mit_PD

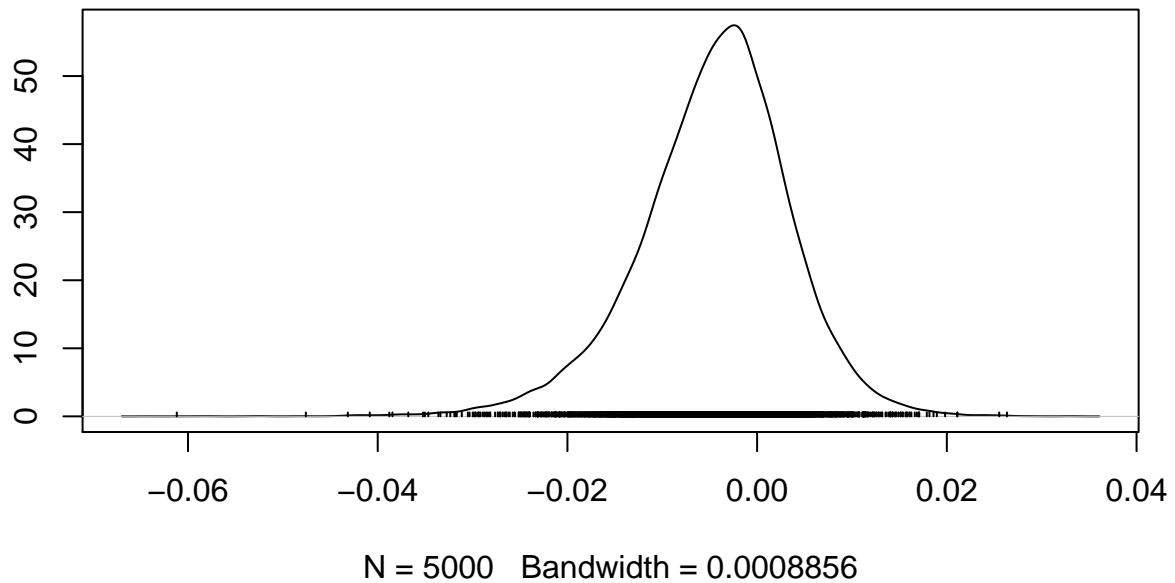


Density of p_avg_mit_PR

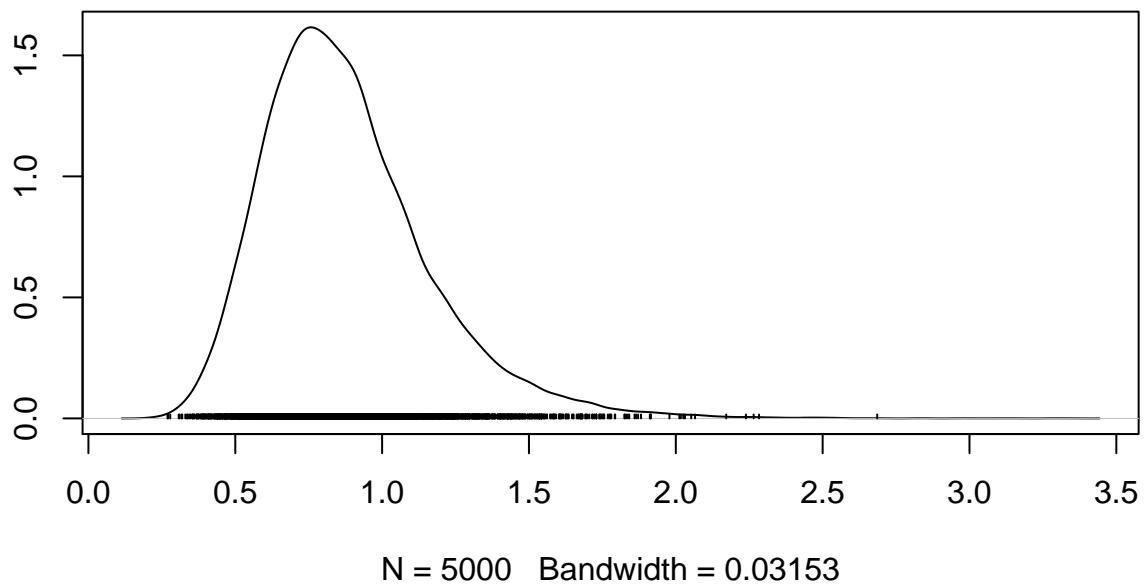


Round 3

Density of p_avg_mit_PD

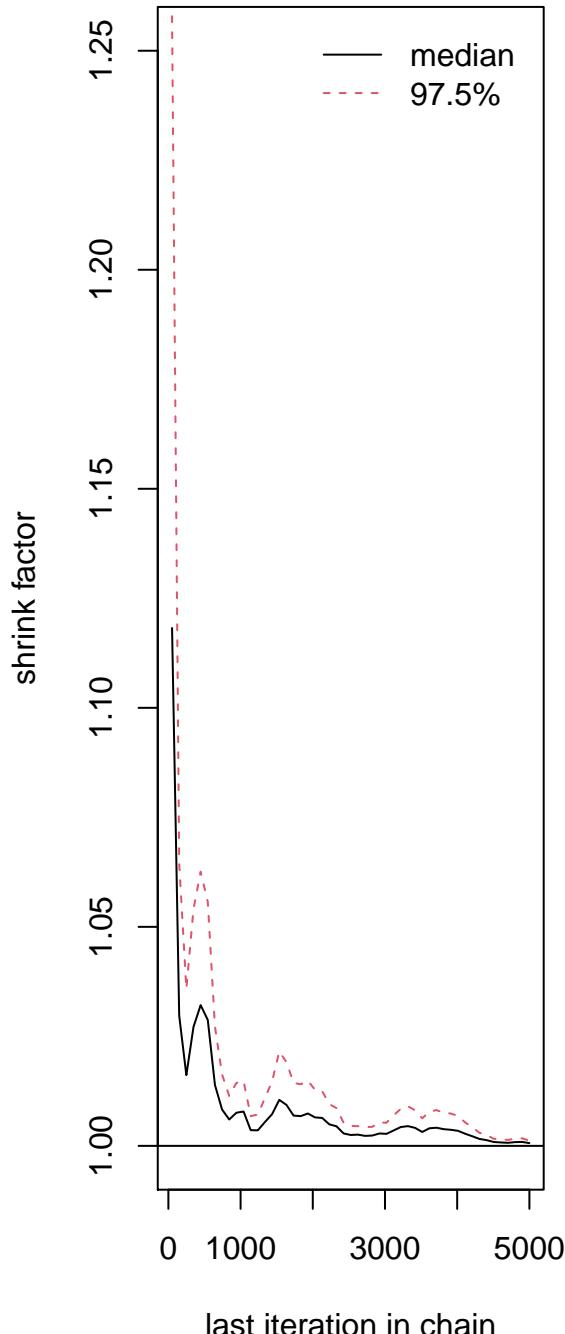


Density of p_avg_mit_PR

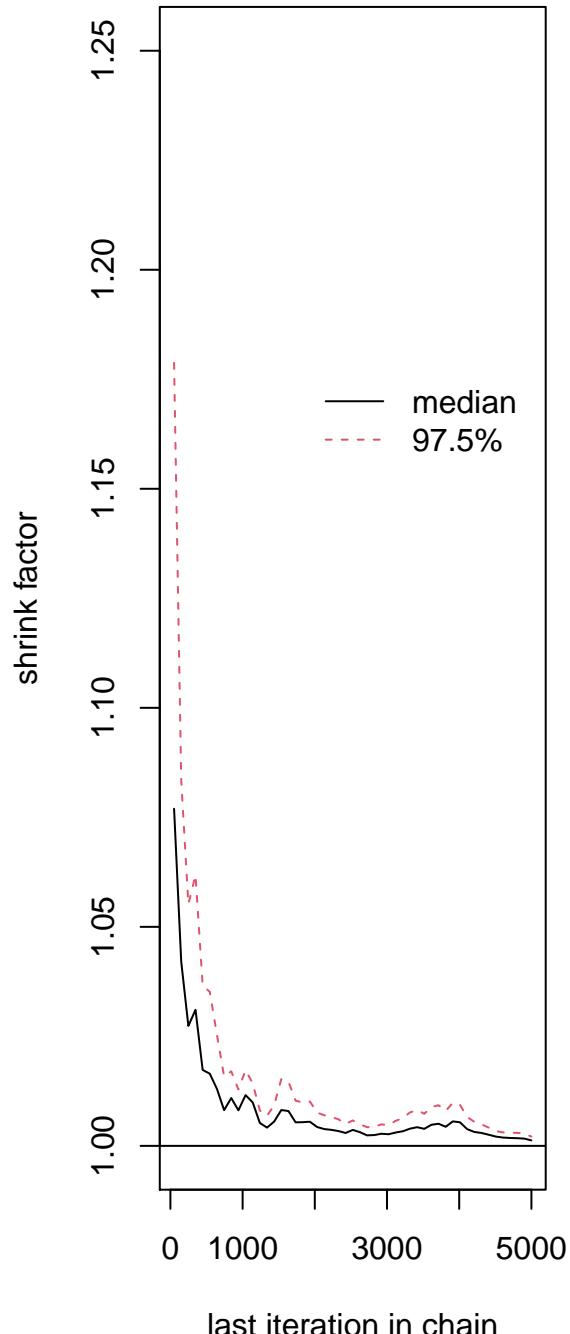


