Electronic Supplementary Material (ESI) for Molecular BioSystems.
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GeneSPIDER Supplemental Figures

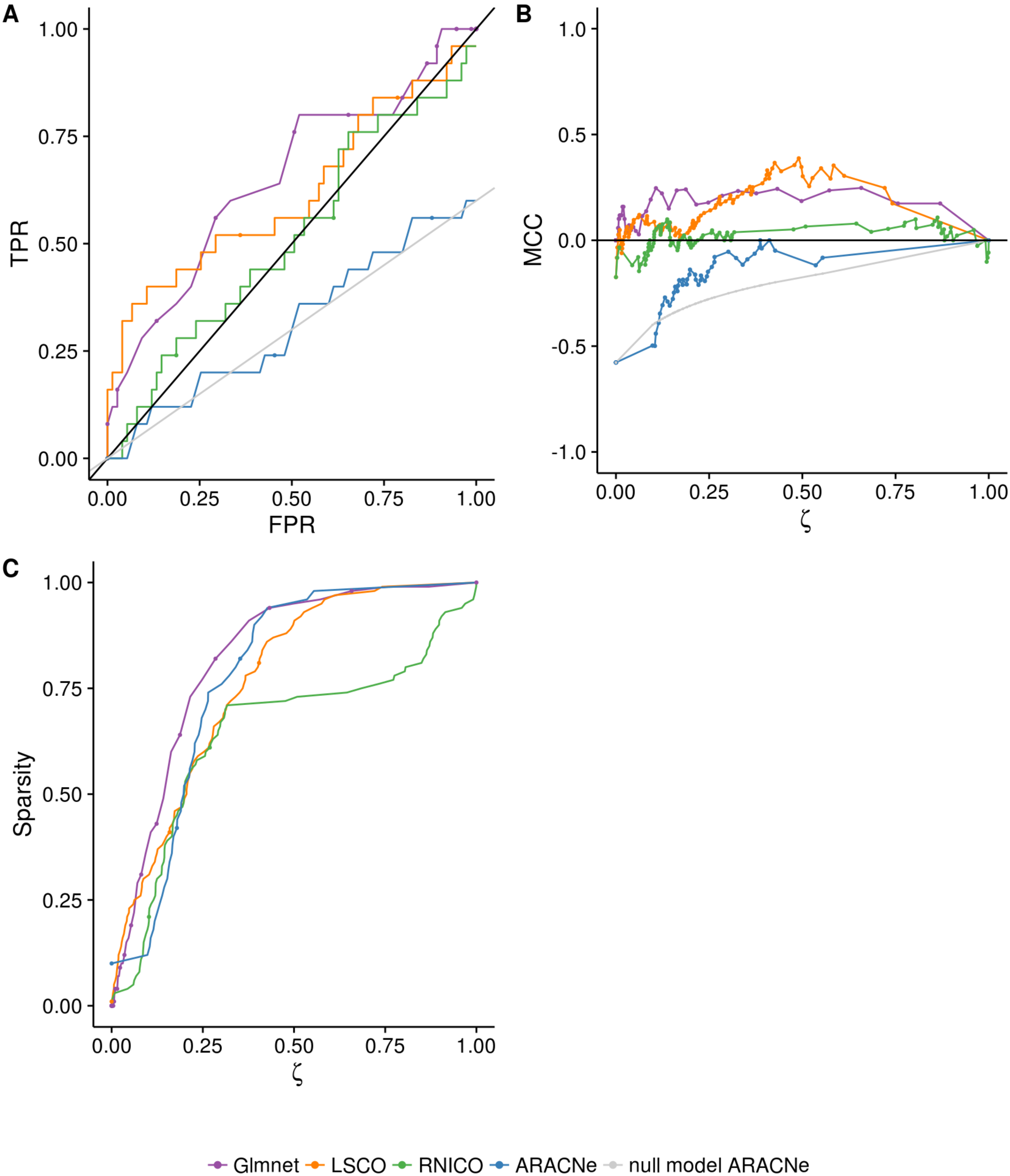
Each of the following pages contains three plots showing the results of network inference benchmarks for a given set of conditions. The benchmarks span a range of network types (*random*, *small-world*, *scale-free* and *small-world scale-free*), sizes (*10*, *50*, *100 nodes*), SNR (*0.01*, *1*, *100*), and IAA (*low* and *high*) levels. Each page corresponds to a combination of these properties, and shows the underlying data that is summarized as AUROC values in Figure 3 of the main text. We here present both benchmarks that consideri self-regulatory links, i.e diagonal elements of the network matrix (benchmarks 1-48), and benchmarks that ignore them (benchmarks 49-96). The reason for including both types of benchmarks is that *ARACNe*, in contrast to the other methods, cannot predict self-regulatory links, and its performance therefore becomes very different depending on whether these links are considered or not. To further highlight this limitation and guide the comparison, *ARACNe* was given a separate ROC-curve baseline that also ignores self-links, and a separate MCC null line that accounts for the effect of the missing self-links.

**Panel A** contains ROC curves of the four methods, *Glmnet*, *LSCO*, *RNICO*, *ARACNe*. The black line represents the null model, i.e. expected result from random inclusion of links in the network. The grey line is the null model of ARACNe.

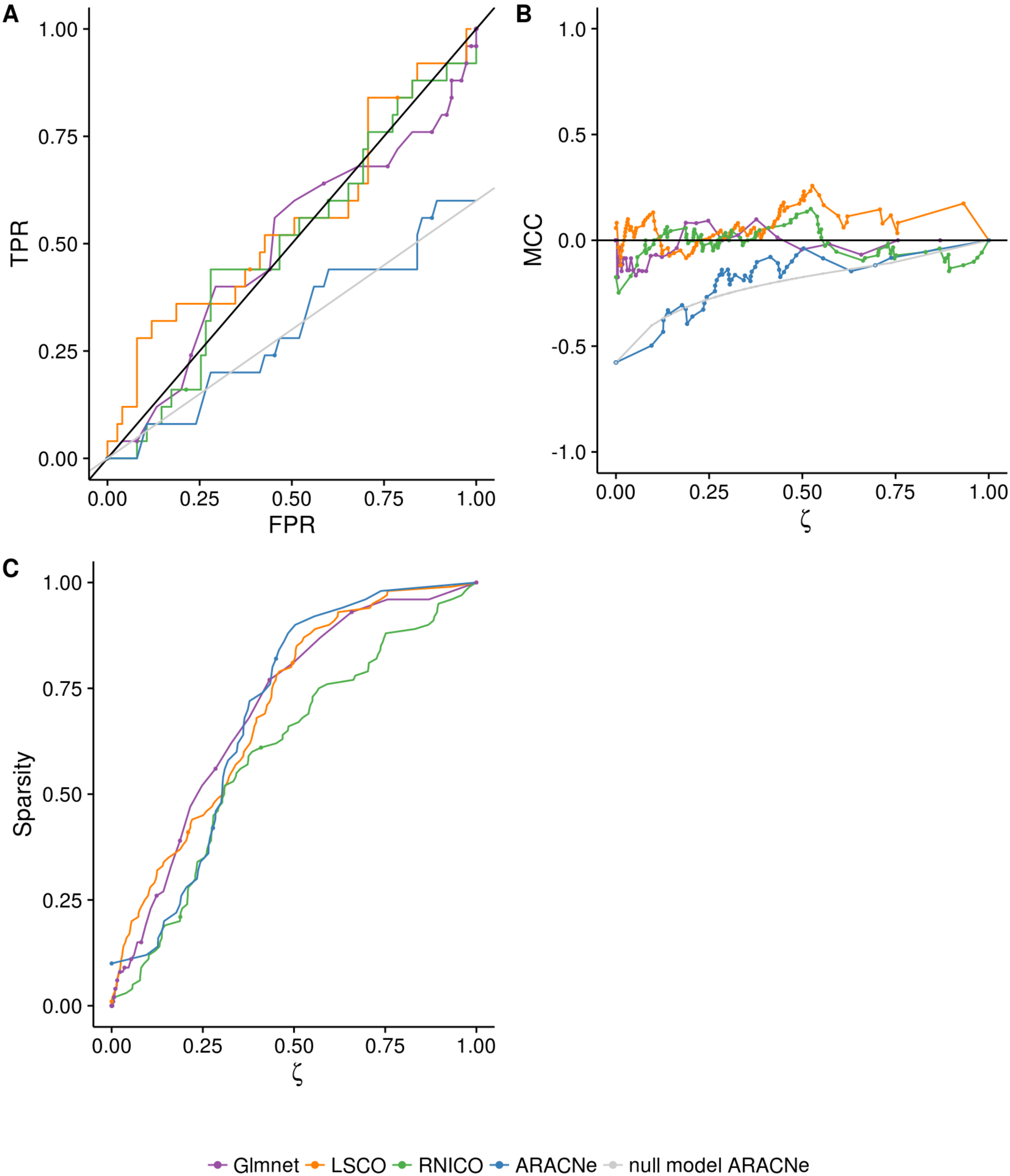
**Panel B** shows the MCC of each method as a function of its respective zeta parameter ($\zeta$), a standardised regularisation coefficient used to determine the sparsity of the network estimated. We use it to span the breadth of empty to full networks (zeta=0 being full, 1 being empty). A grey null line is included for the ARACNe method.

**Panel C** shows how the used zeta parameter affects the network sparsity; the zeta axis has been scaled for each method so that 0 represents the full and 1 the empty network.