Gelman Diagnostic

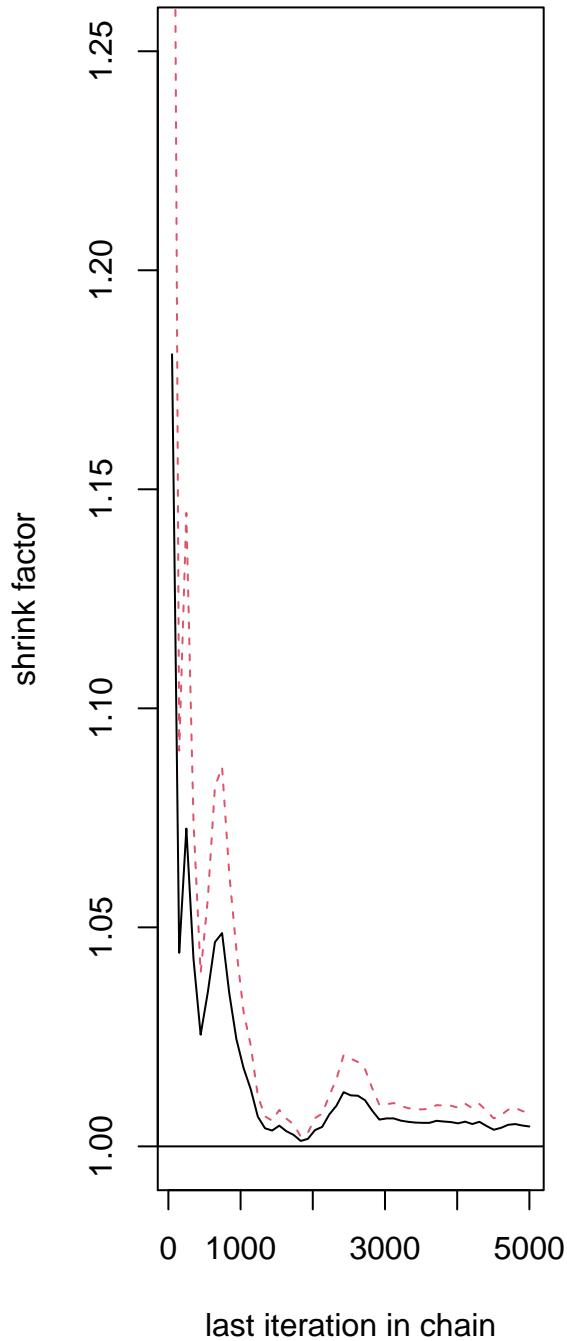
Round 1
p_avg_mit_PD



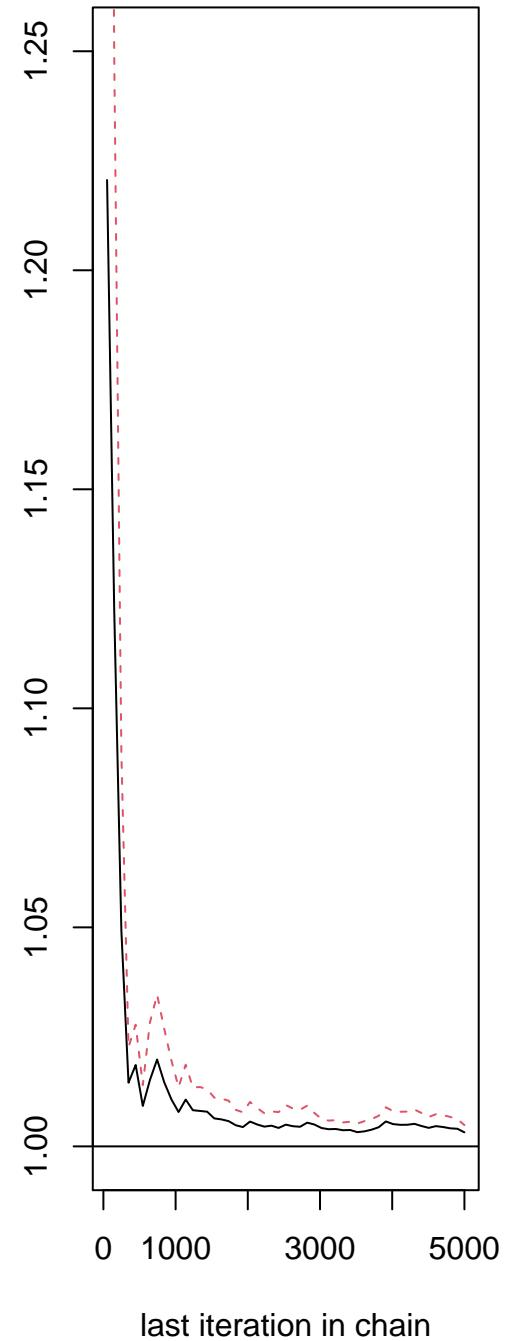
p_avg_mit_PR



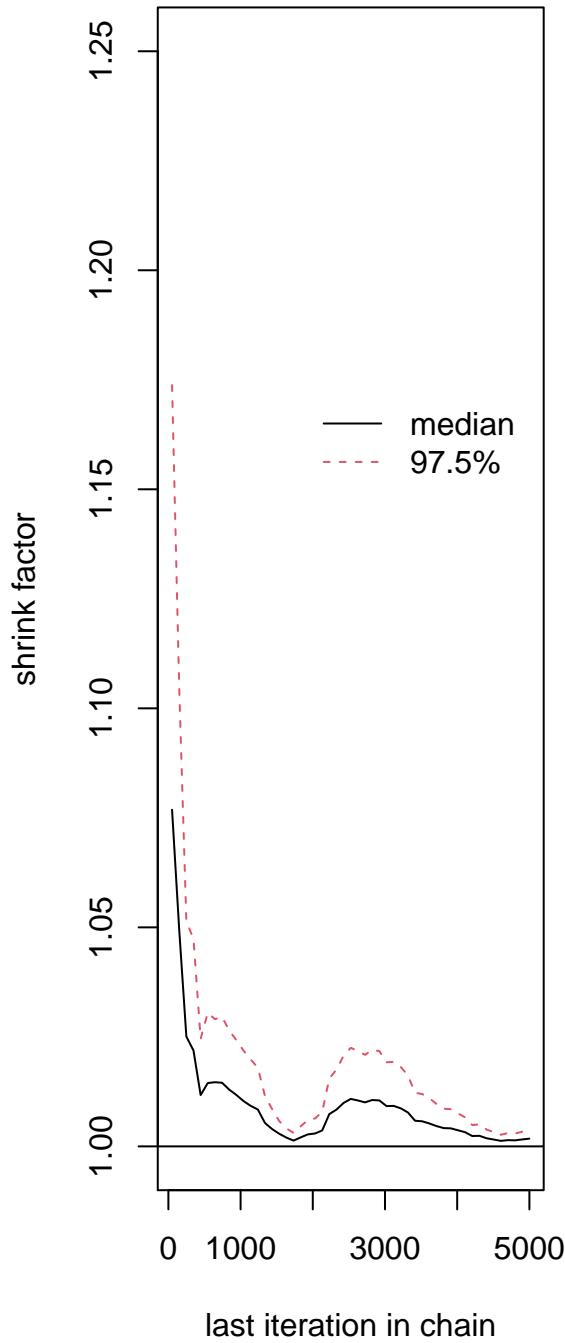
Round 1
p_avg_mit_PD



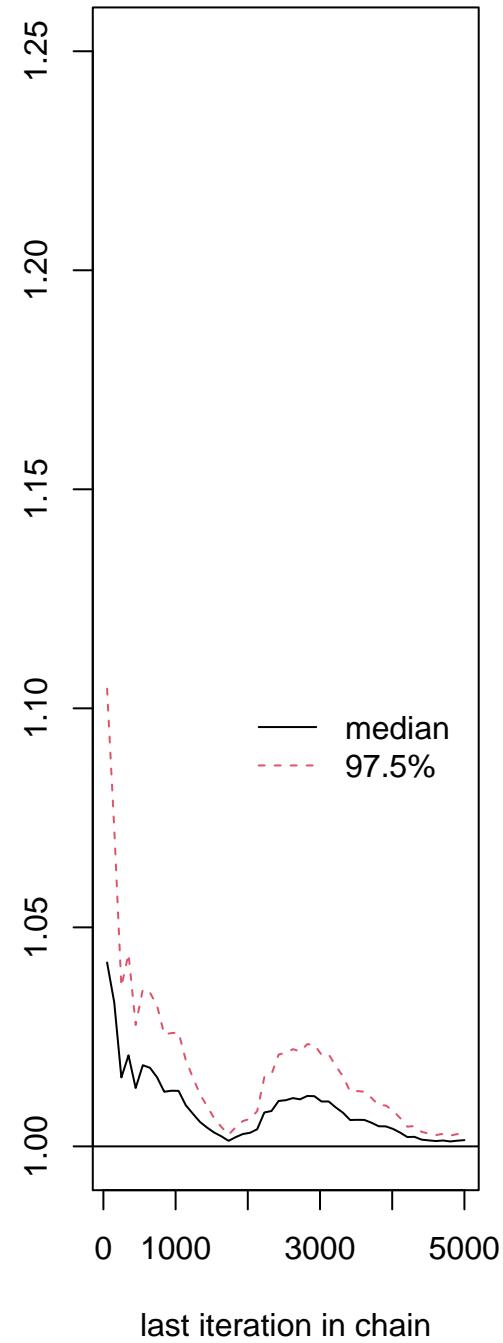
p_avg_mit_PR



Round 1
p_avg_mit_PD

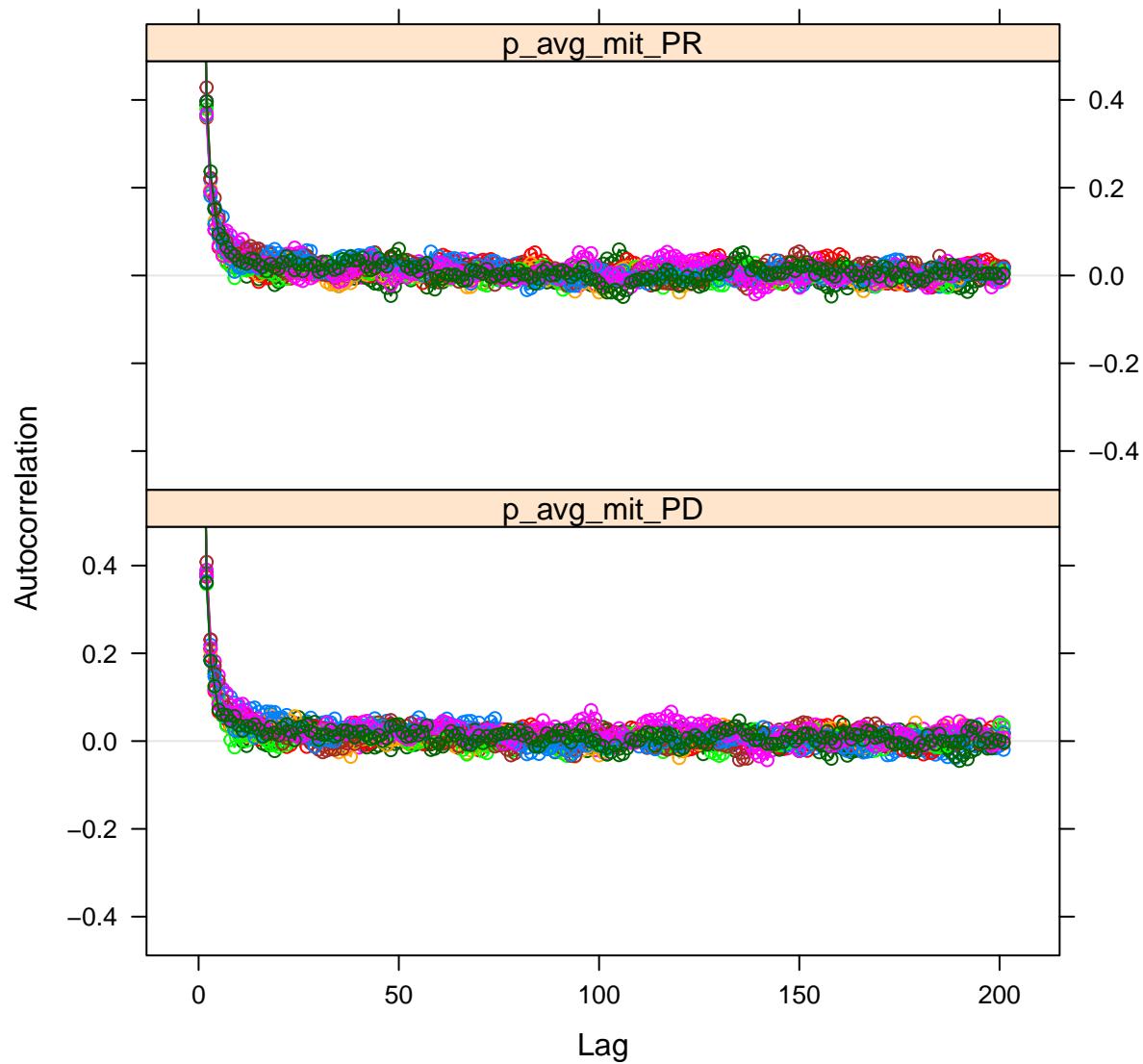


p_avg_mit_PR

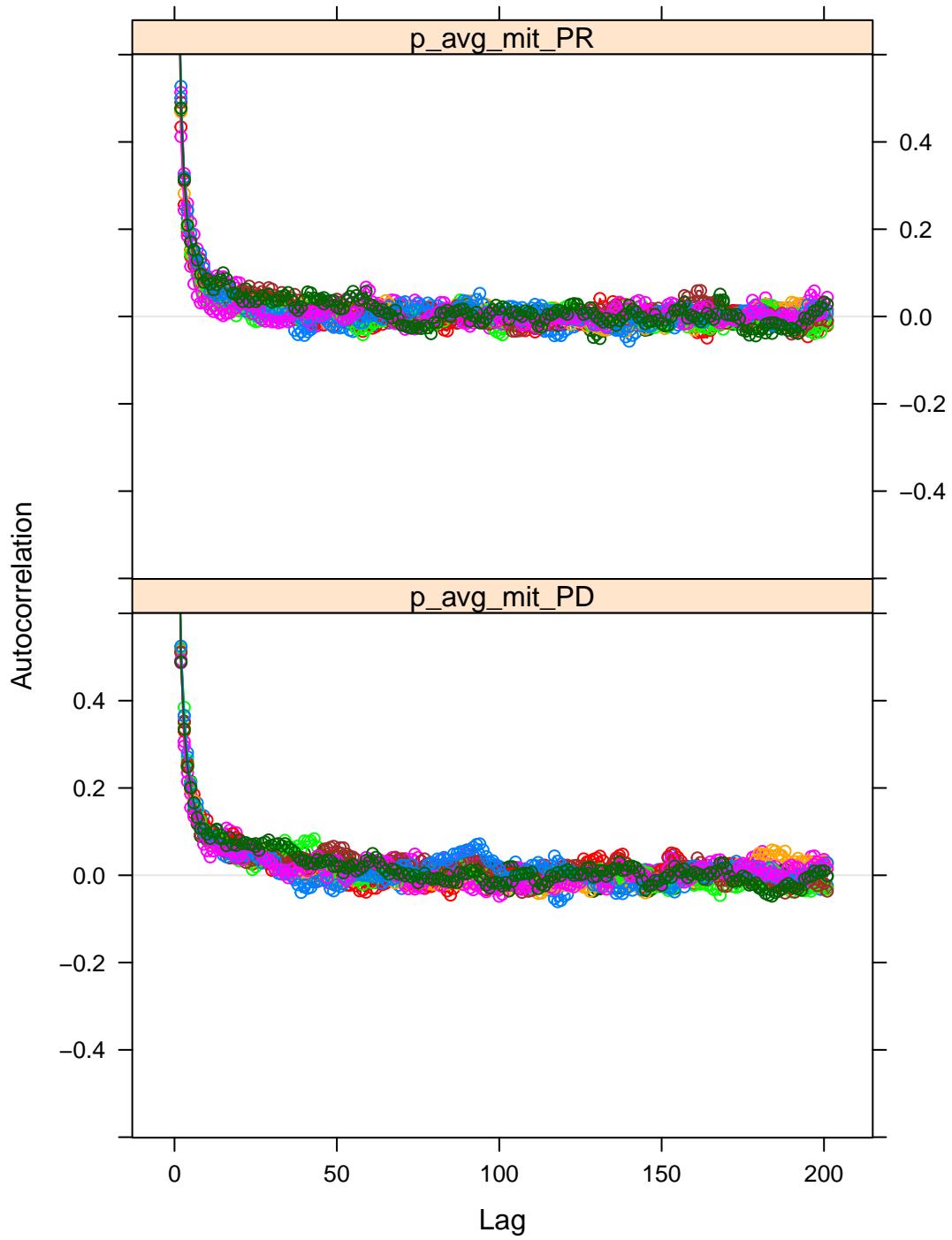


Autocorrelation plots

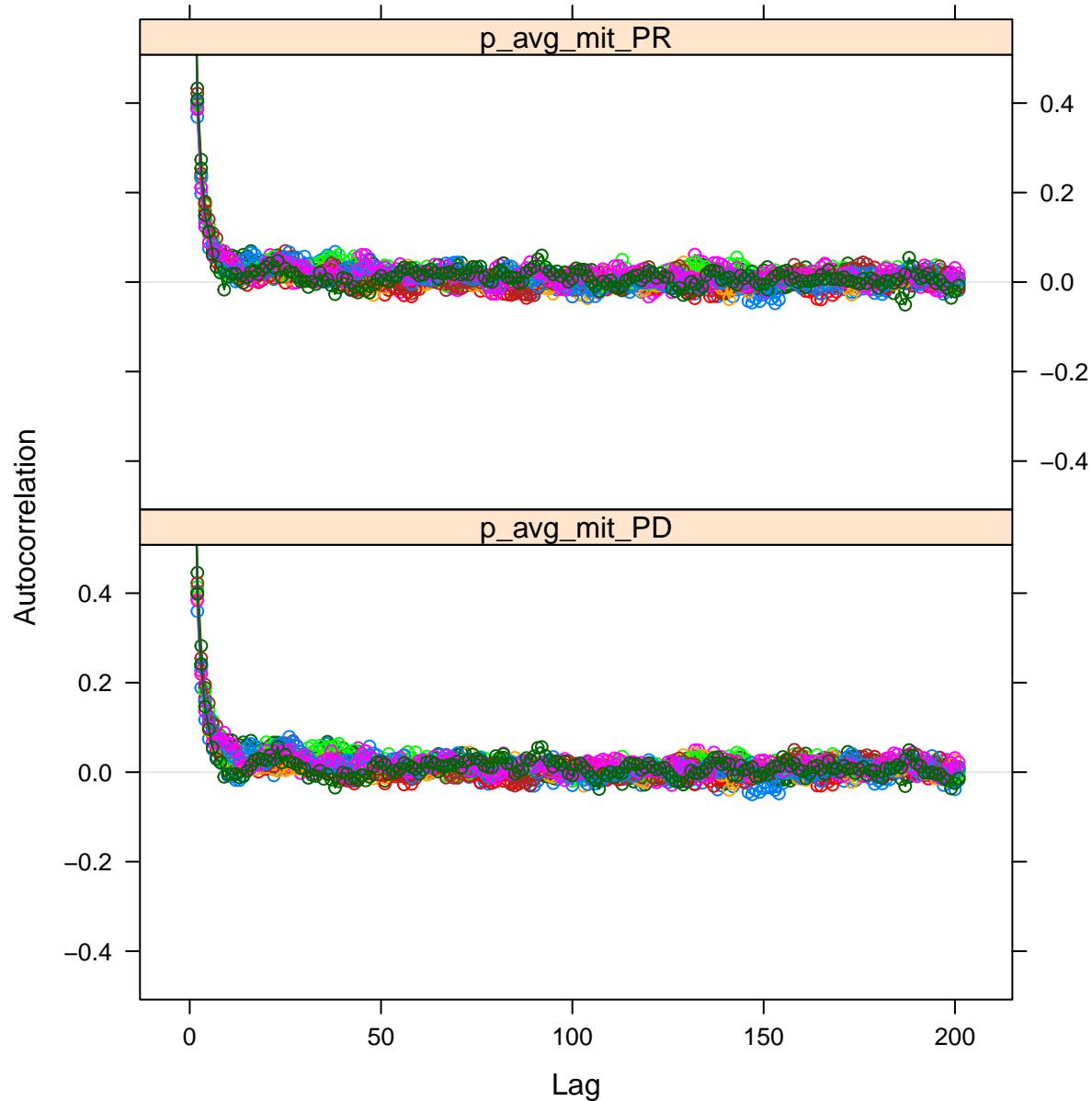
ACF plot: Antibody prev ~ Mitigation – Round 1