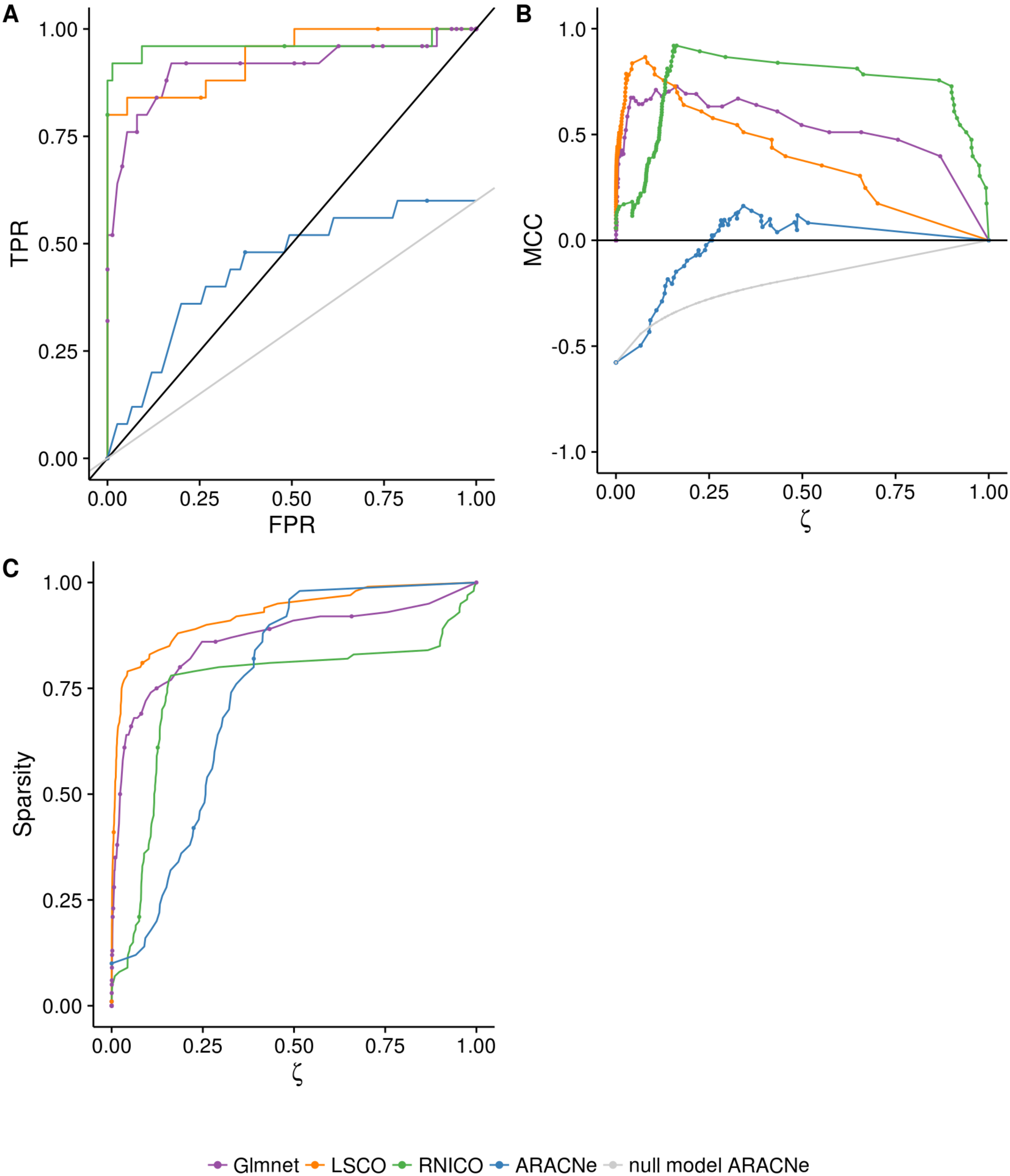
Case random N10 SNR0.01 high IAA



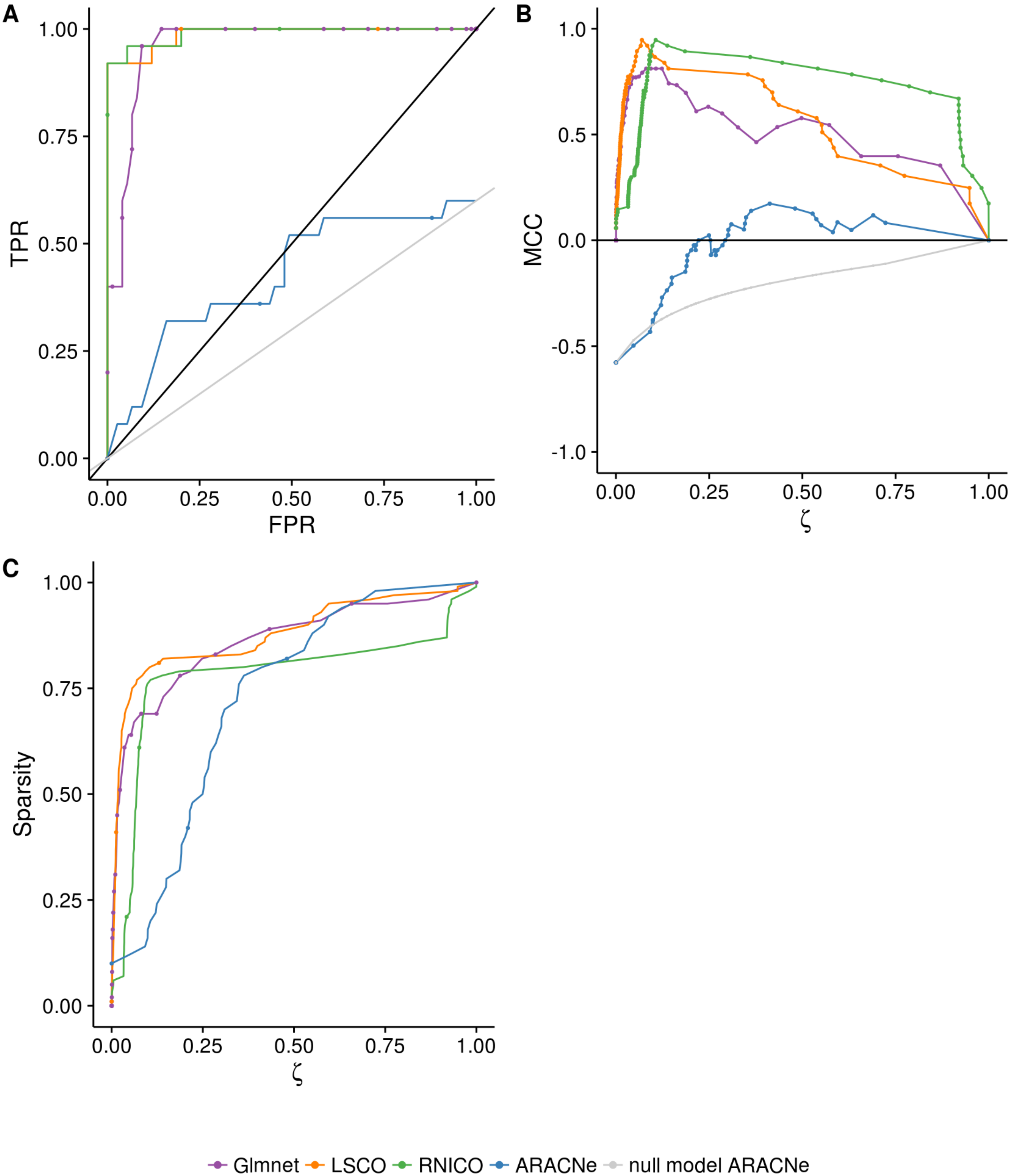
Case random N10 SNR0.01 low IAA



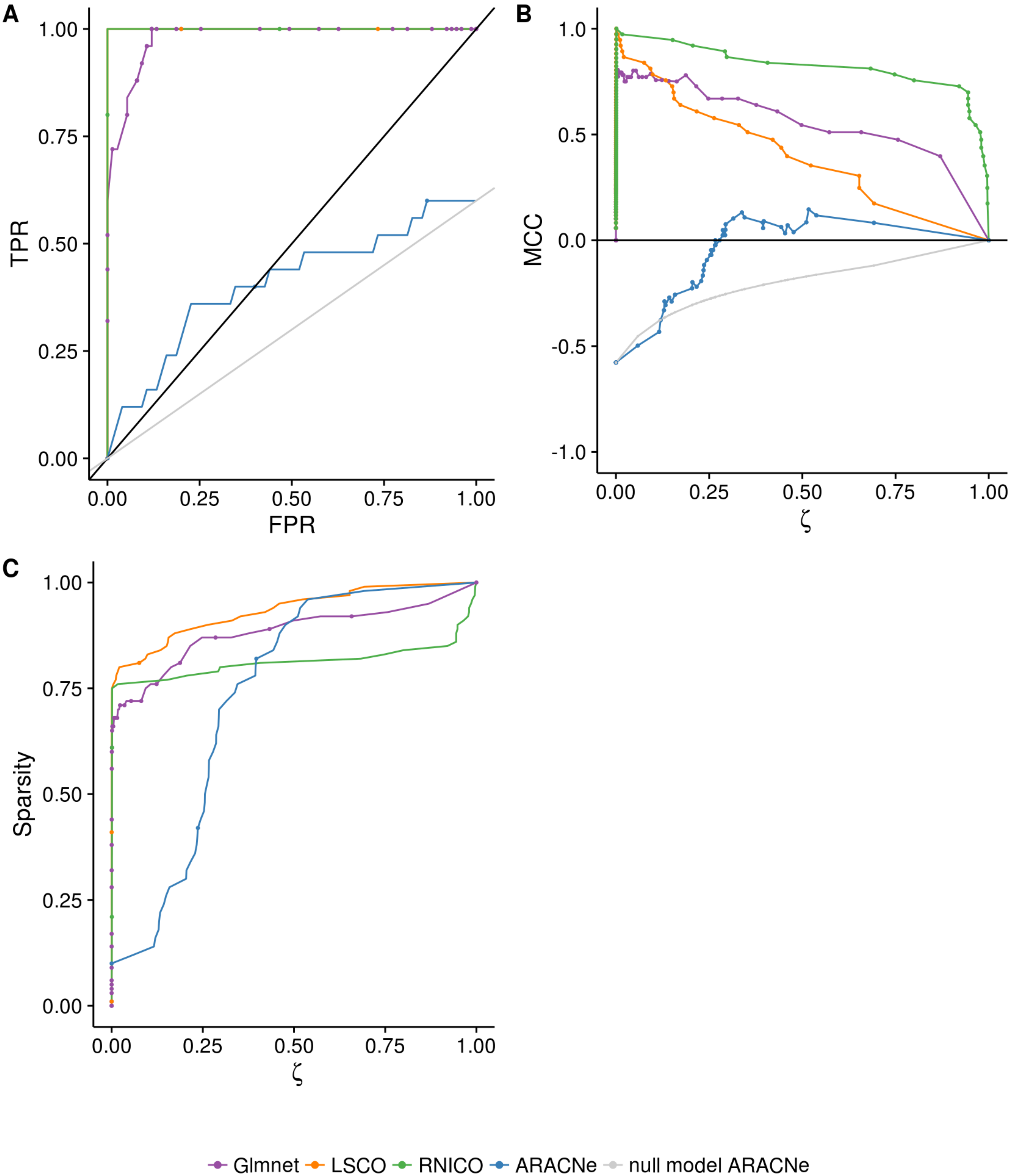
Case random N10 SNR1 high IAA



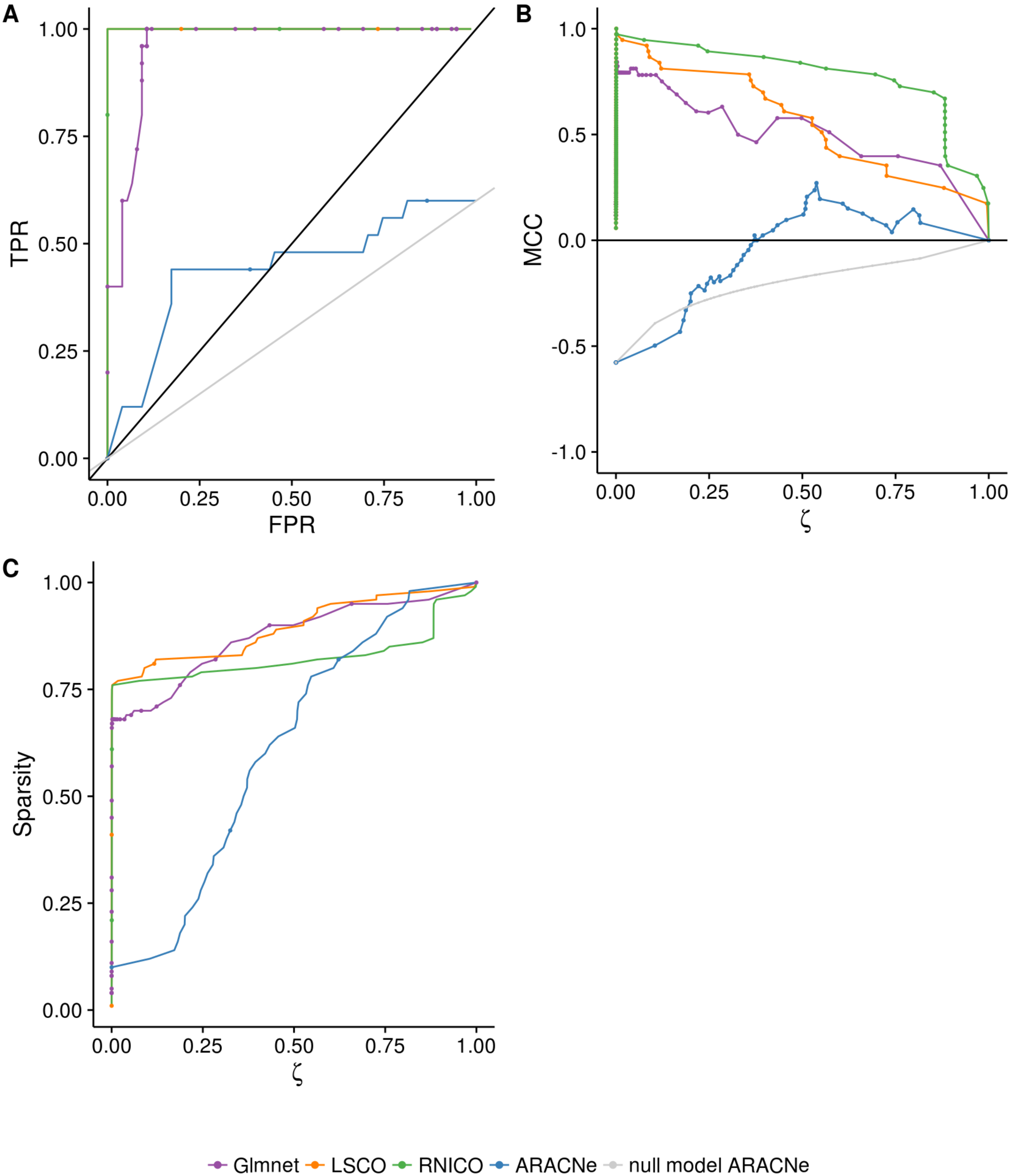
Case random N10 SNR1 low IAA



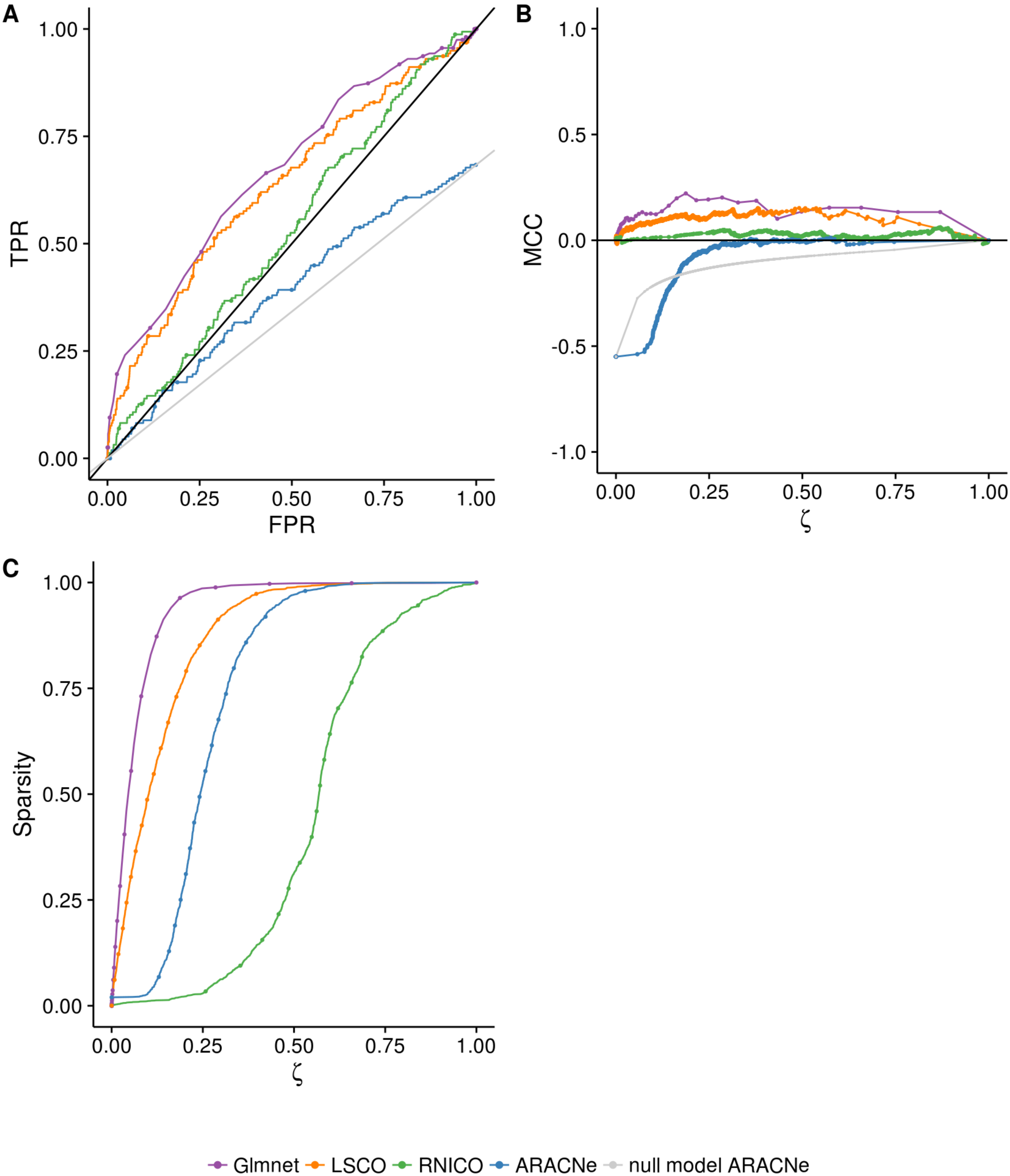
Case random N10 SNR100 high IAA



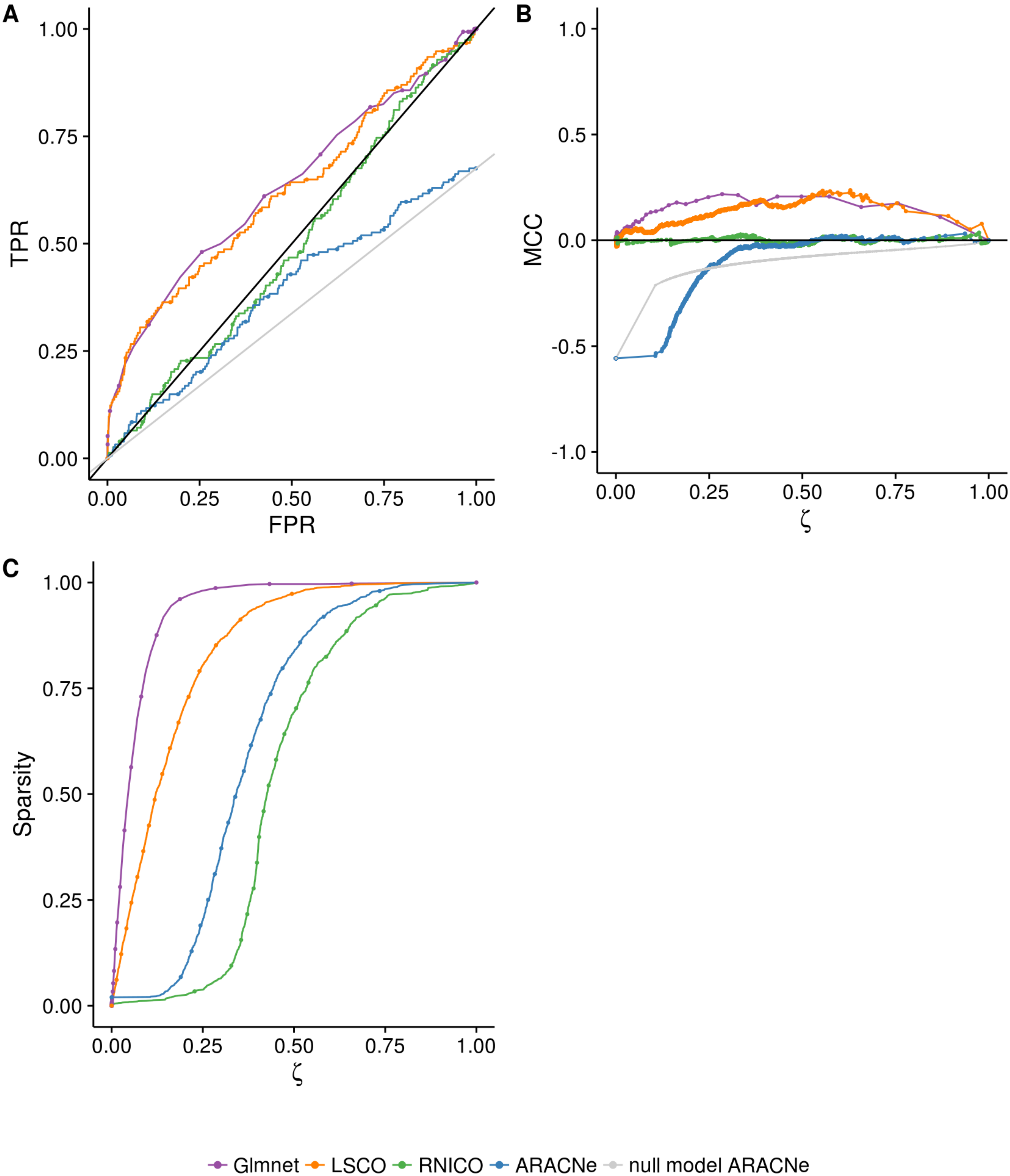