ACF plot: Antibody prev ~ Mitigation – Round 2



ACF plot: Antibody prev ~ Mitigation – Round 3



Self-reported test positivity prevalence and mitigation

Effective Sample Size

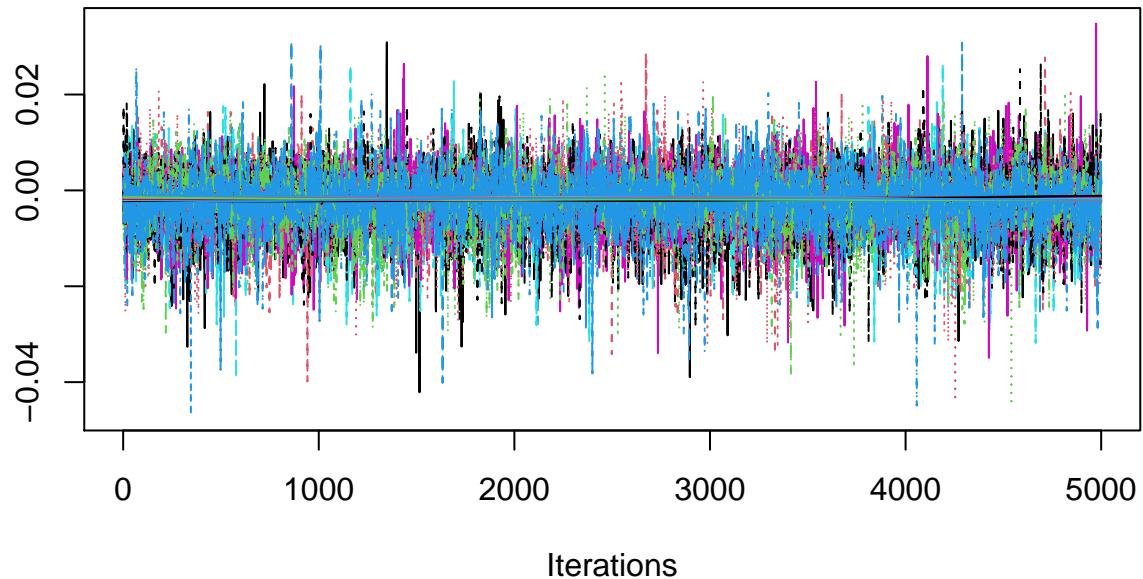
Table 7: Effective Sample Size: Antibody prev Mitigation

Round	Prev..Diff	Prev..Ratio
Round 1	14248	16276
Round 2	8120	10151
Round 3	13358	14106