Case random N10 SNR100 low IAA



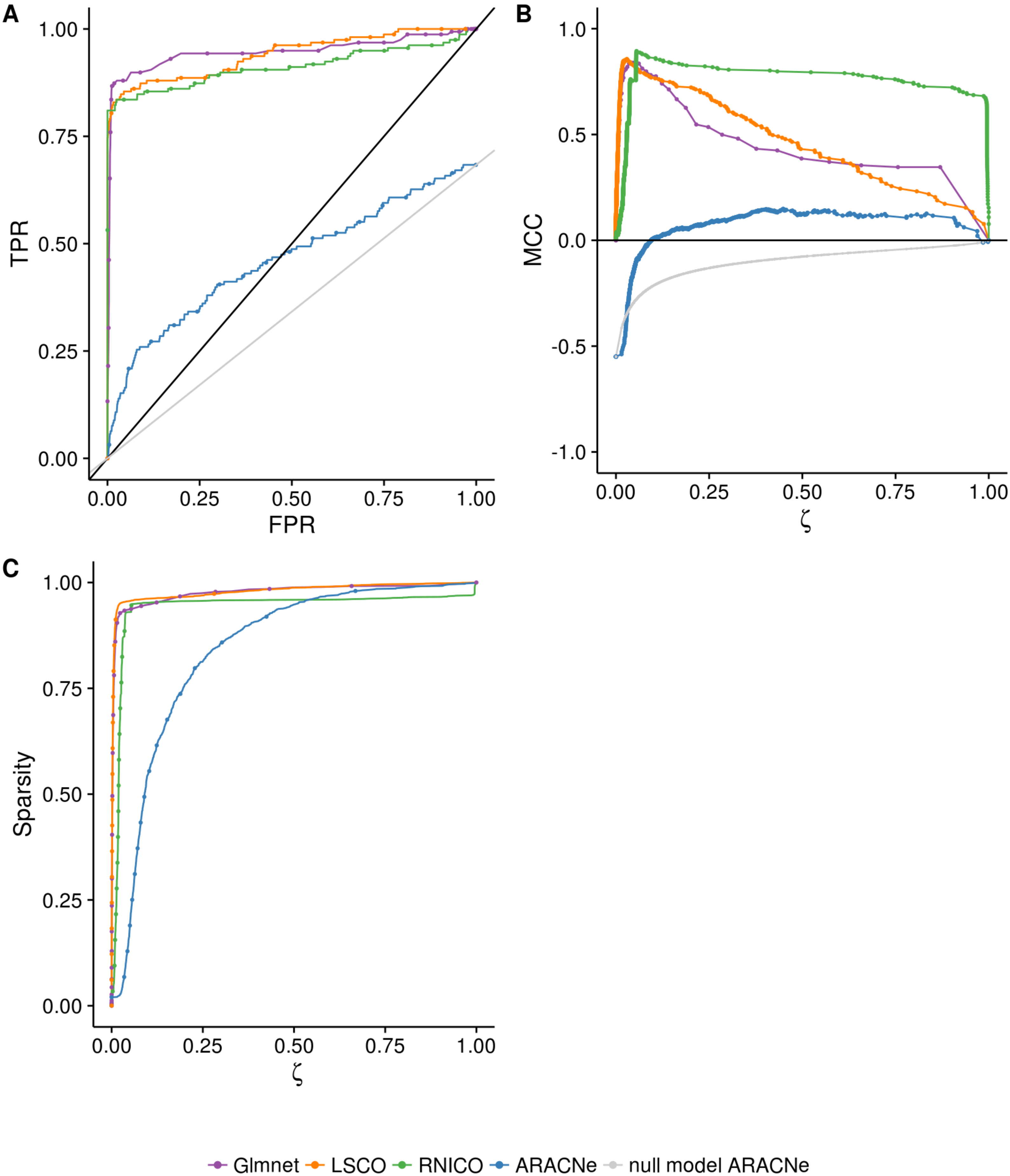
Case random N50 SNR0.01 high IAA



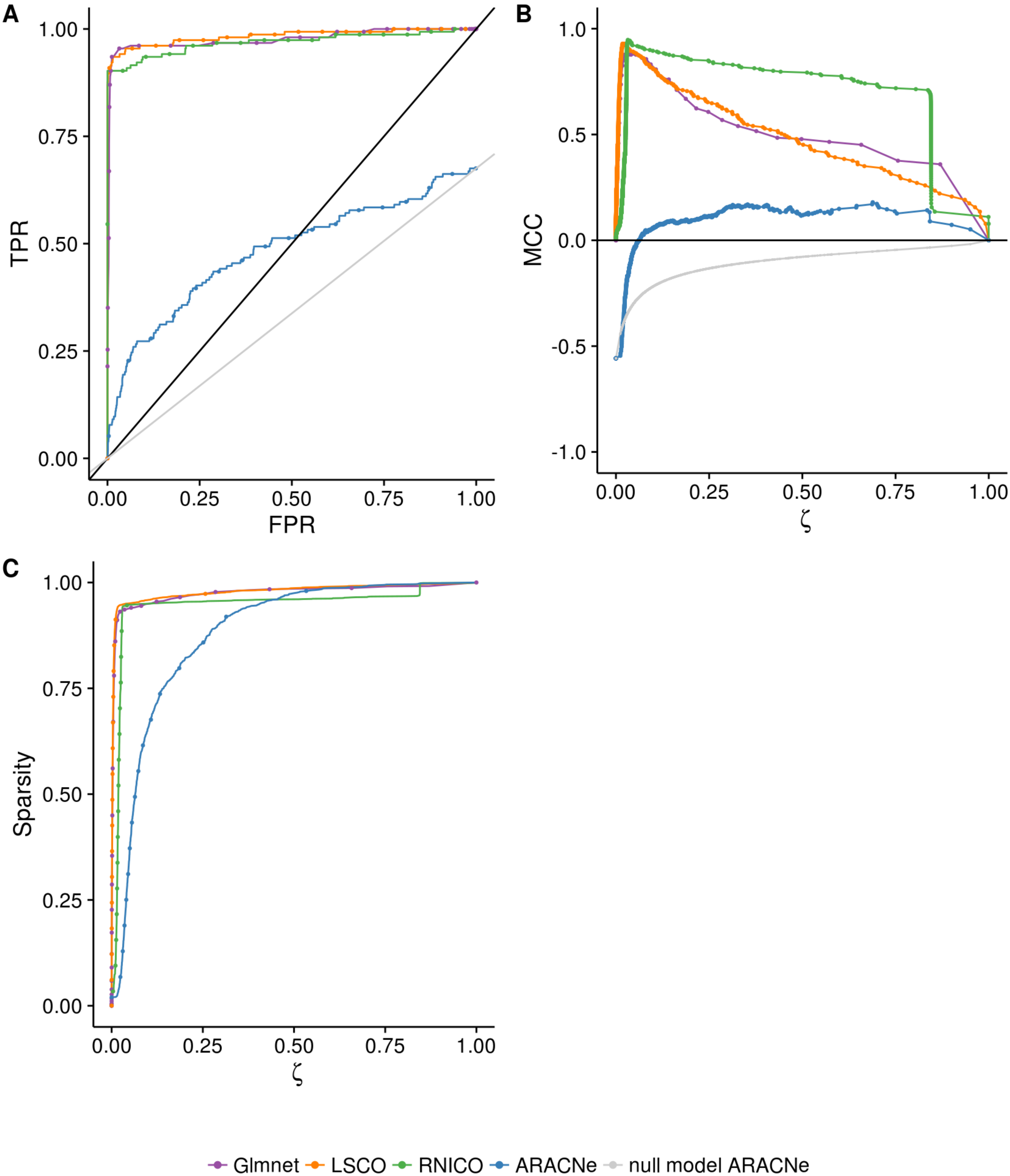
Case random N50 SNR0.01 low IAA



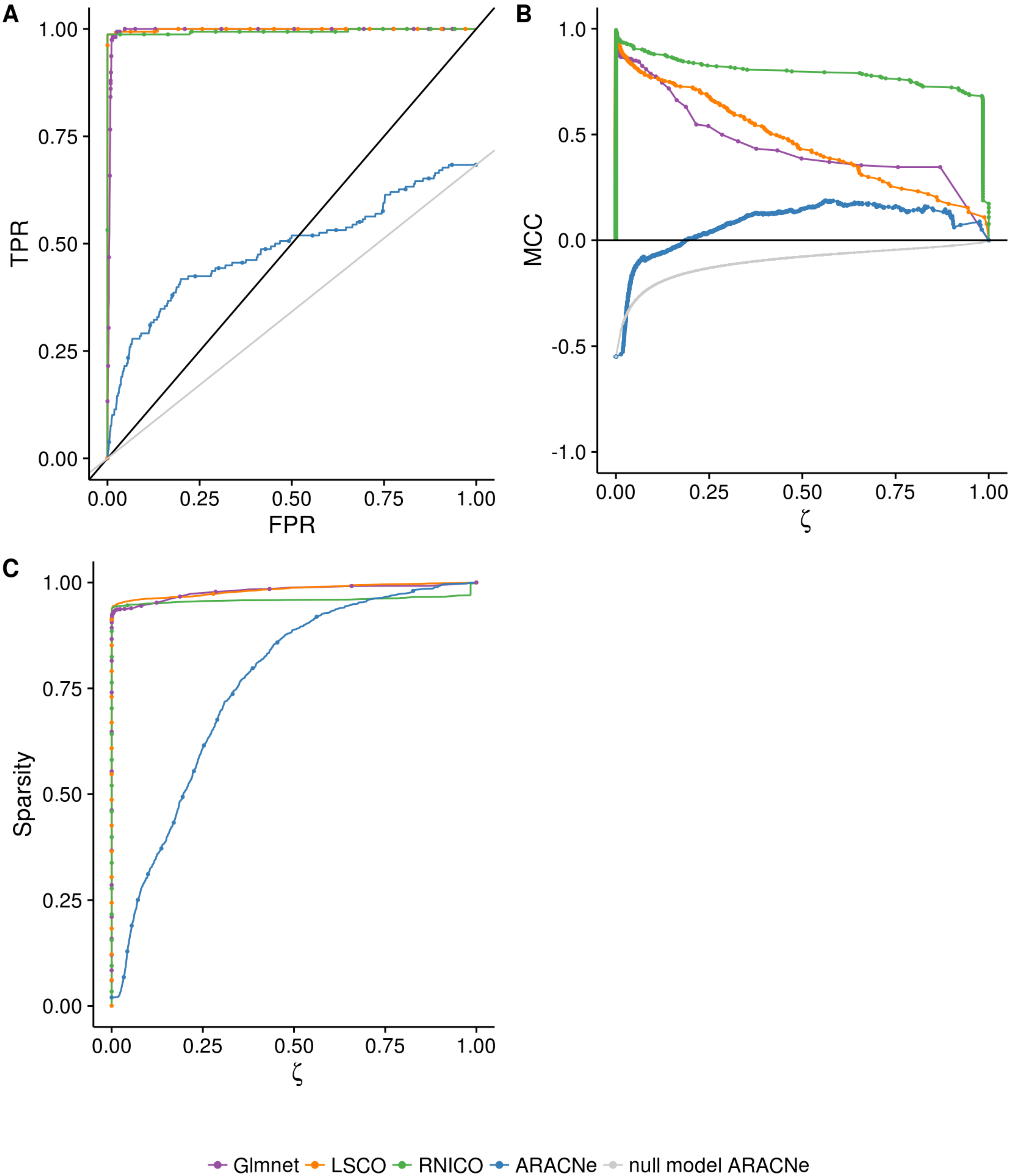
Case random N50 SNR1 high IAA



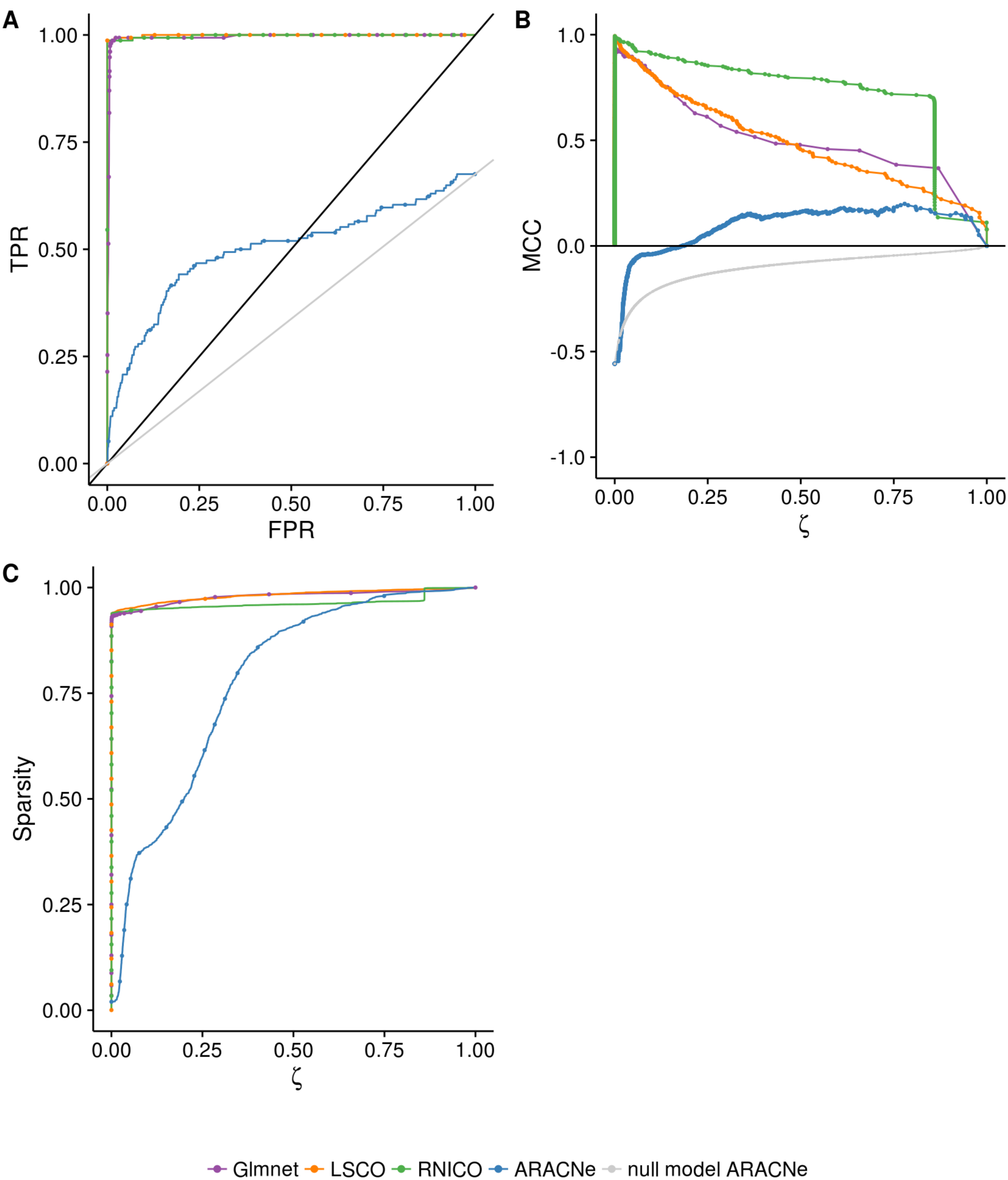
Case random N50 SNR1 low IAA



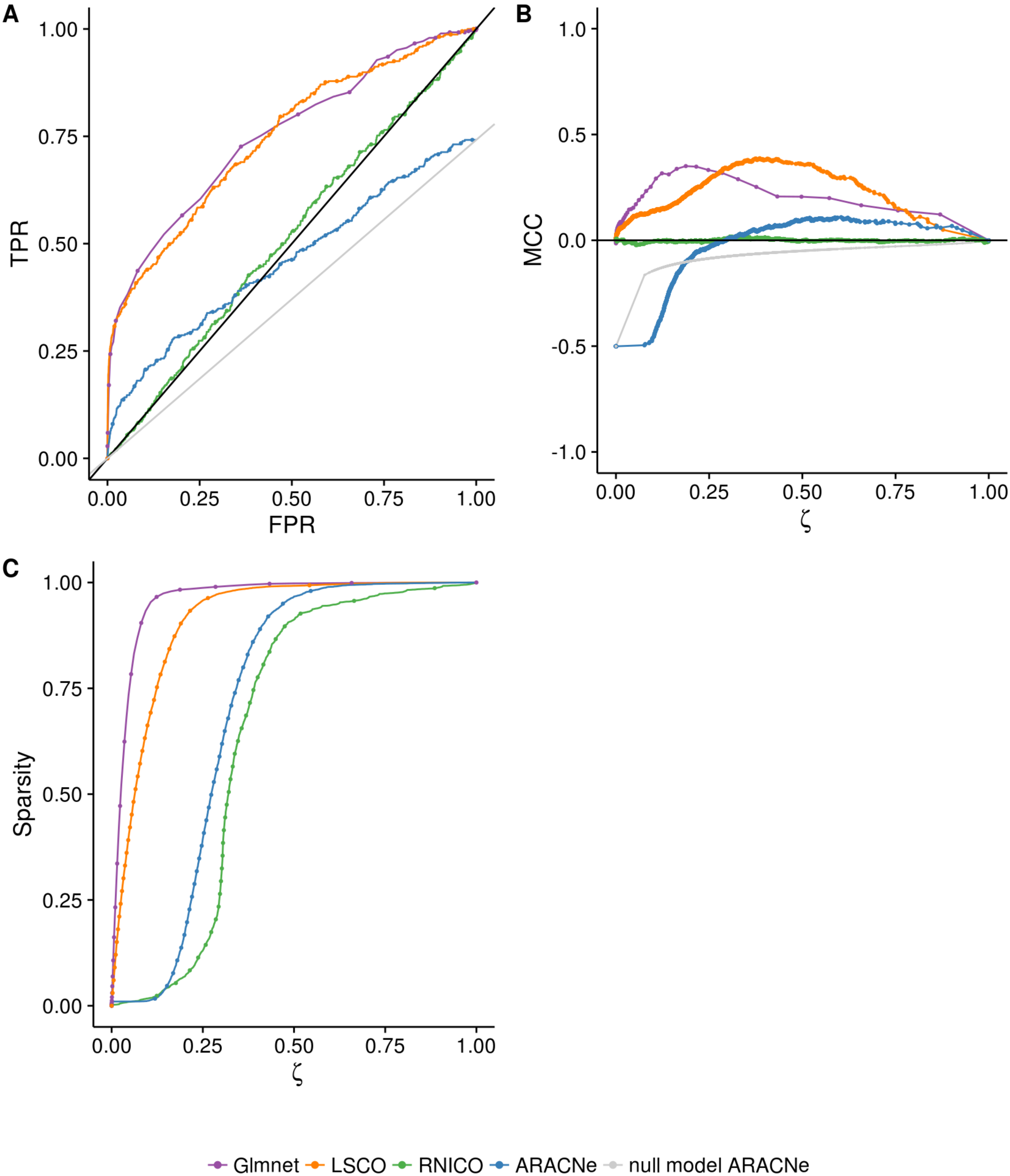
Case random N50 SNR100 high IAA