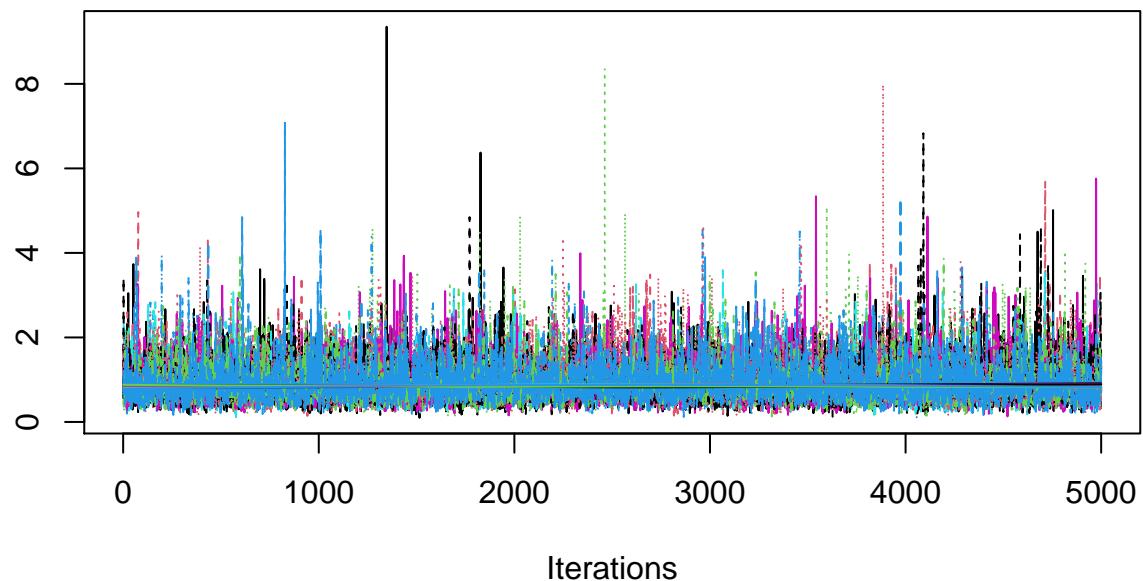
Trace plots

Round 1

Trace of p_avg_mit_PD

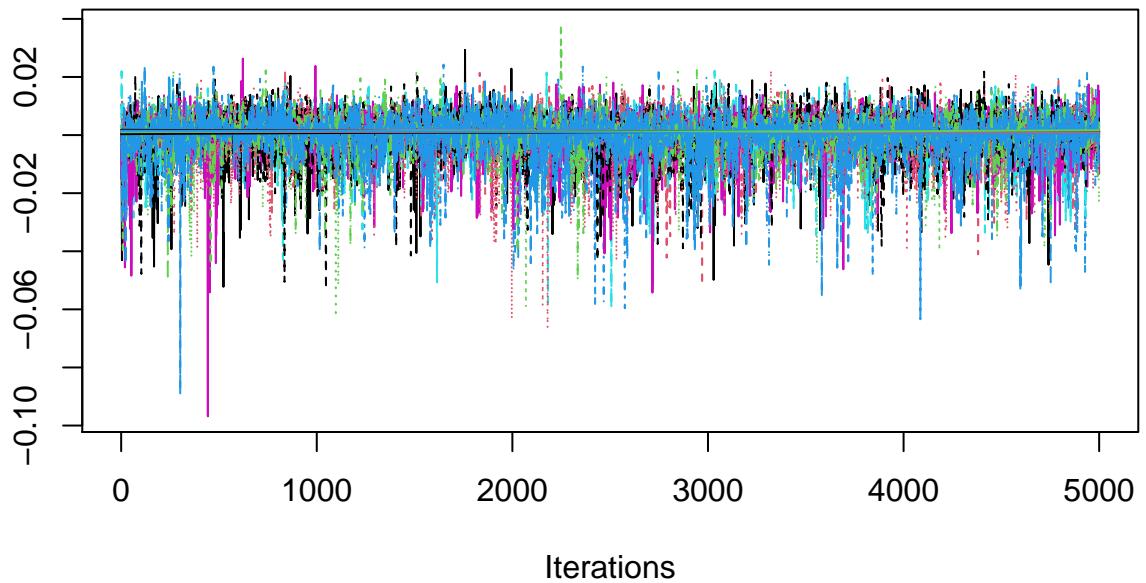


Trace of p_avg_mit_PR

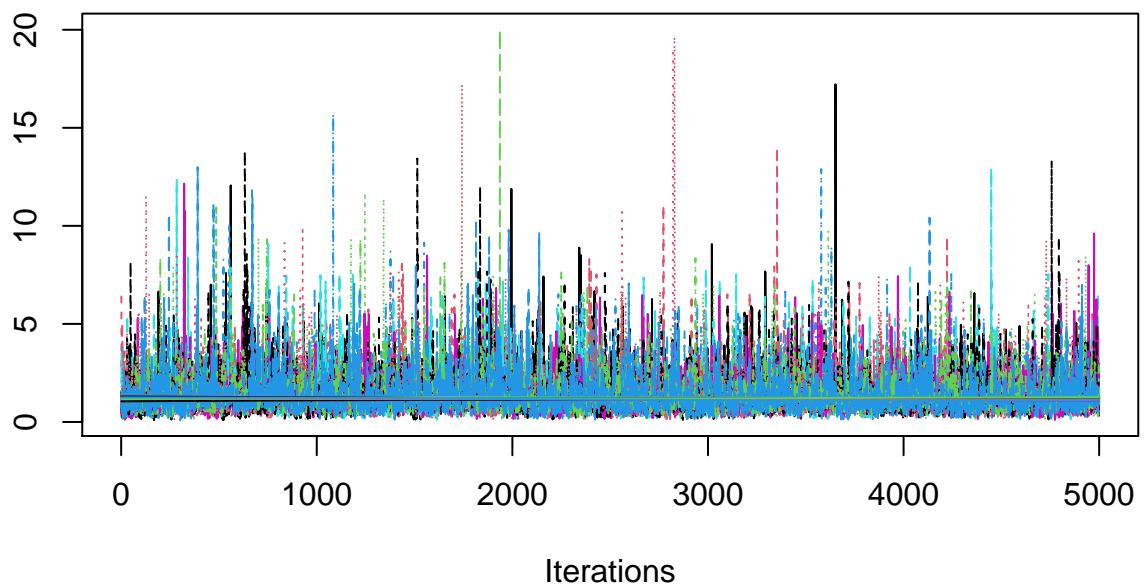


Round 2

Trace of p_avg_mit_PD

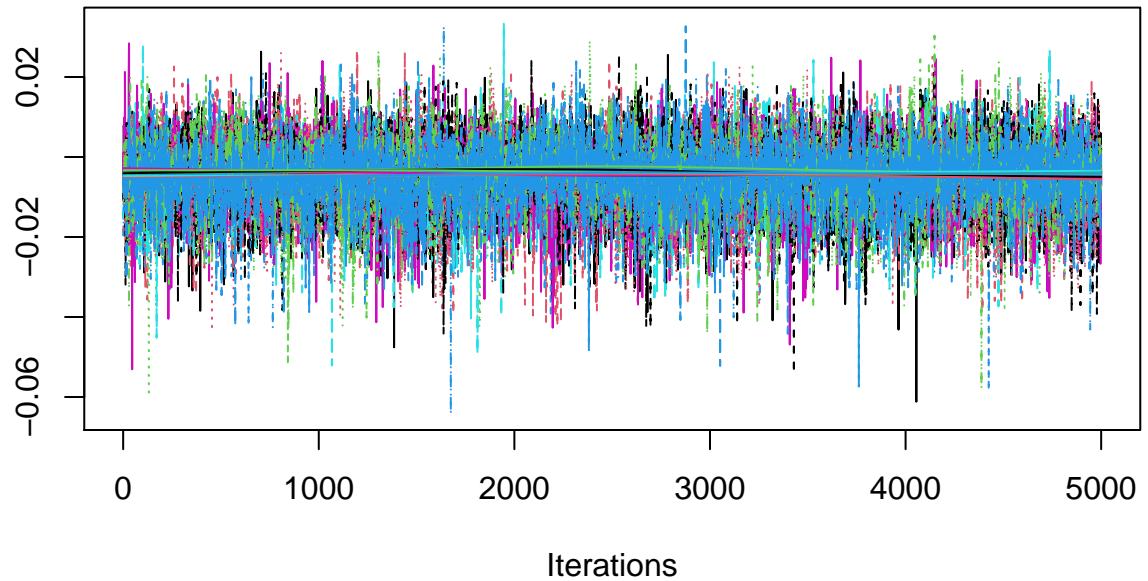


Trace of p_avg_mit_PR

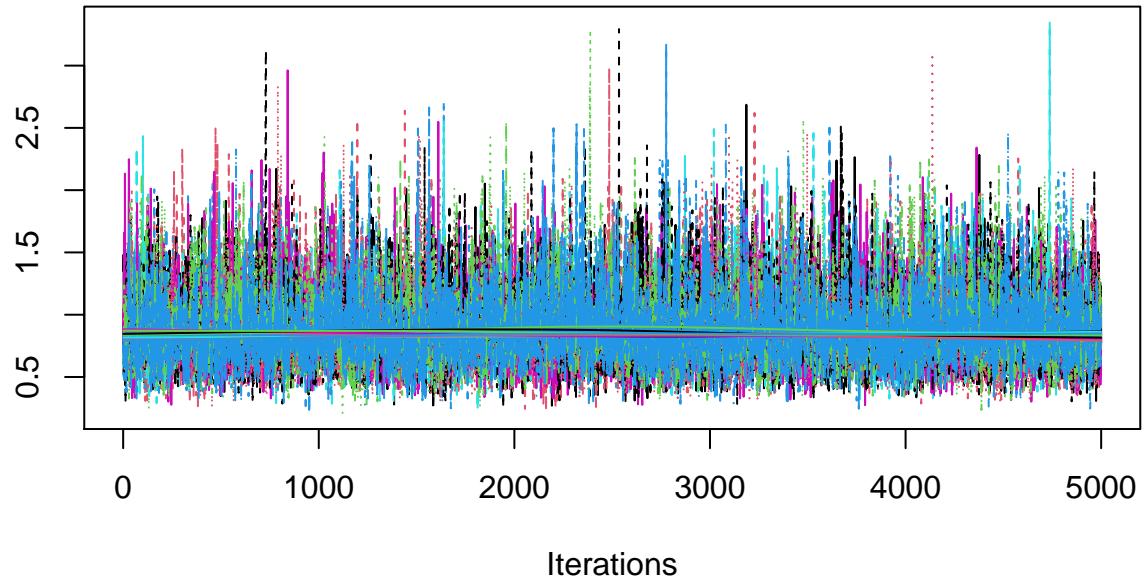


Round 3

Trace of p_avg_mit_PD