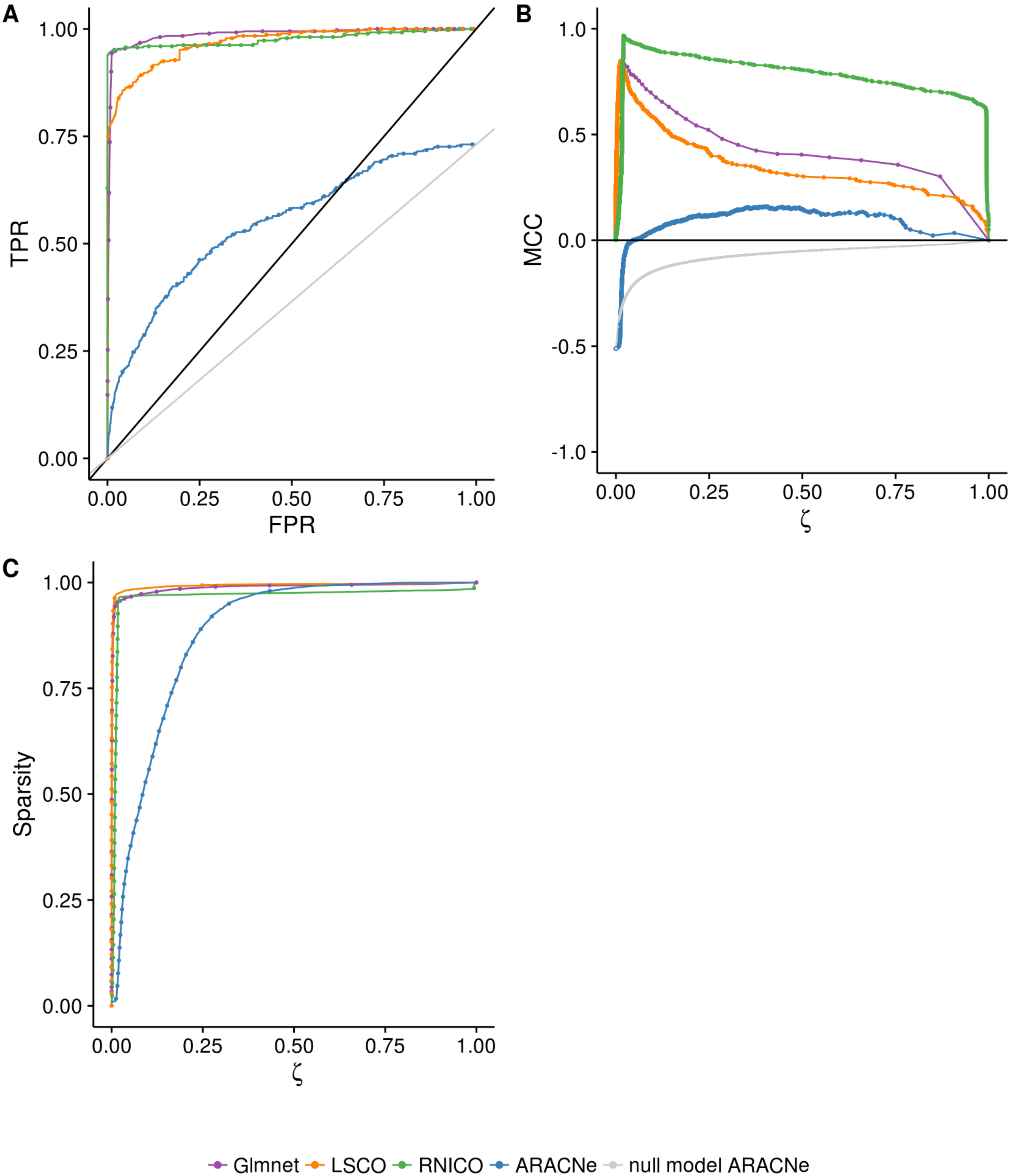
Case random N50 SNR100 low IAA



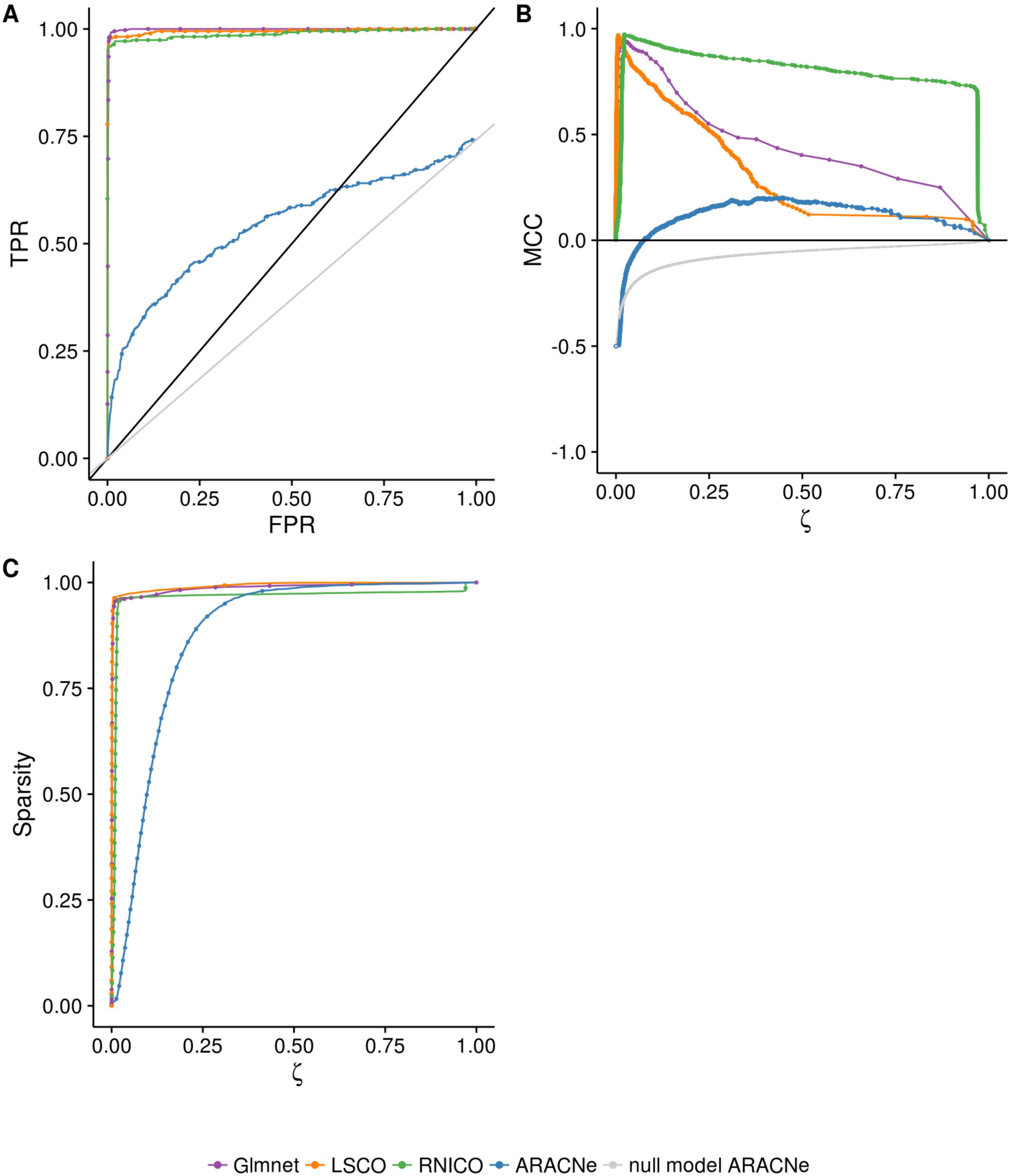
Case random N100 SNR0.01 low IAA



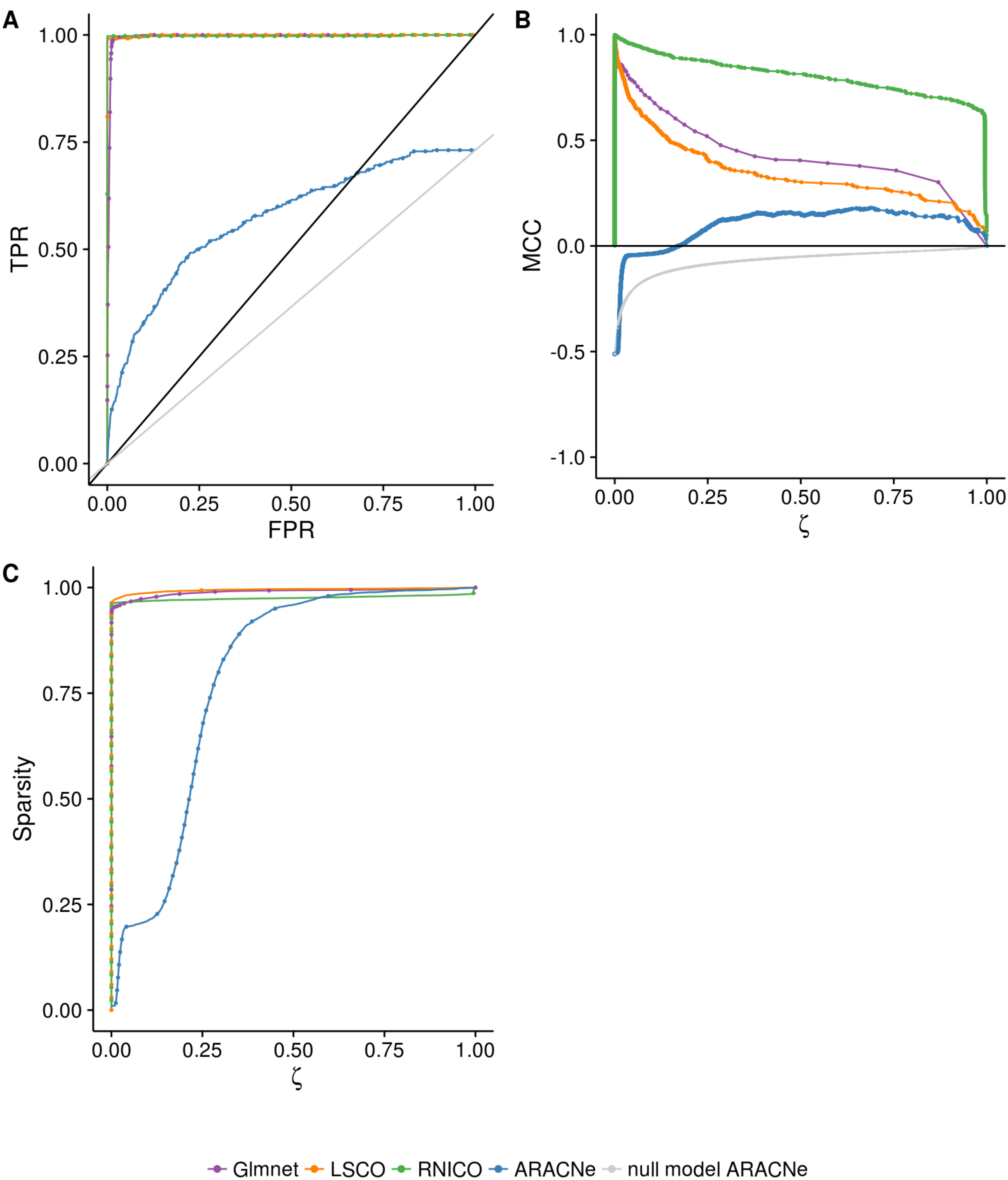
Case random N100 SNR1 high IAA



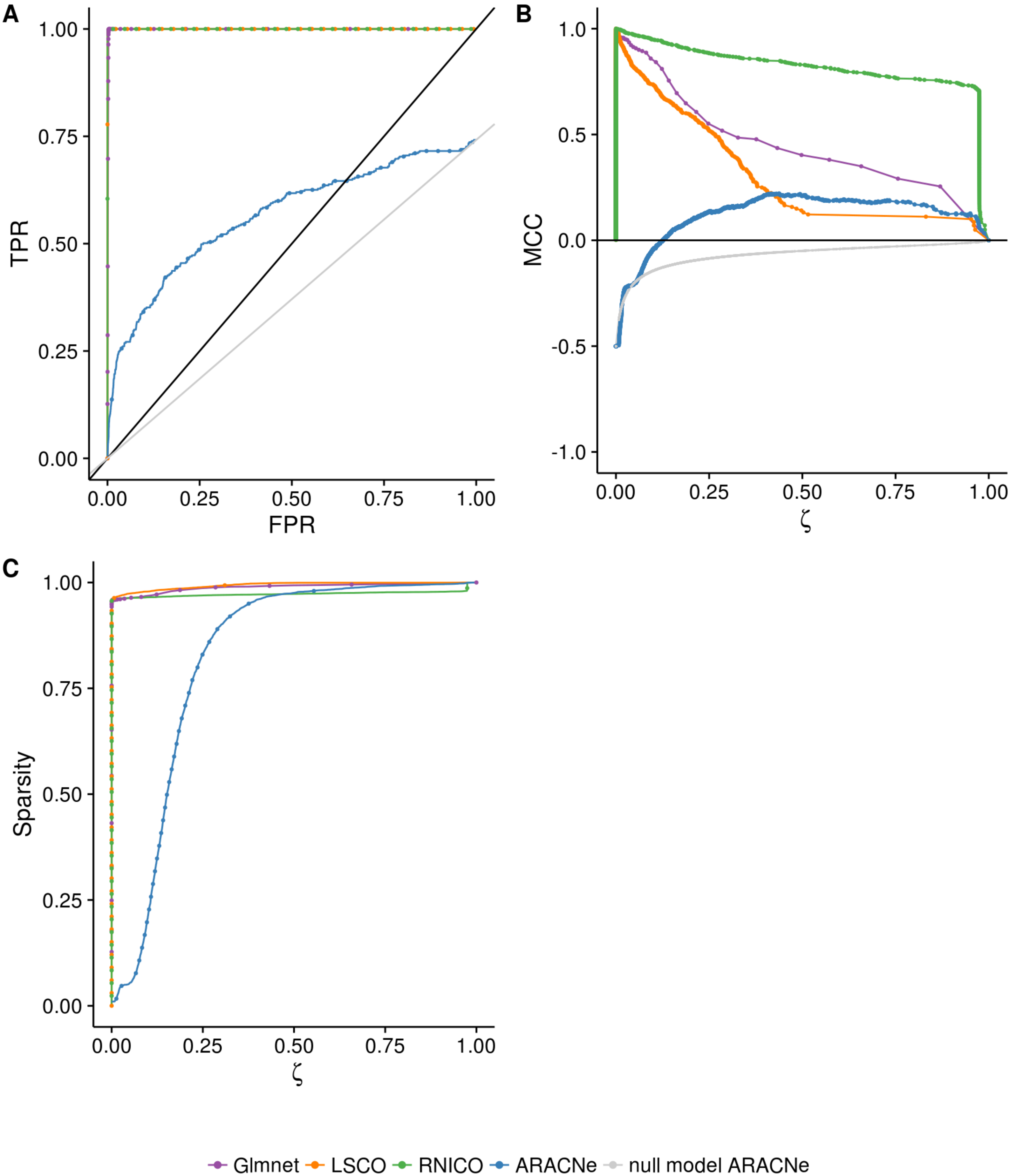
Case random N100 SNR1 low IAA



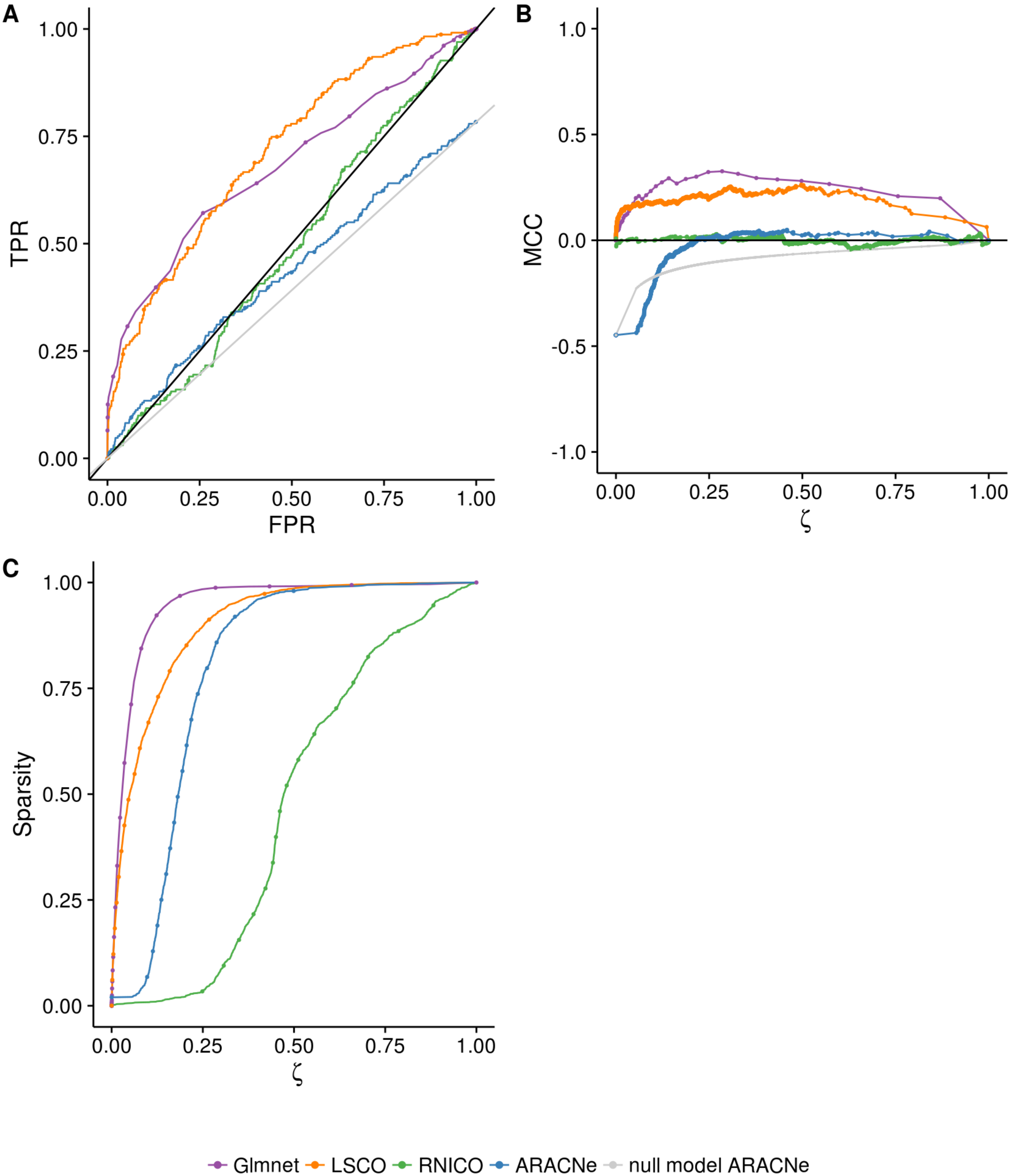
Case random N100 SNR100 high IAA



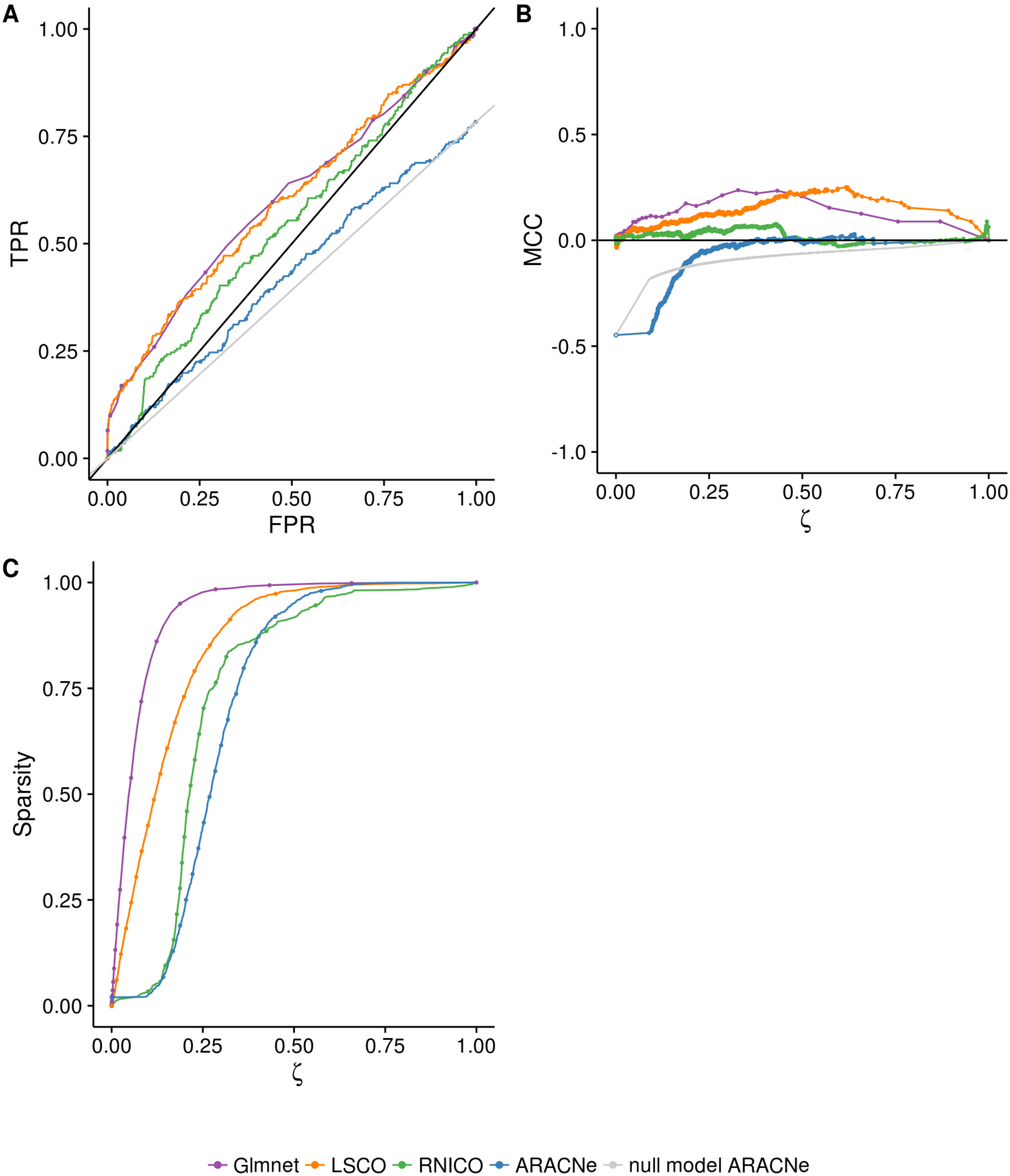
Case random N100 SNR100 low IAA



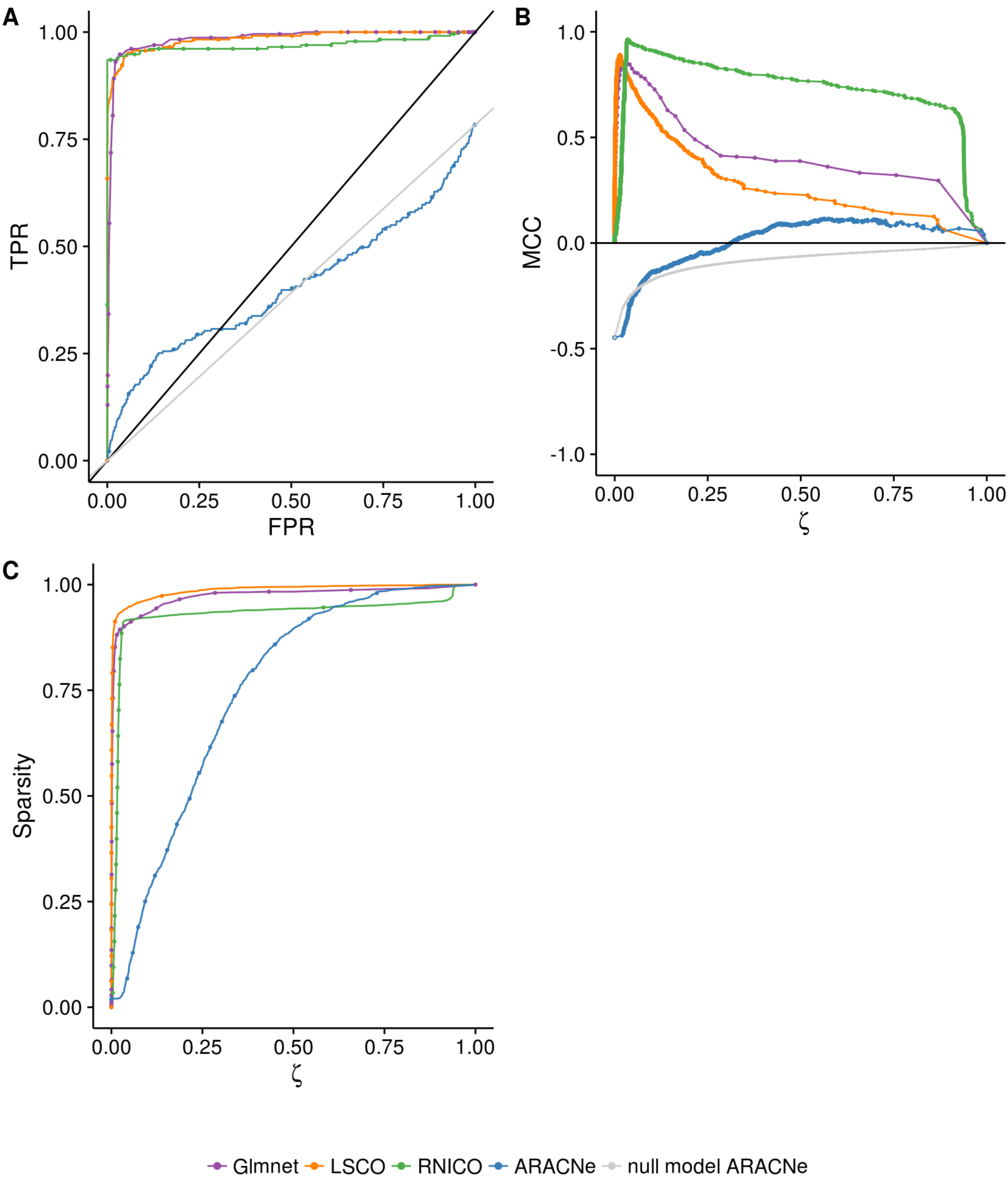
Case scalefree N50 SNR0.01 high IAA



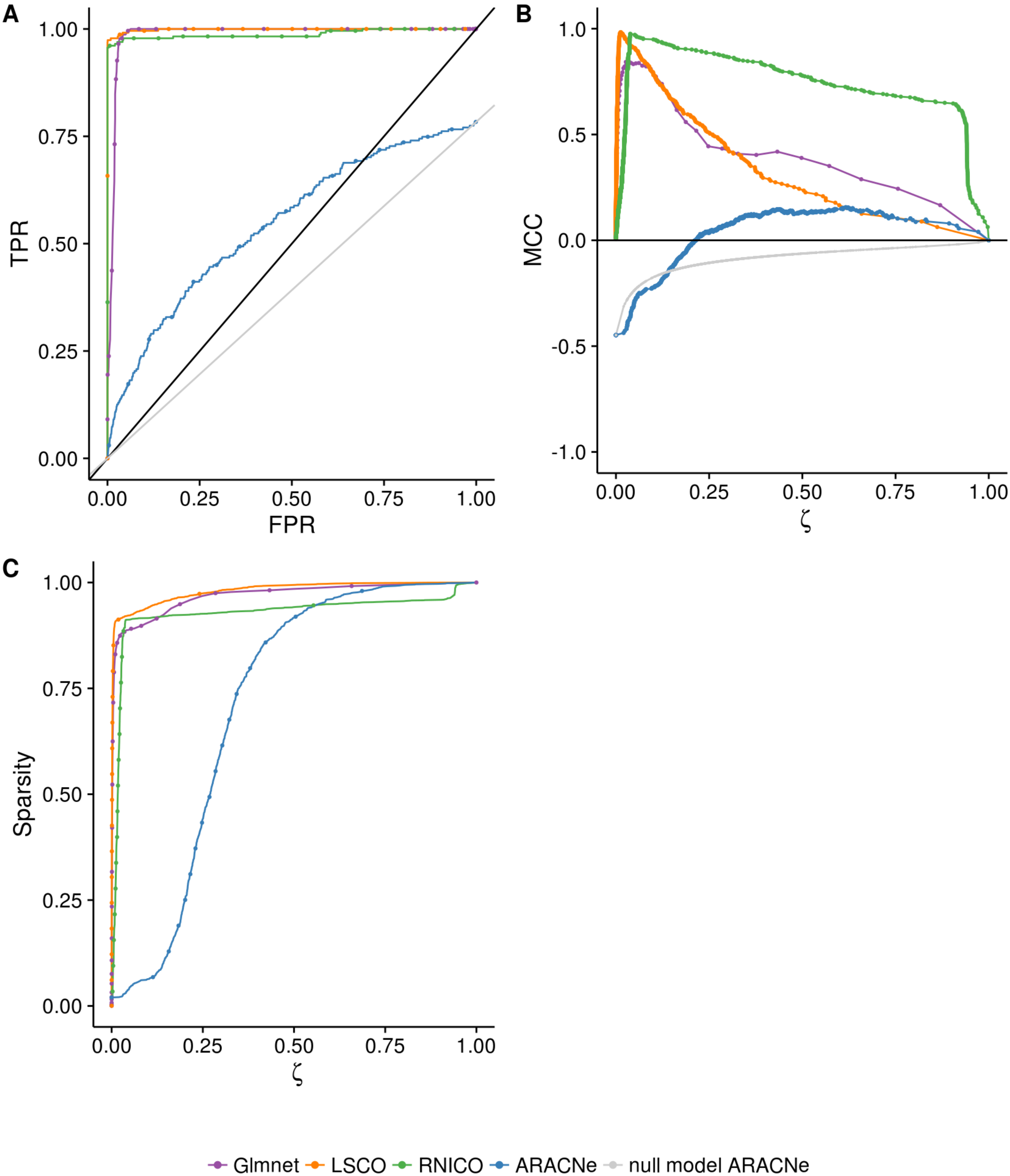
Case scalefree N50 SNR0.01 low IAA



Case scalefree N50 SNR1 high IAA



Case scalefree N50 SNR1 low IAA



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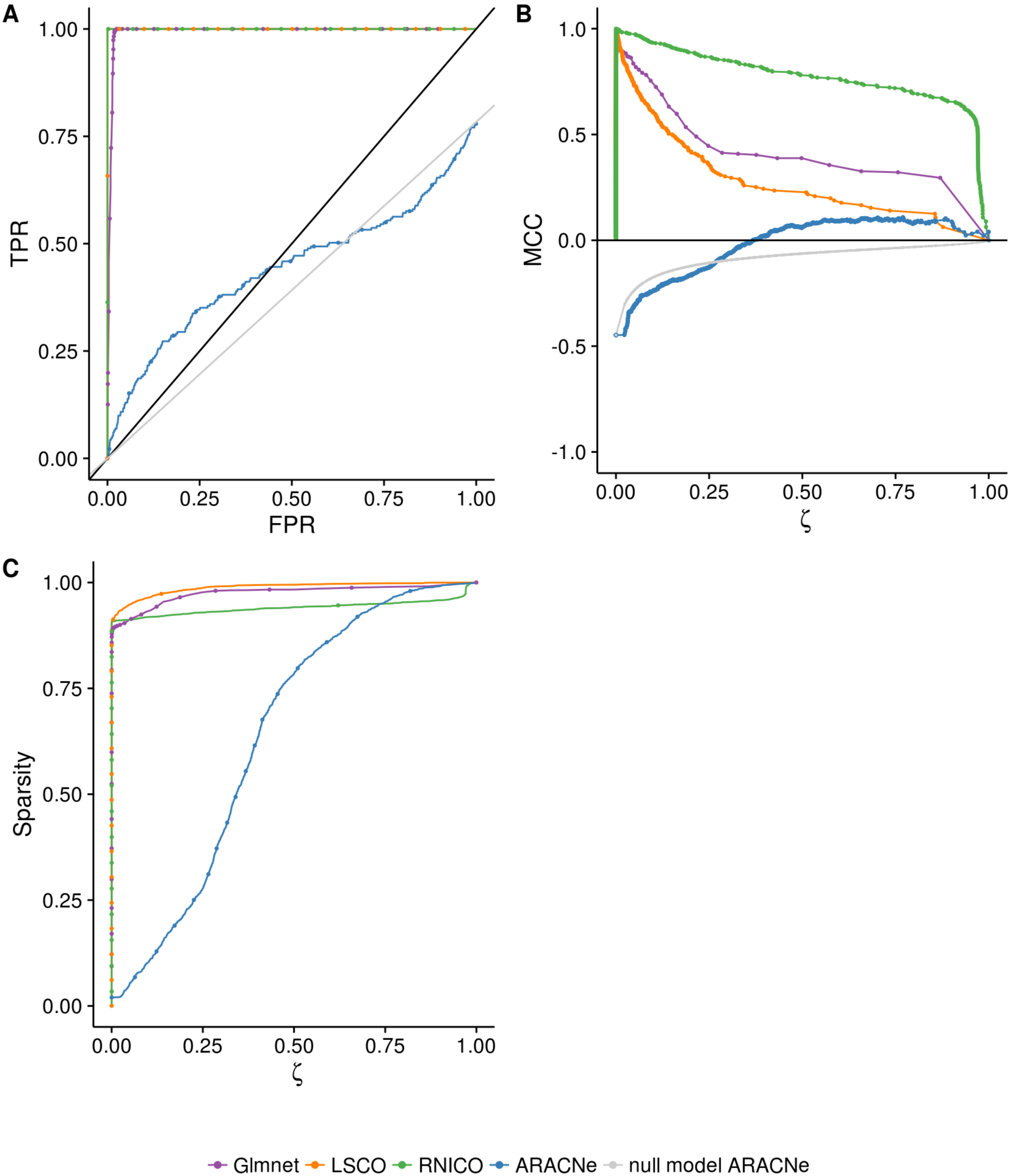
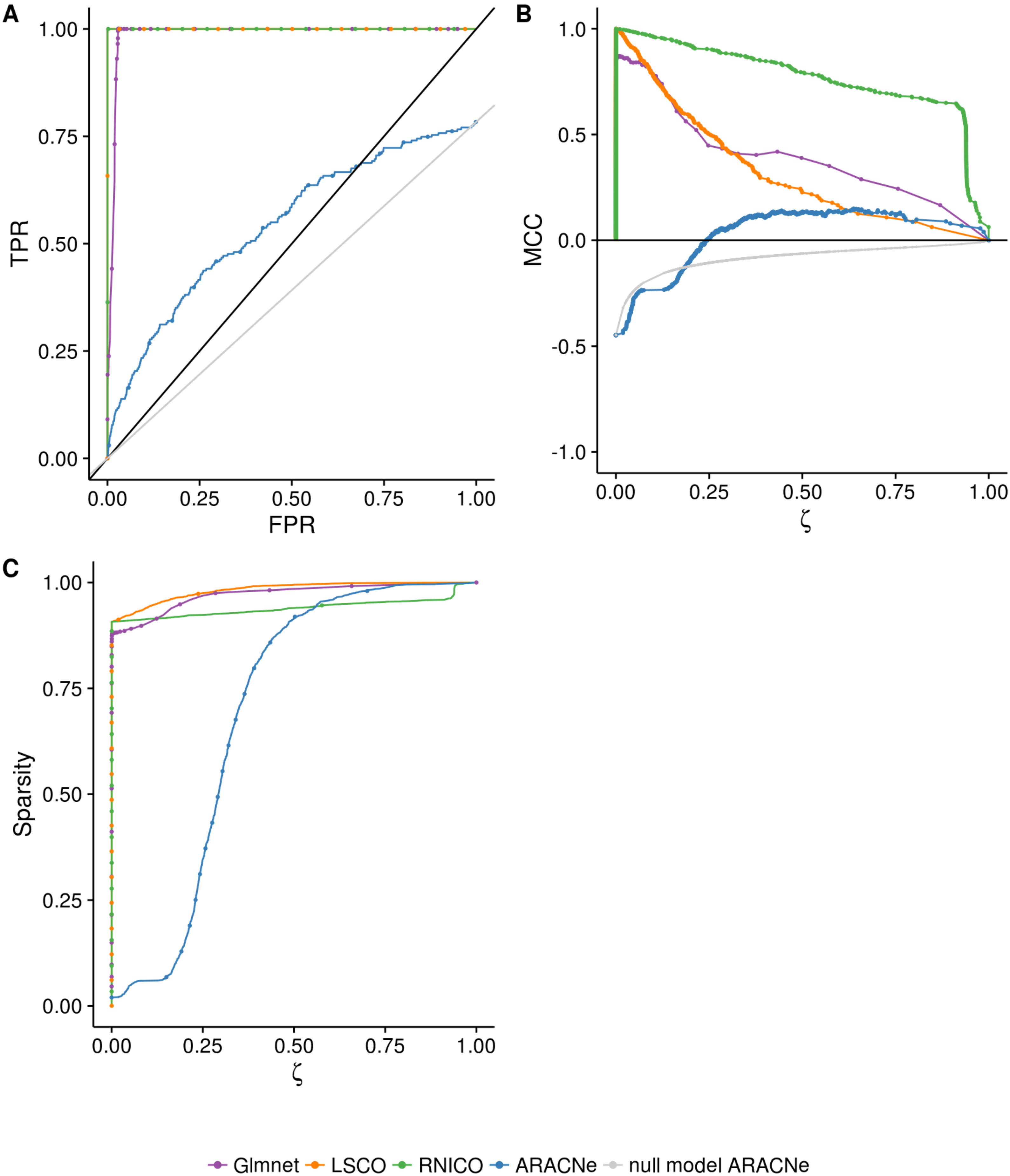
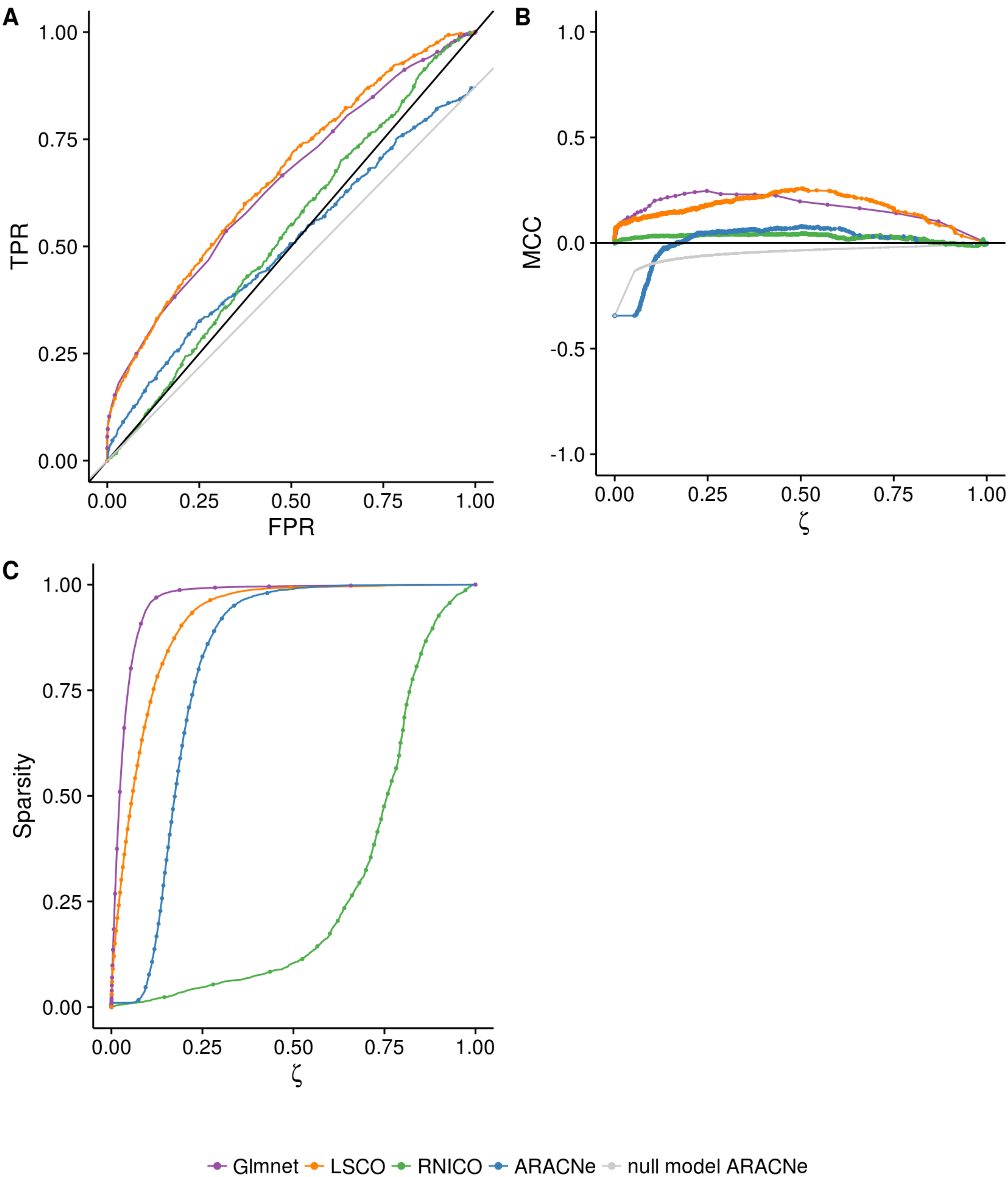