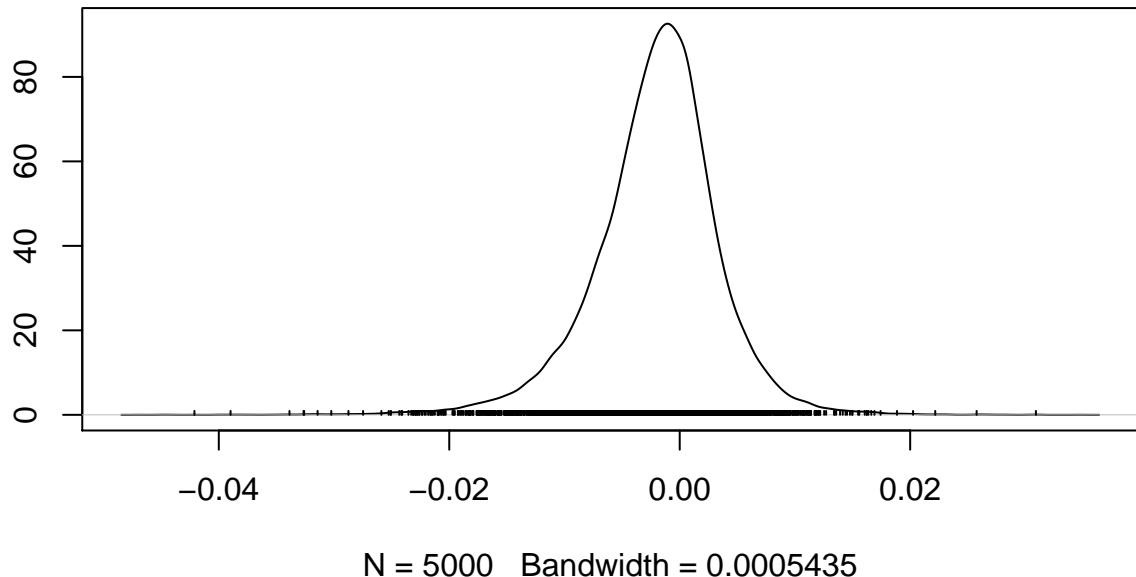
Trace of p_avg_mit_PR



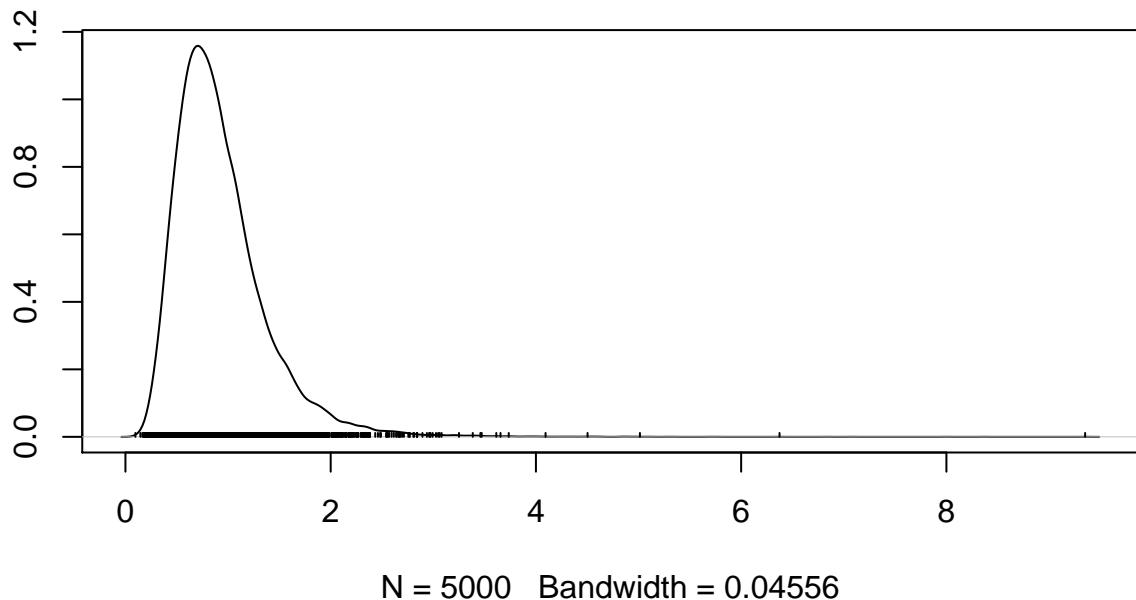
Density plots

Round 1

Density of p_avg_mit_PD

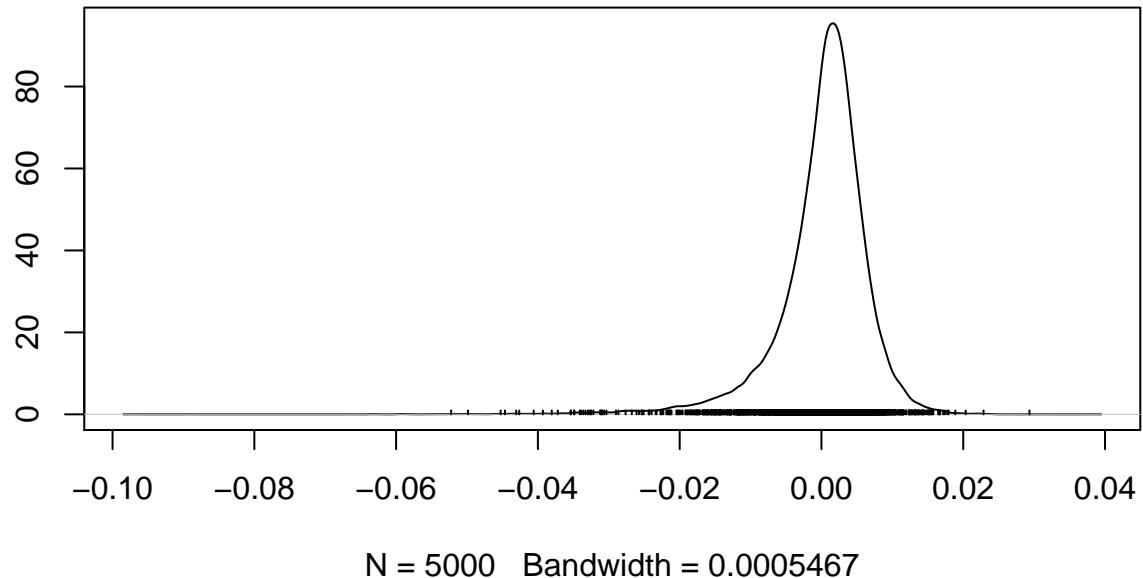


Density of p_avg_mit_PR

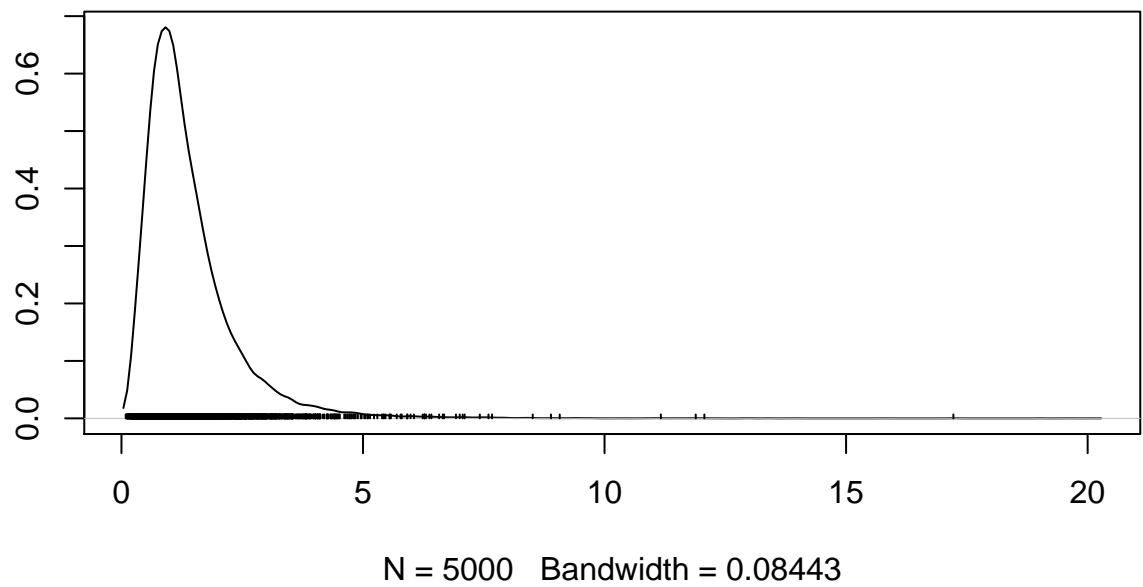


Round 2

Density of p_avg_mit_PD

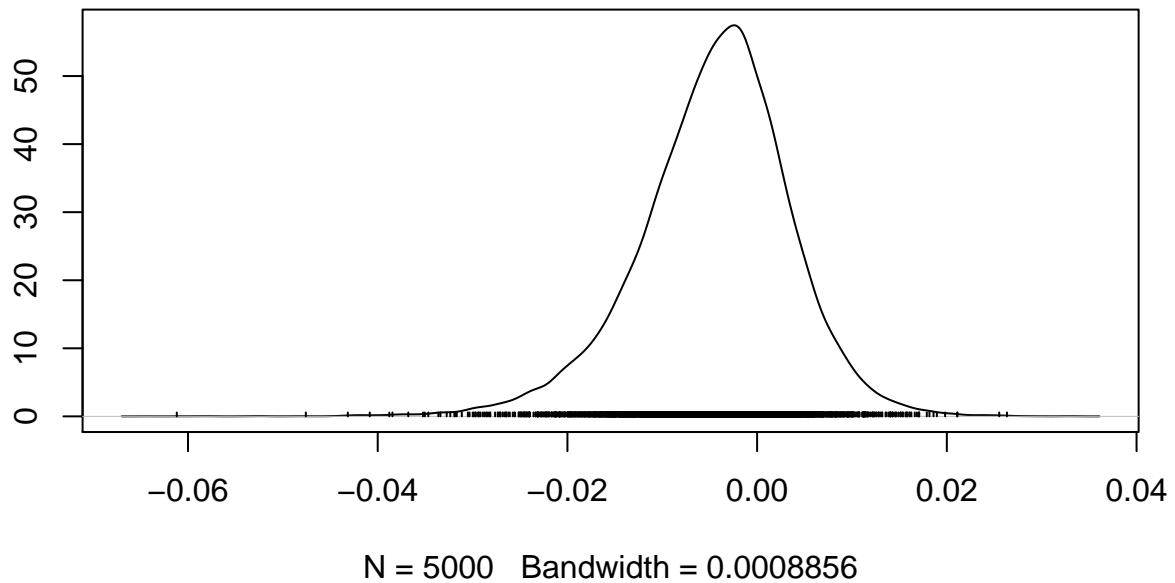


Density of p_avg_mit_PR

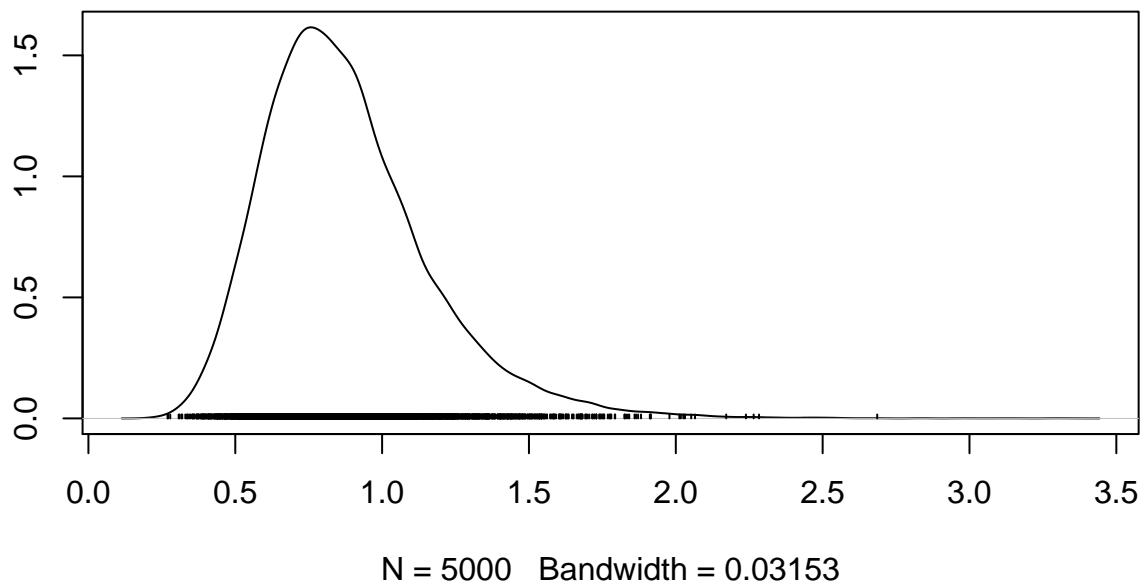


Round 3

Density of p_avg_mit_PD

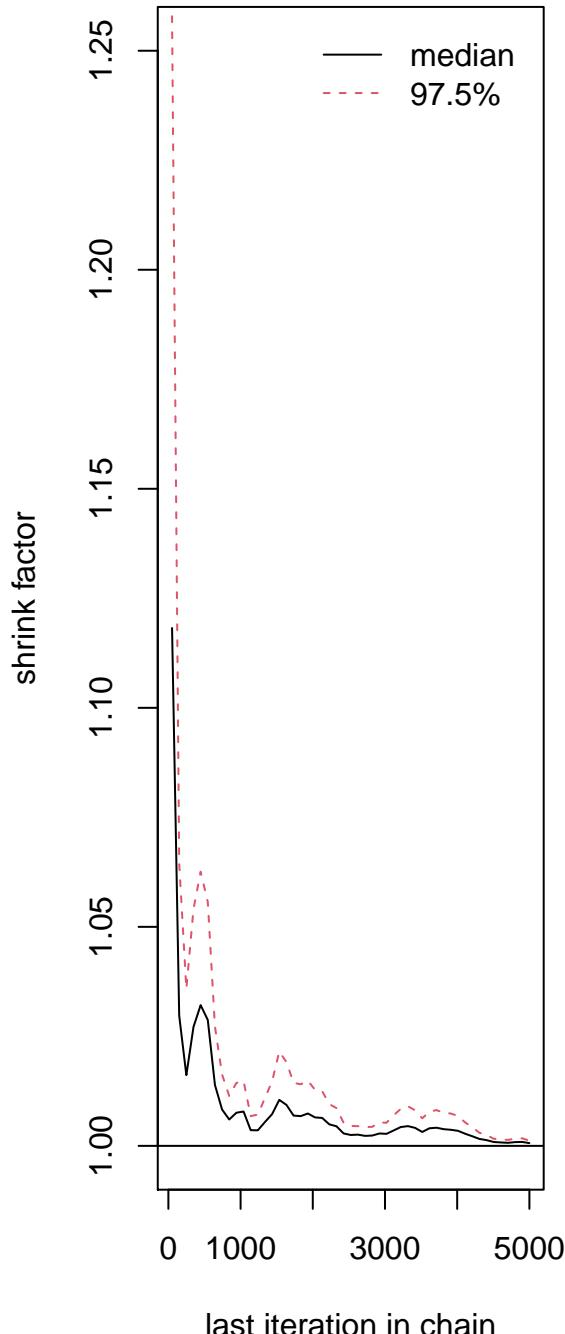


Density of p_avg_mit_PR

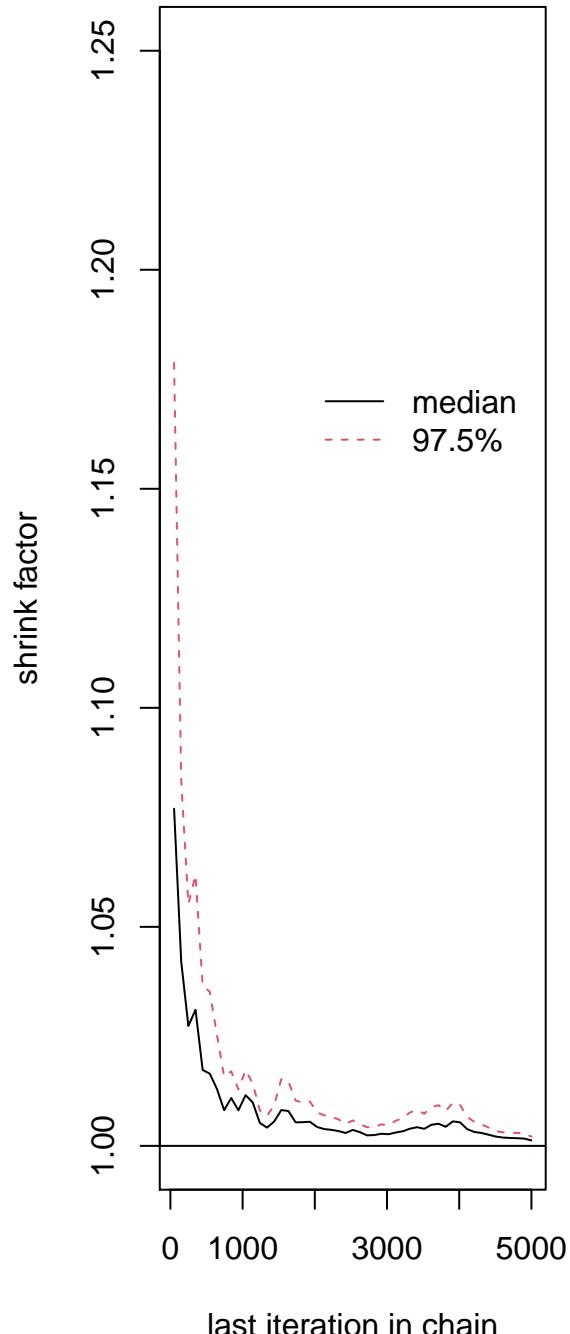


Gelman Diagnostic

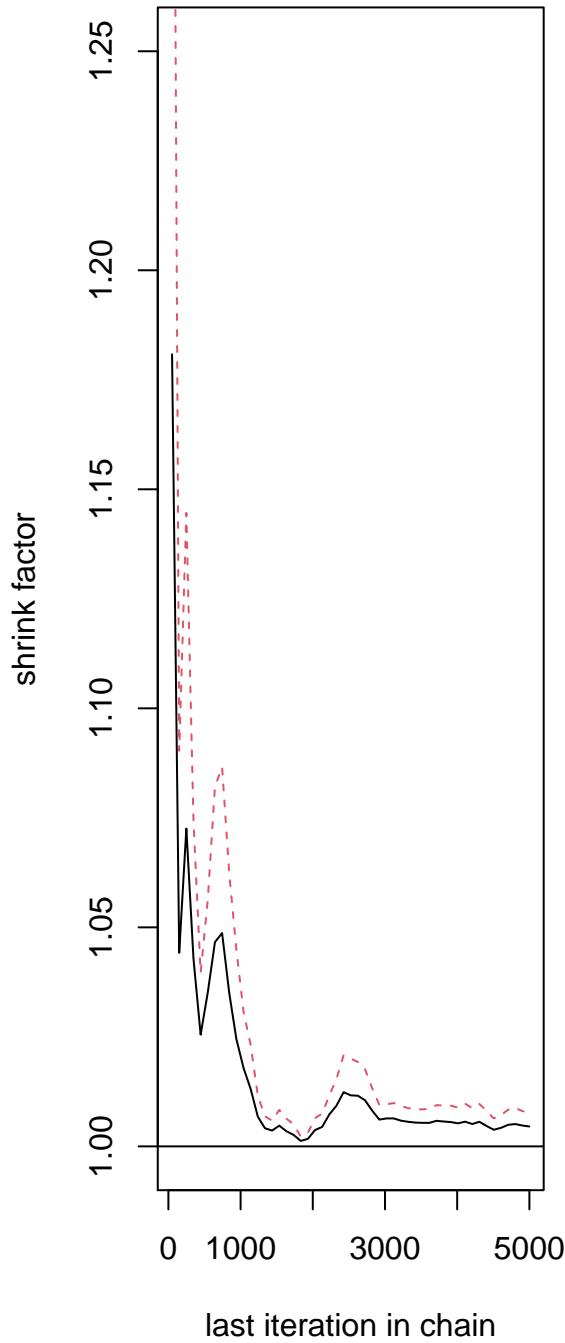
Round 1
p_avg_mit_PD



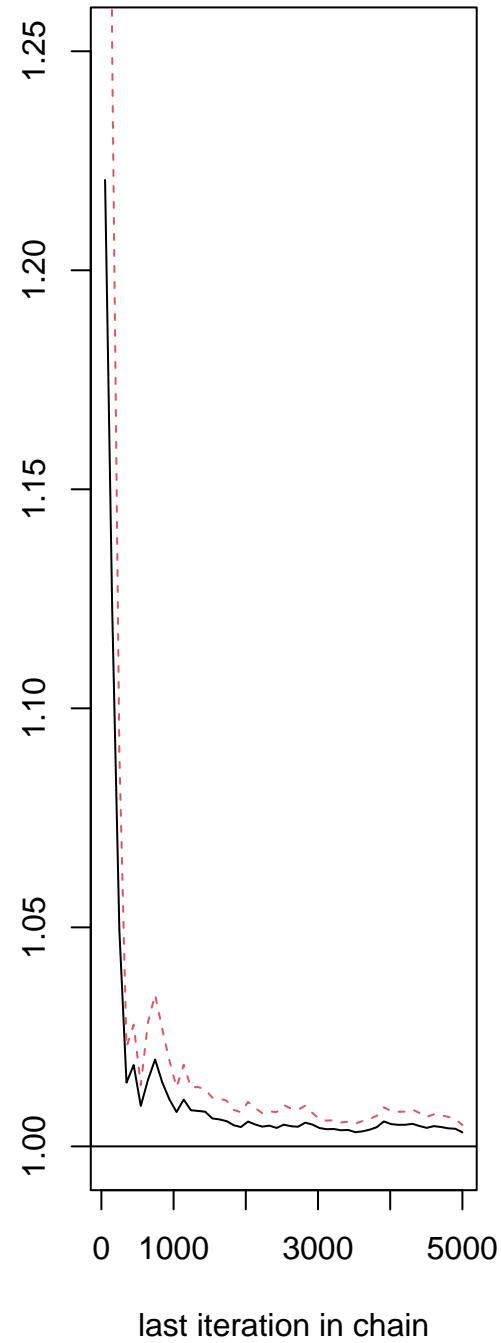
p_avg_mit_PR



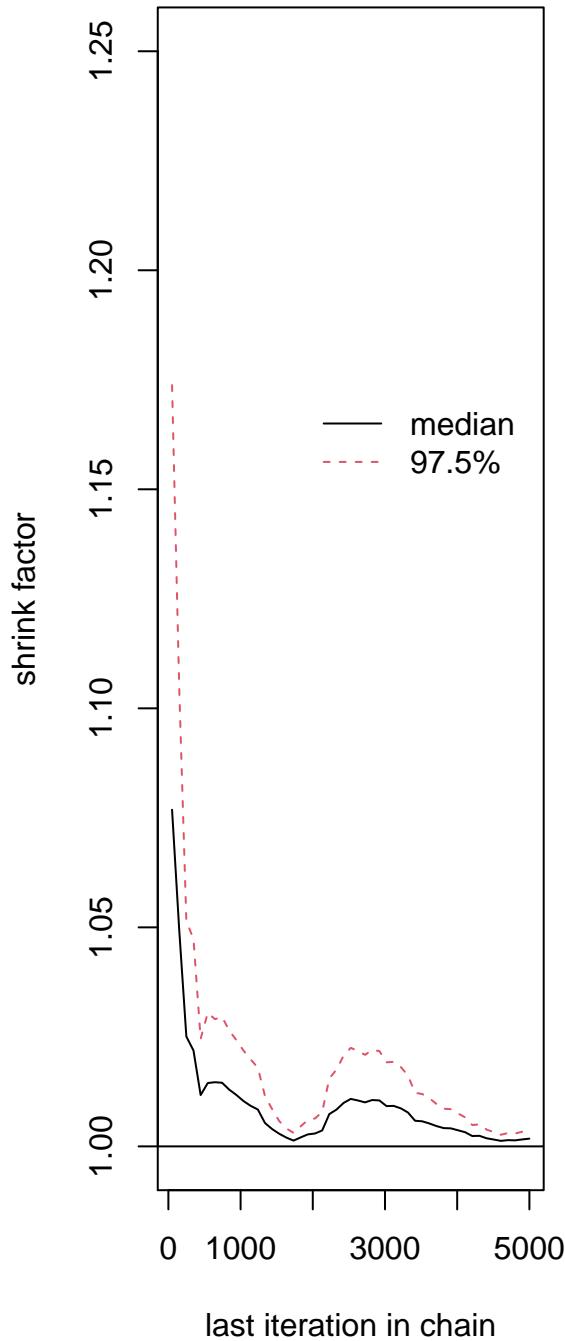