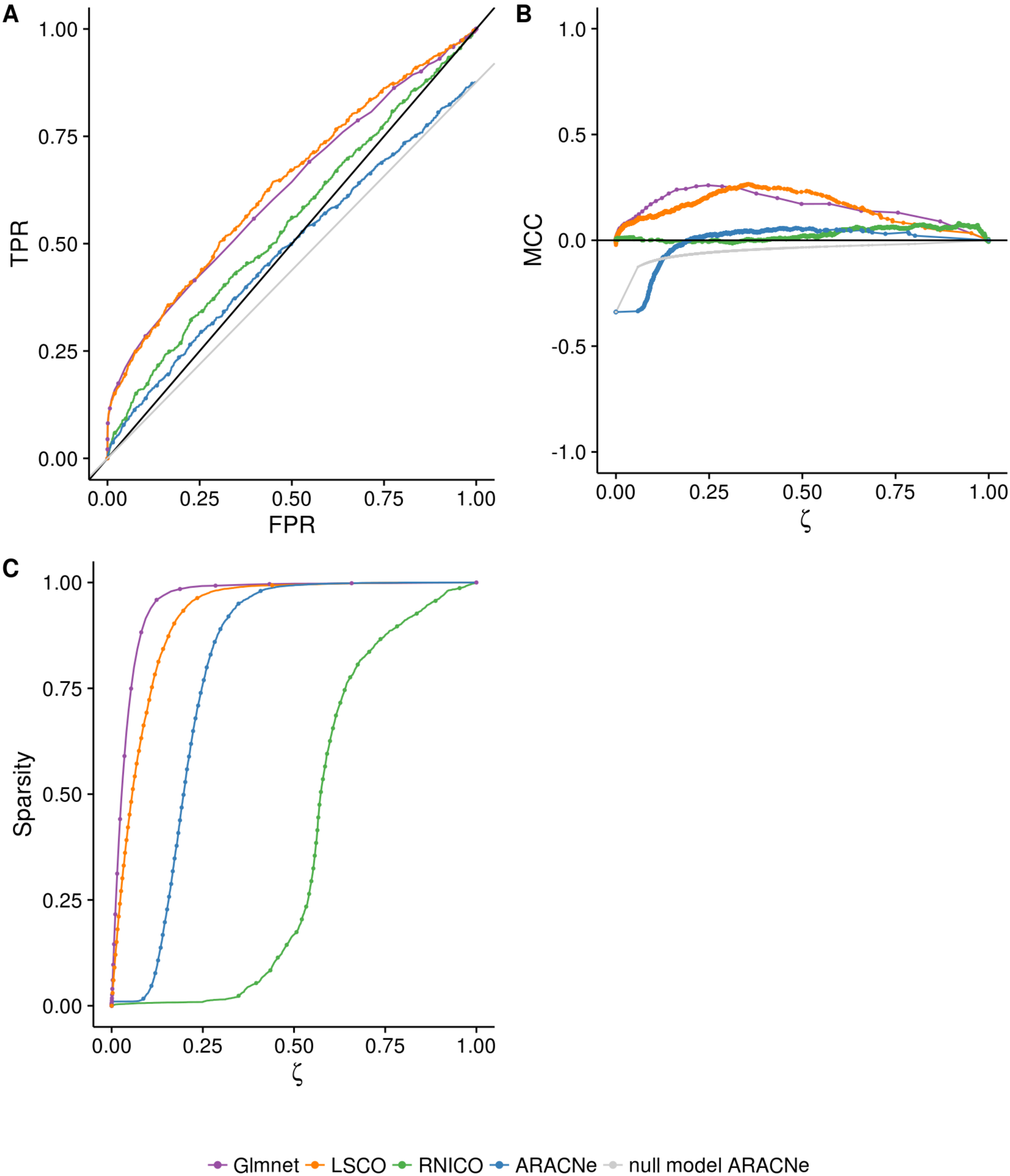
Case scalefree N50 SNR100 low IAA



Case scalefree N100 SNR0.01 high IAA



Case scalefree N100 SNR0.01 low IAA



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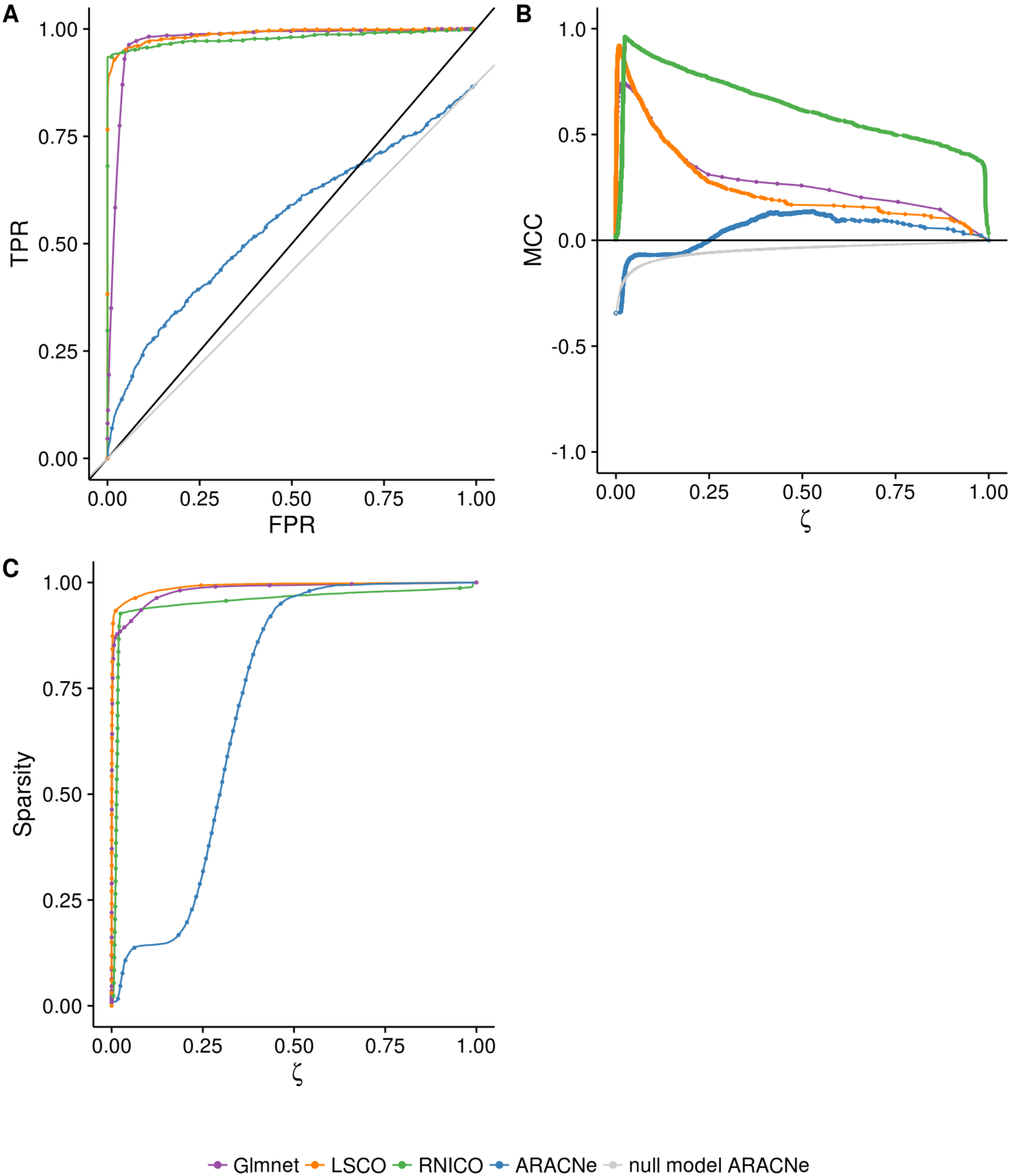
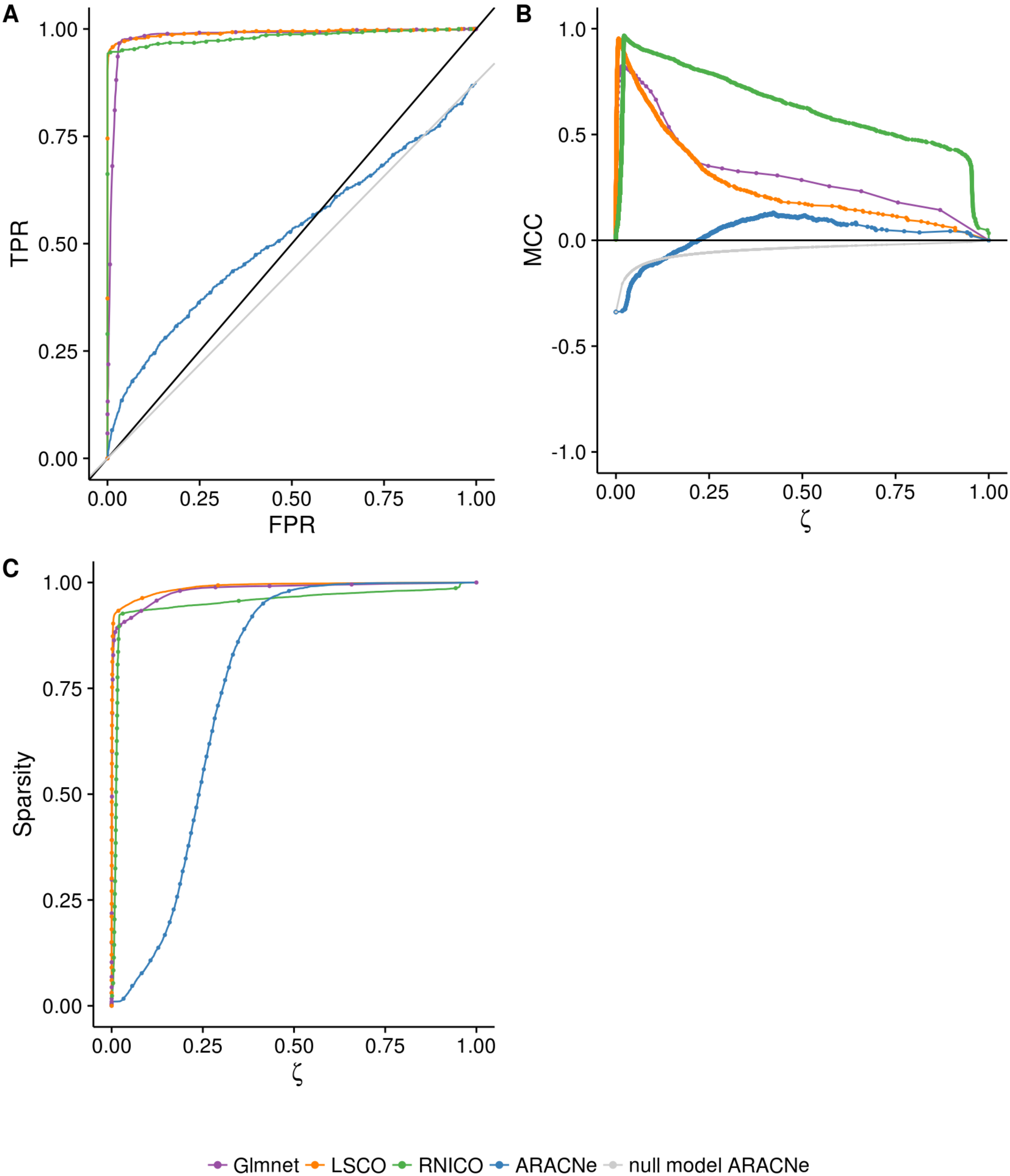
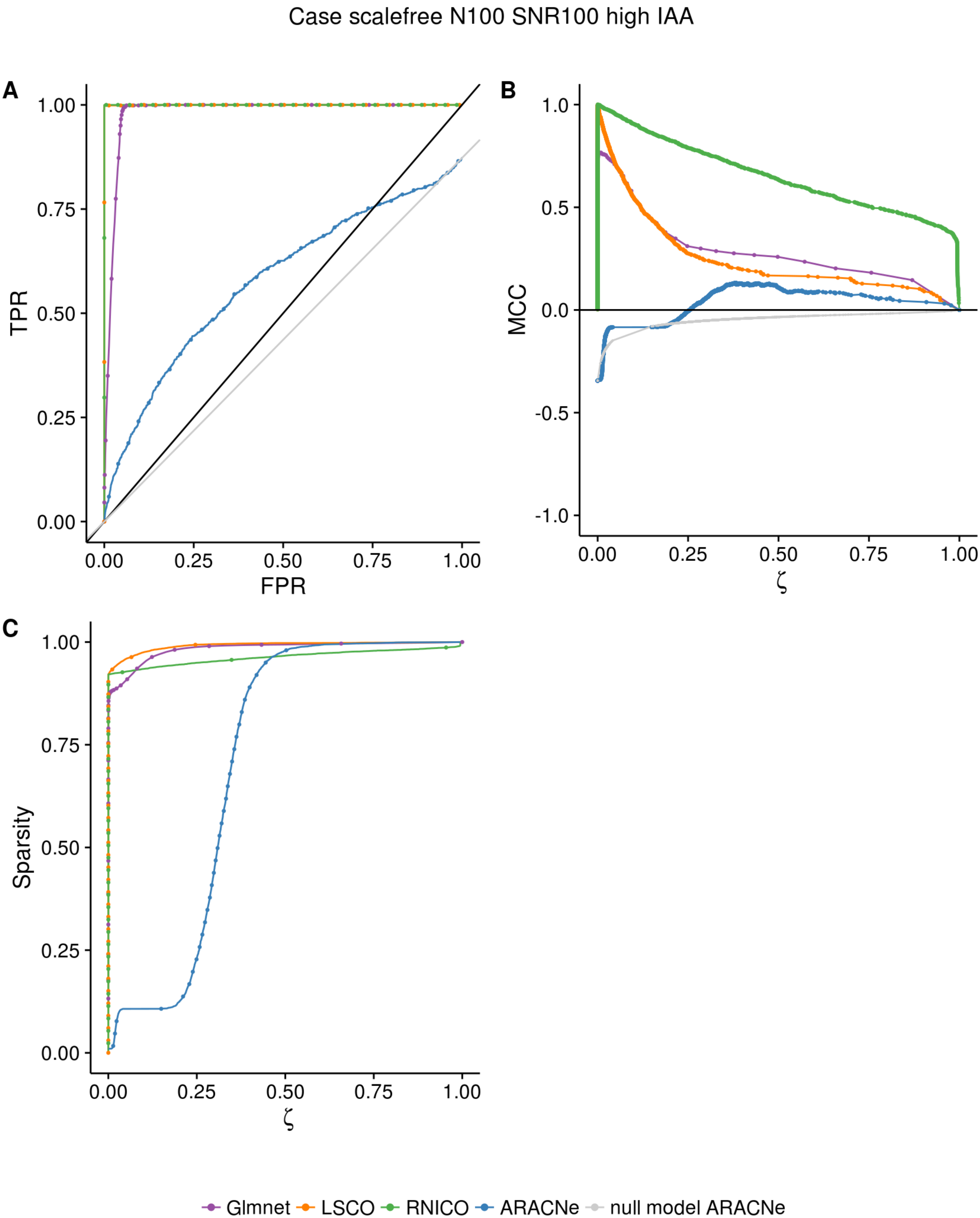
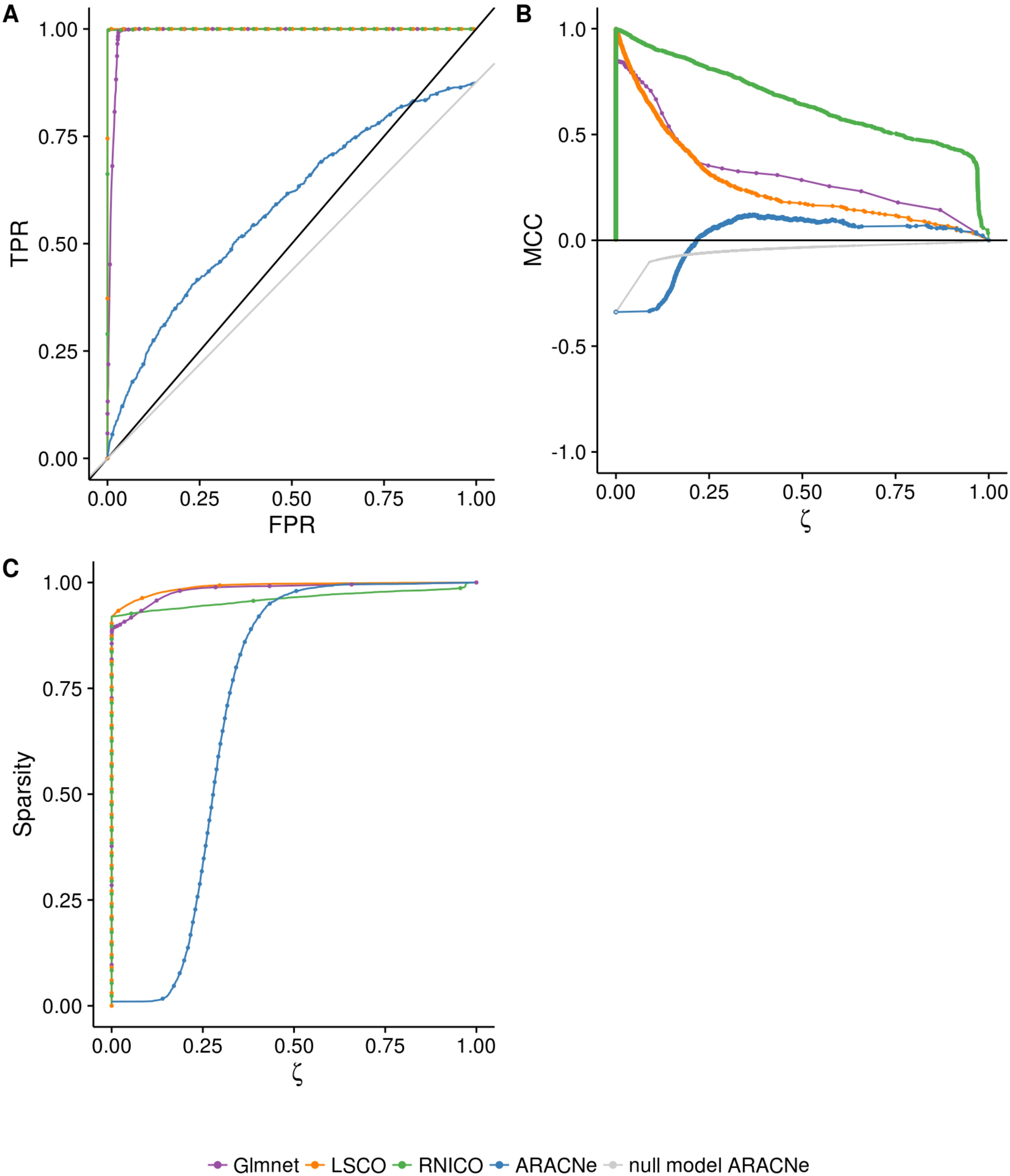