Round 1
p_avg_mit_PD



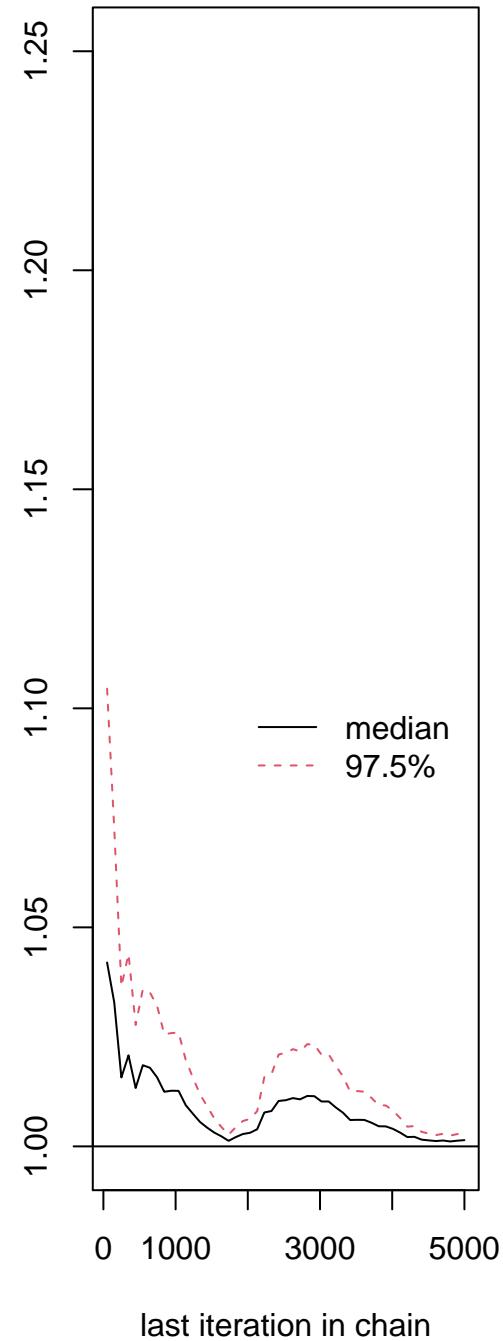
p_avg_mit_PR



Round 1 p_avg_mit_PD

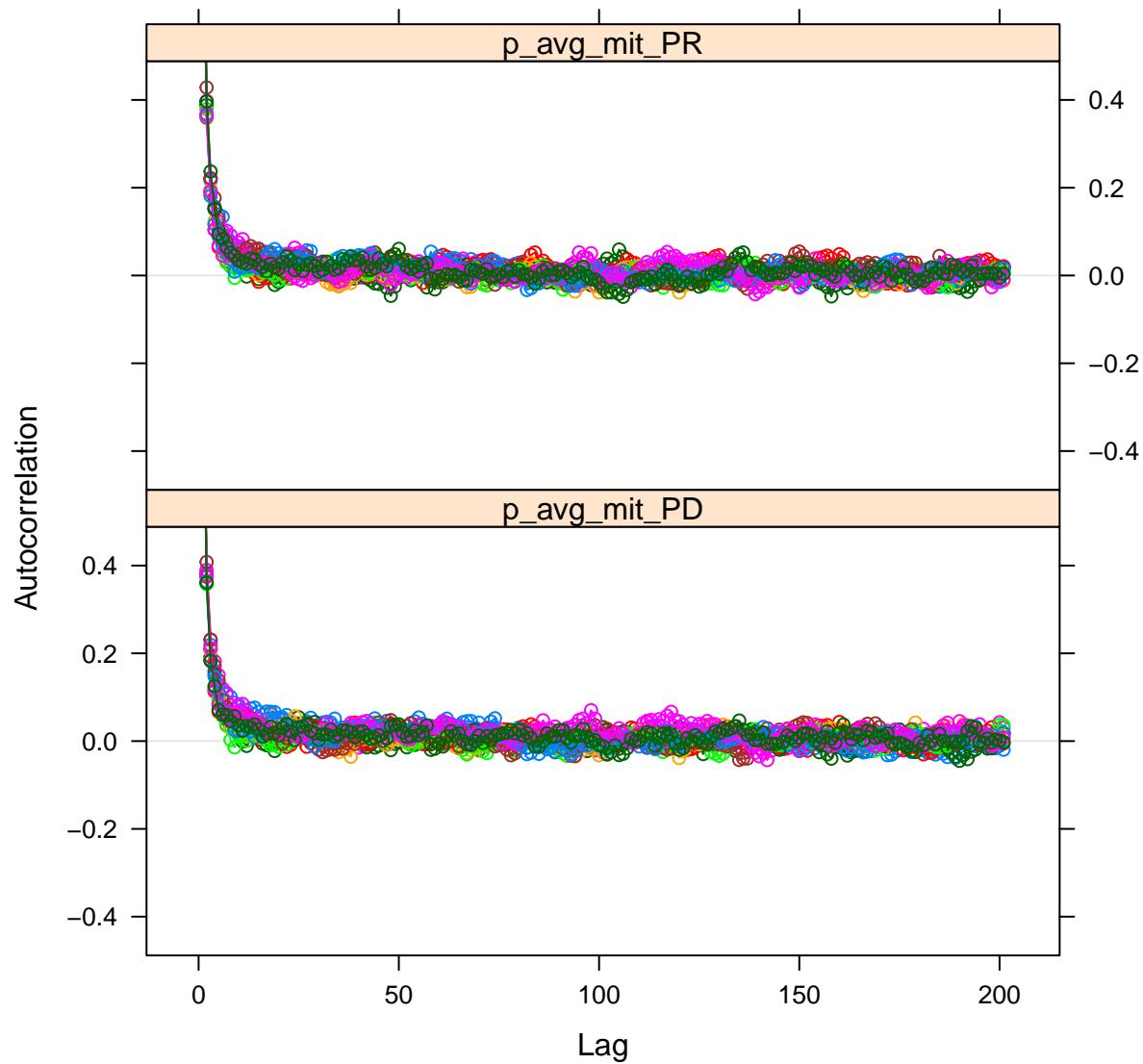


p_avg_mit_PR

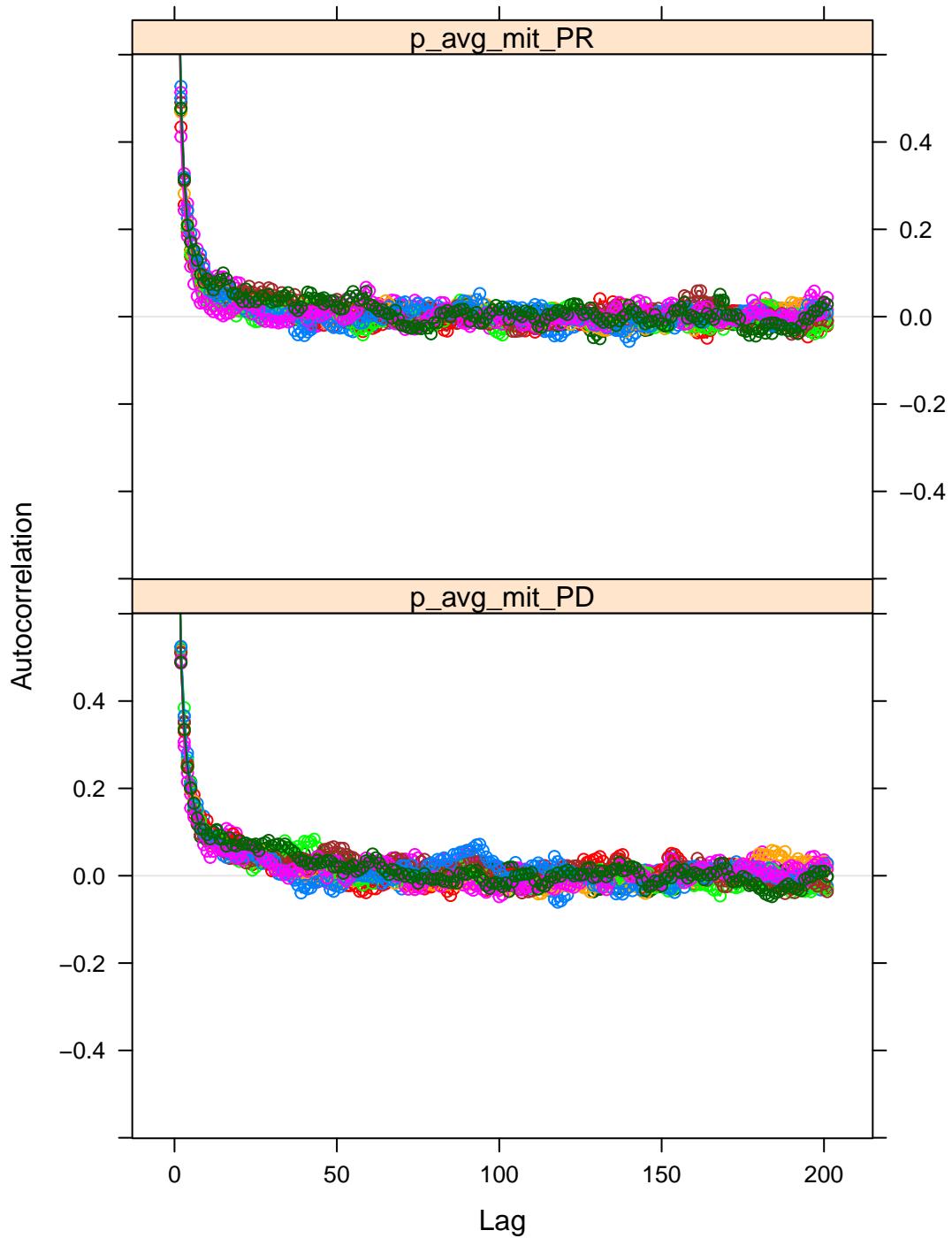


Autocorrelation plots

ACF plot: Antibody prev ~ Mitigation – Round 1



ACF plot: Antibody prev ~ Mitigation – Round 2



ACF plot: Antibody prev ~ Mitigation – Round 3