Case scalefree N100 SNR1 low IAA

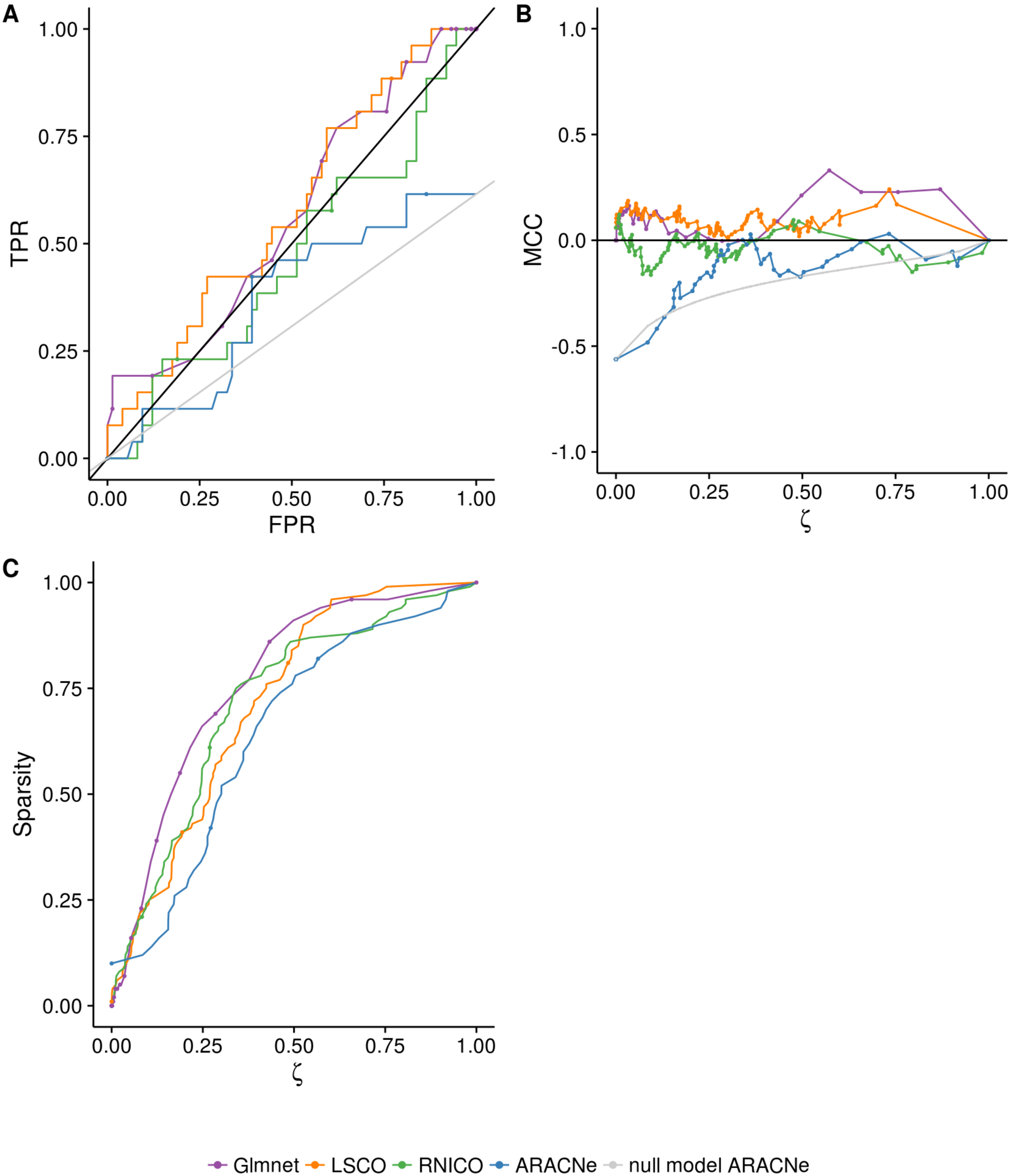



Case scalefree N100 SNR100 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
0.00
0.25
0.50
0.75
1.00
C
Sparsity
ζ
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Glmnet
LSCO
RNICO
ARACNe
null model ARACNe

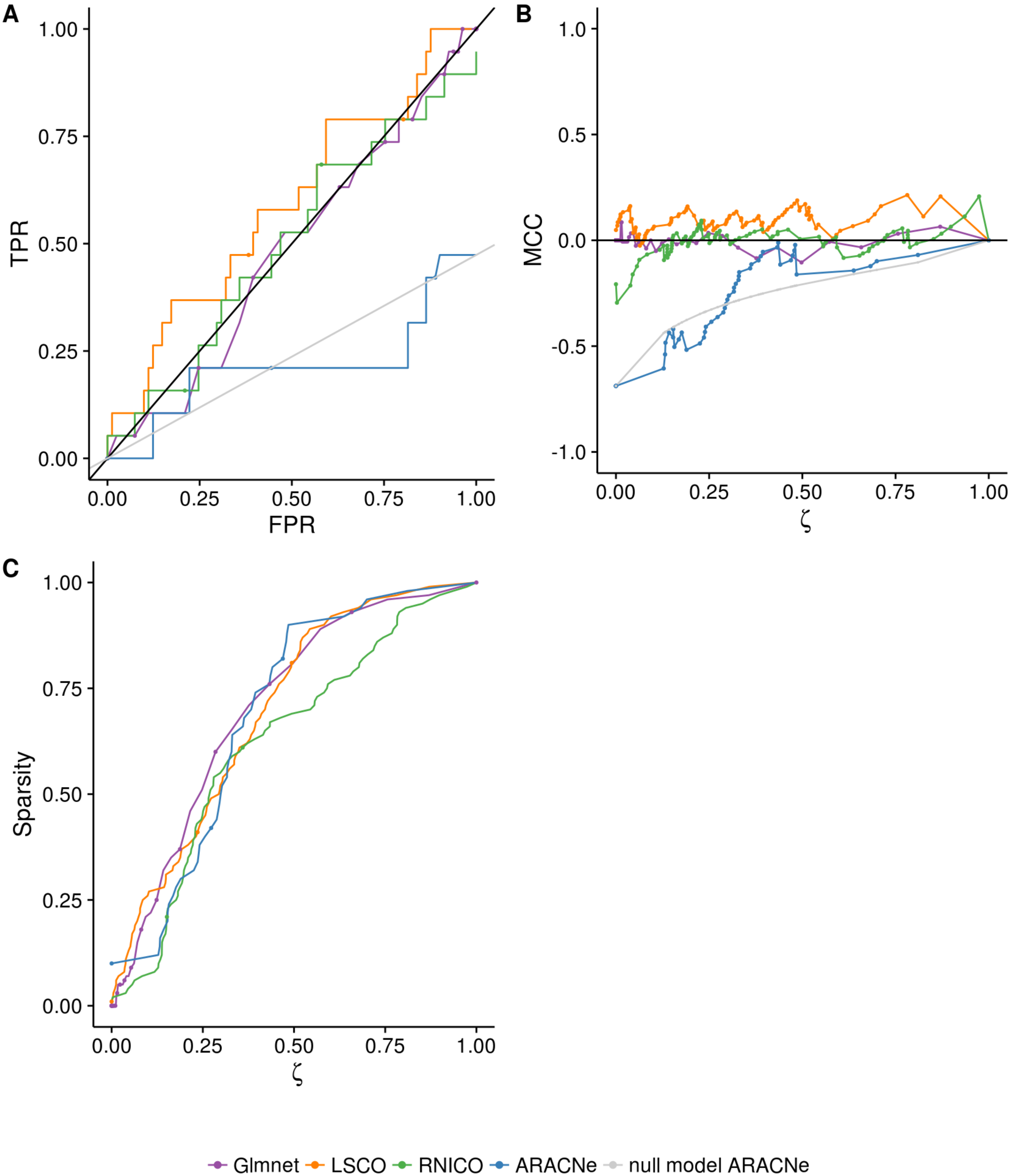
Case scalefree N100 SNR100 low IAA



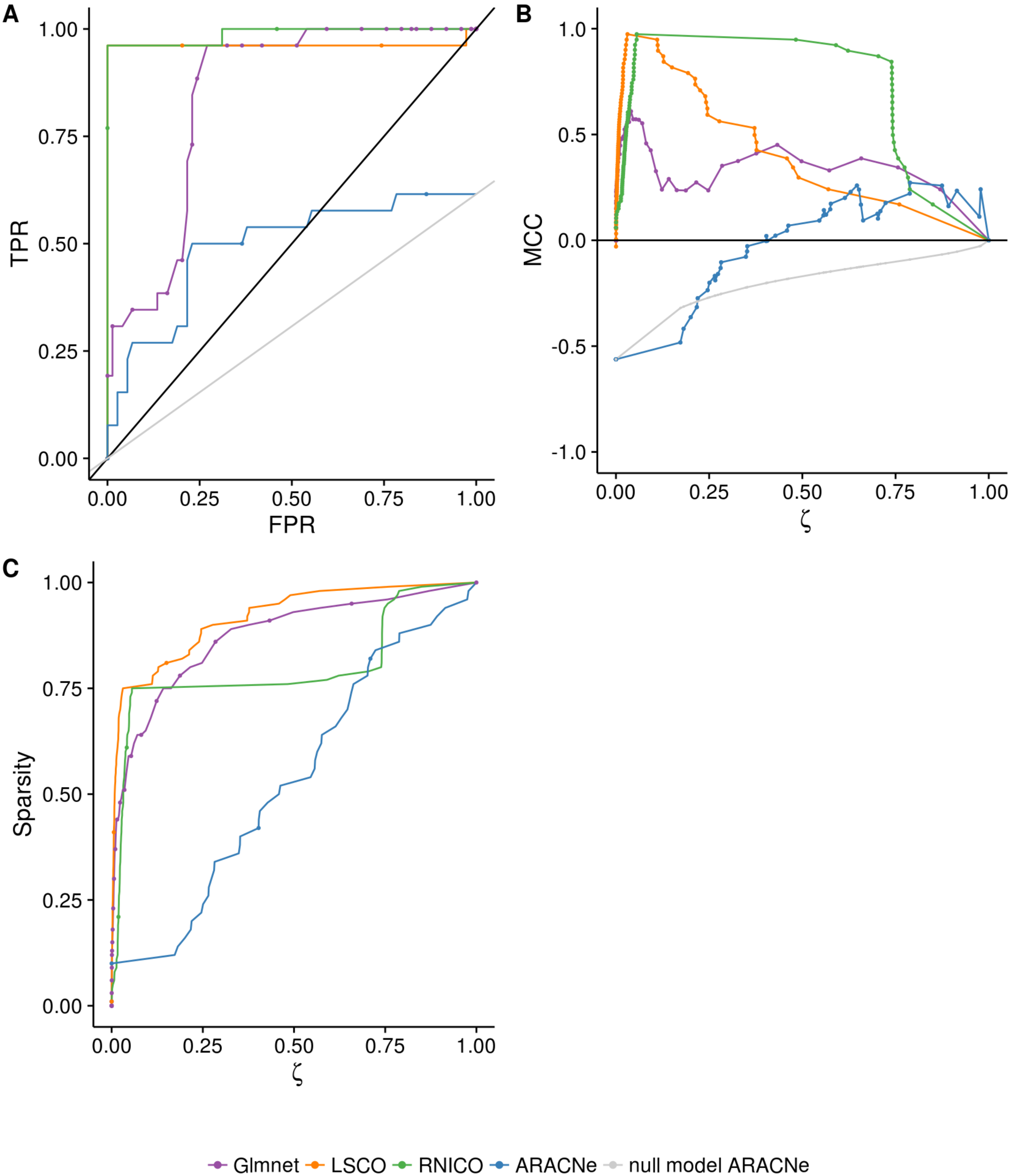
Case smallworld N10 SNR0.01 high IAA



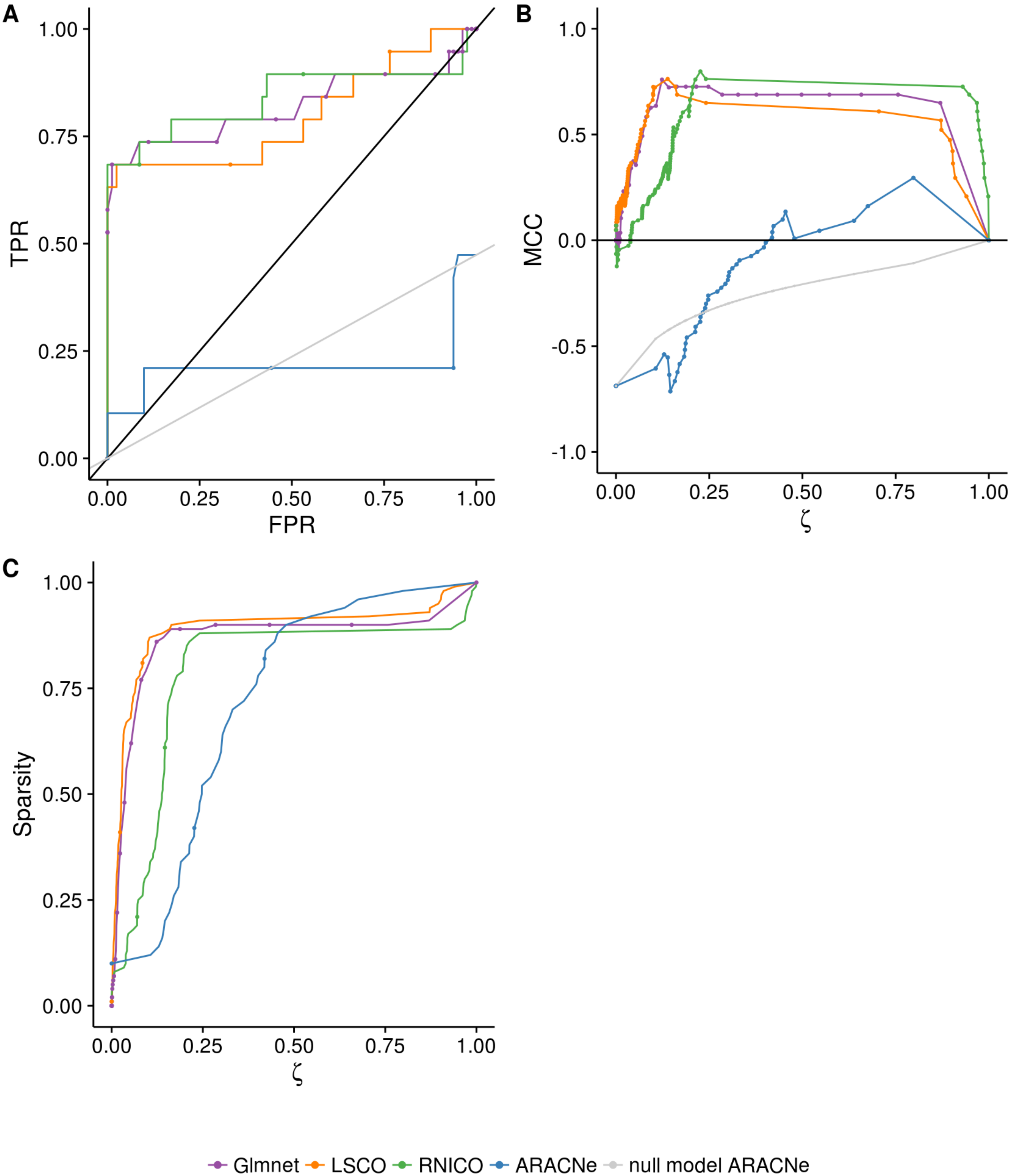
Case smallworld N10 SNR0.01 low IAA



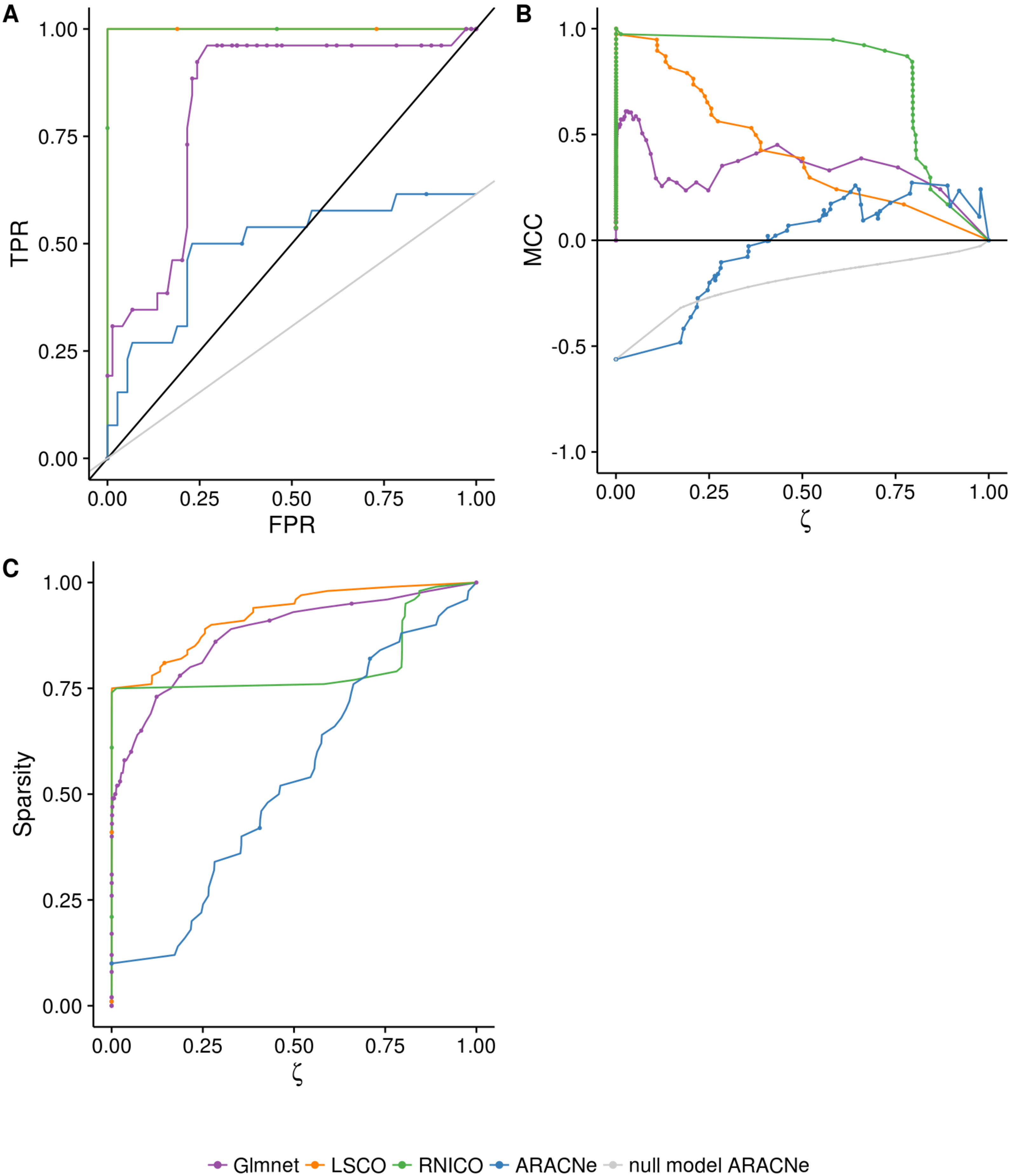
Case smallworld N10 SNR1 high IAA



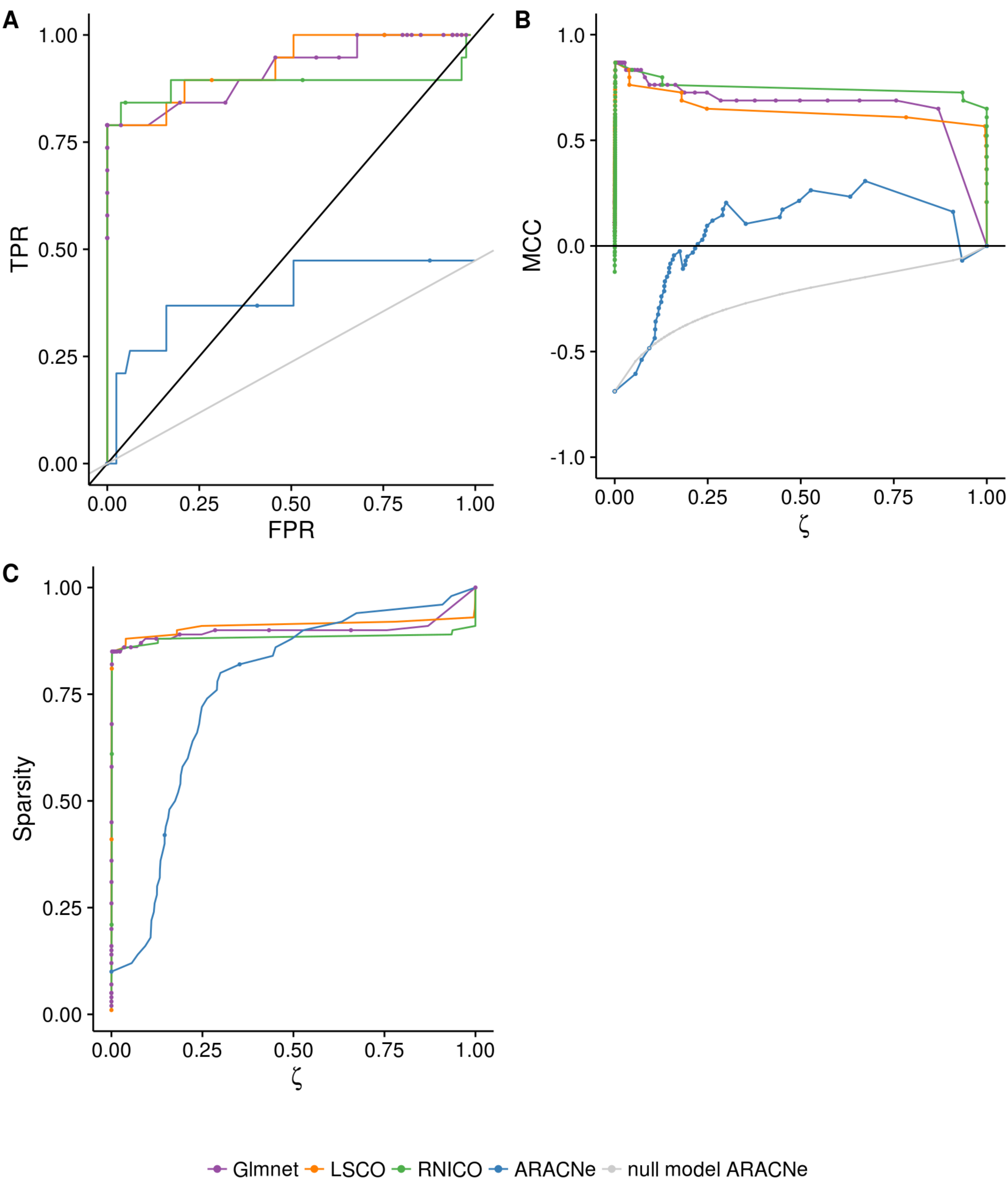
Case smallworld N10 SNR1 low IAA

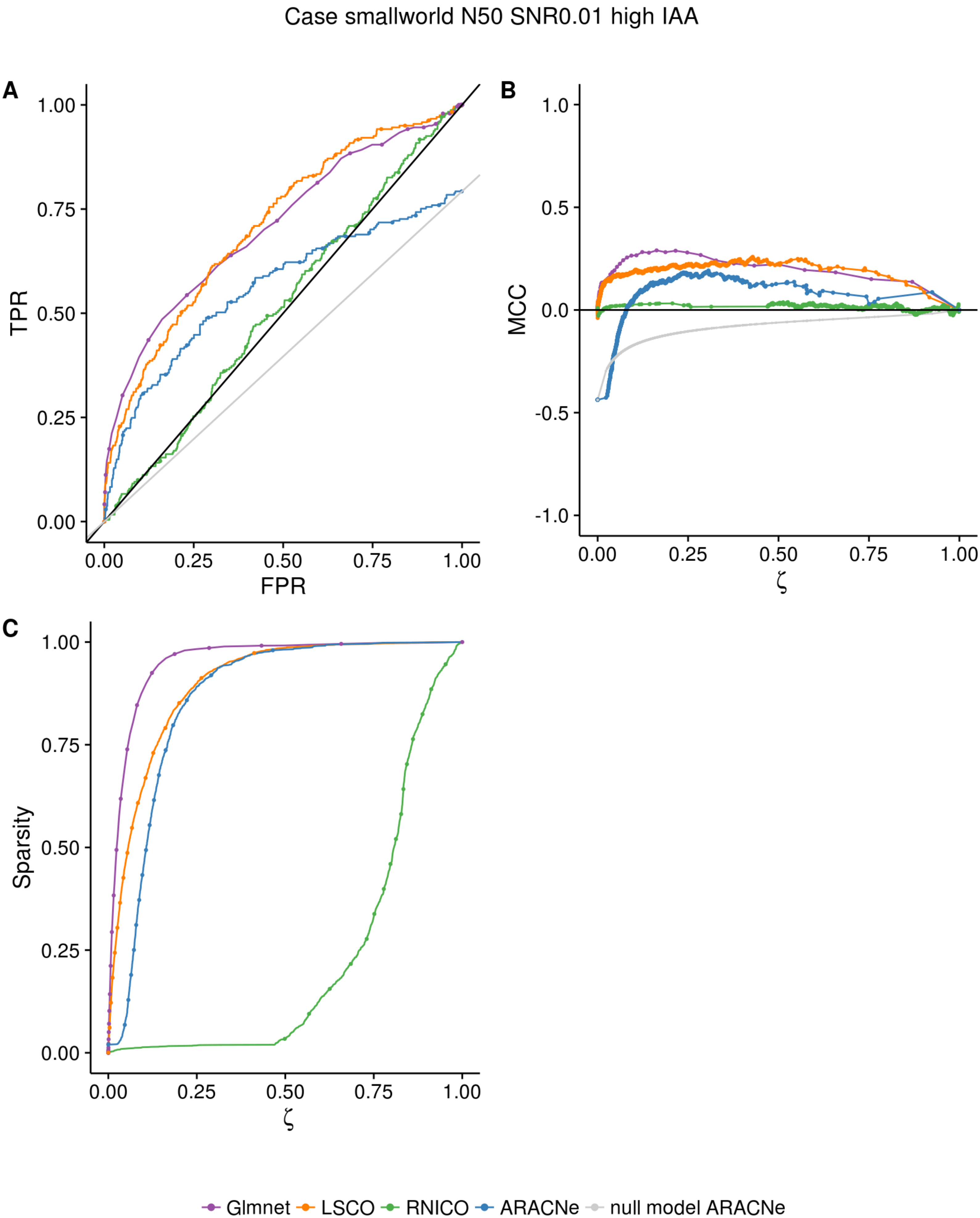


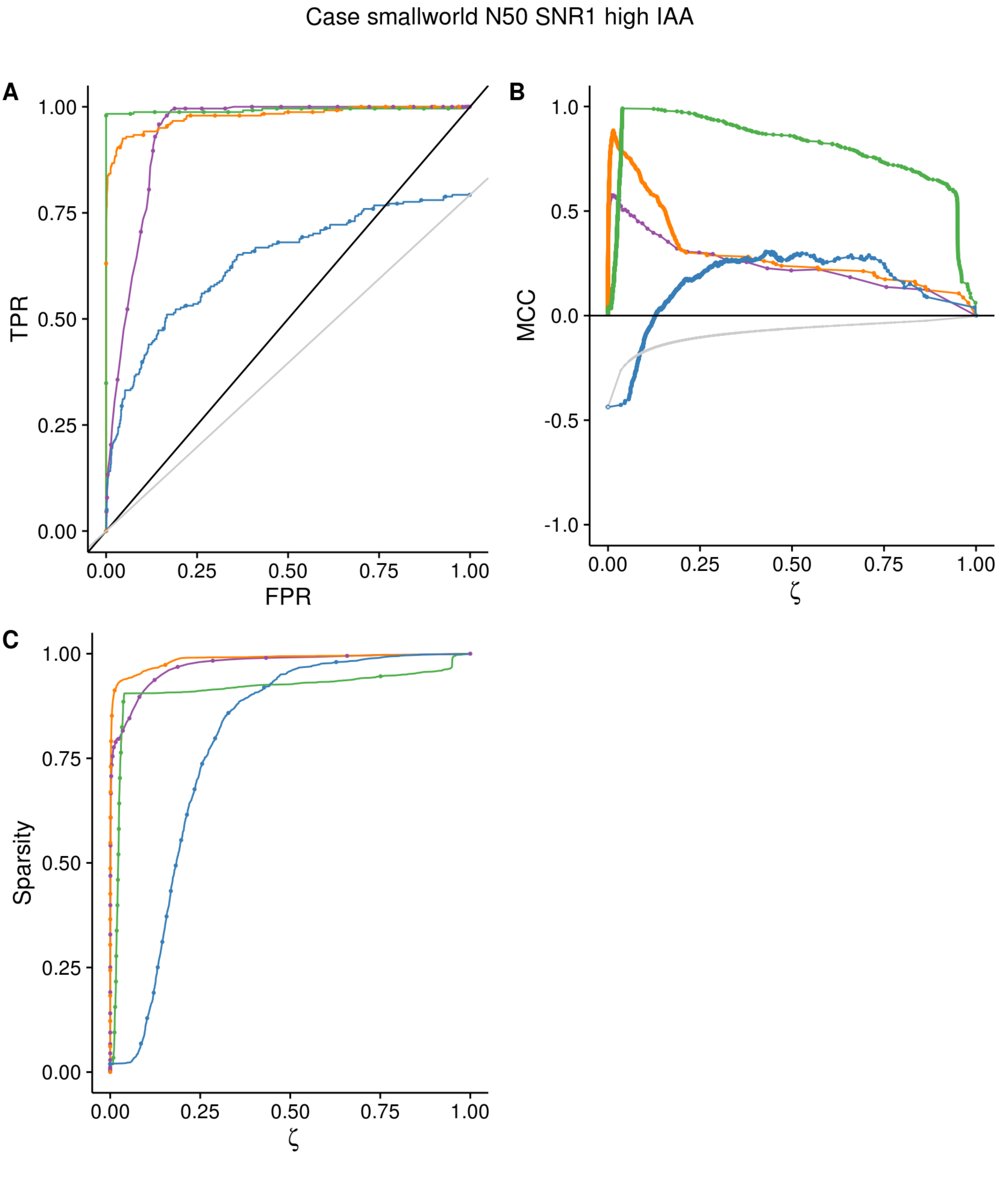
Case smallworld N10 SNR100 high IAA



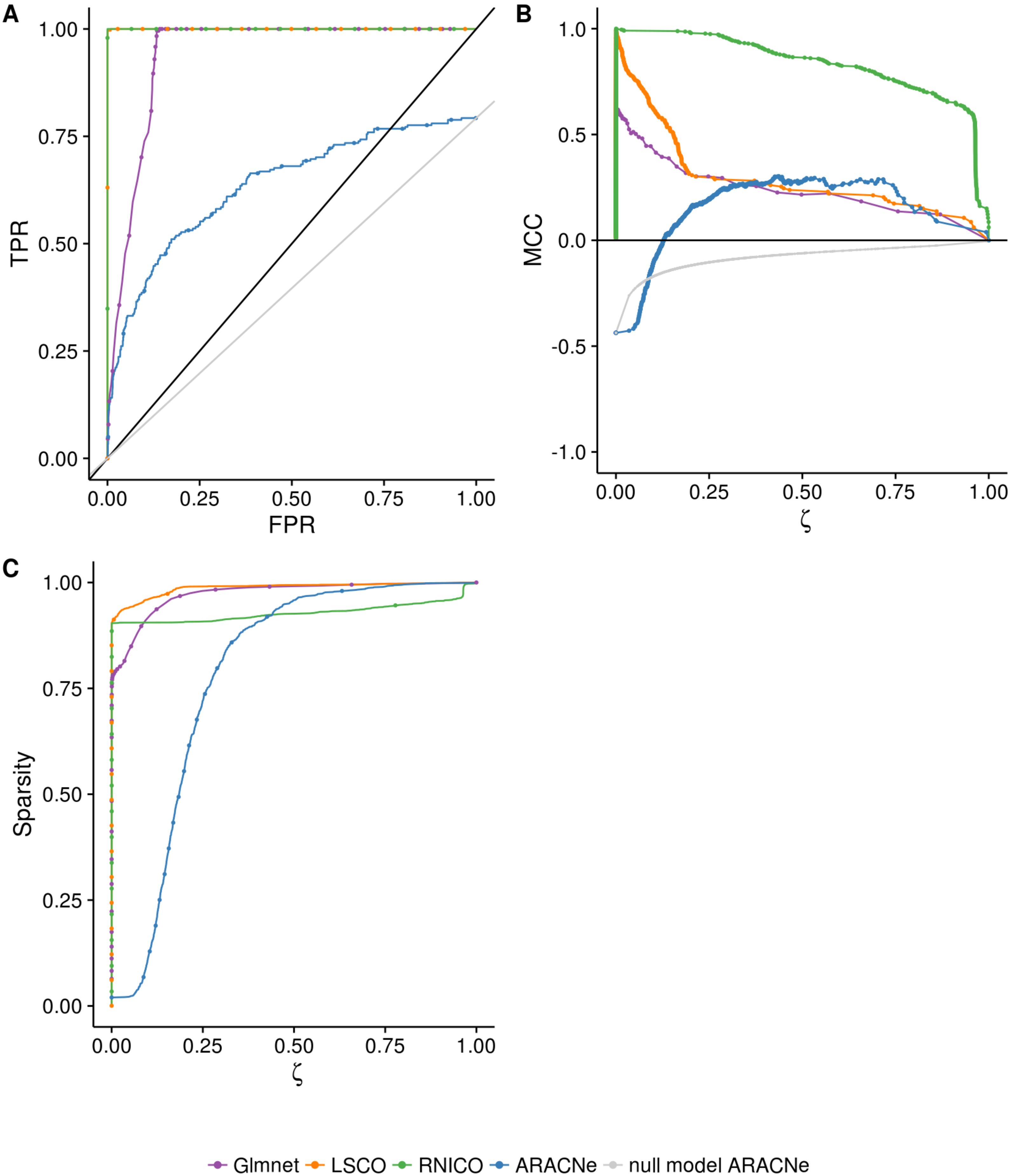
Case smallworld N10 SNR100 low IAA



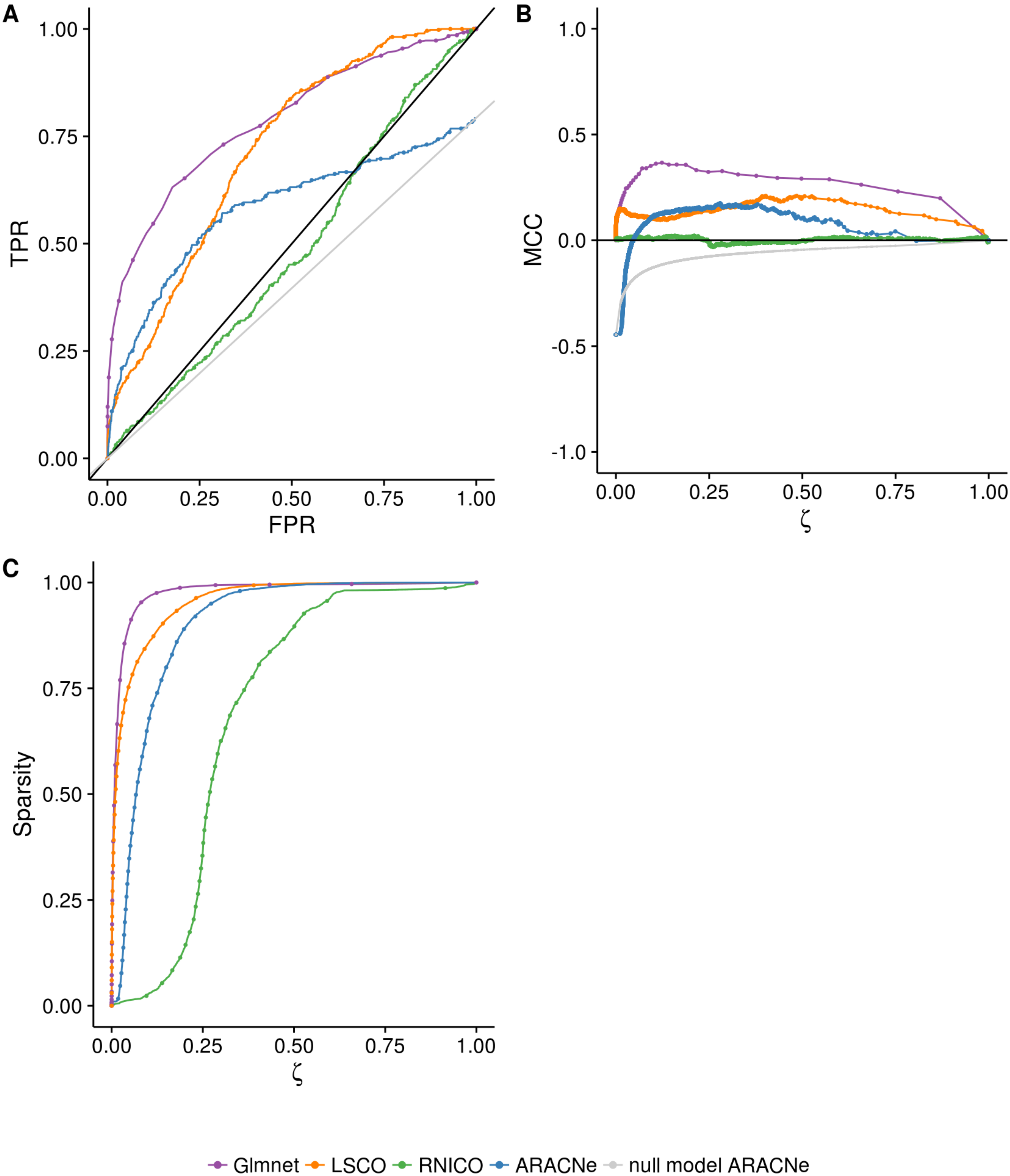

Case smallworld N50 SNR0.01 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
B
MCC
1.0
0.5
0.0
-0.5
-1.0
ζ
C
Sparsity
ζ
Glmnet
LSCO
RNICO
ARACNe
null model ARACNe


Case smallworld N50 SNR1 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
0.00
0.25
0.50
0.75
1.00
C
Sparsity
ζ
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Glmnet
LSCO
RNICO
ARACNe
null model ARACNe

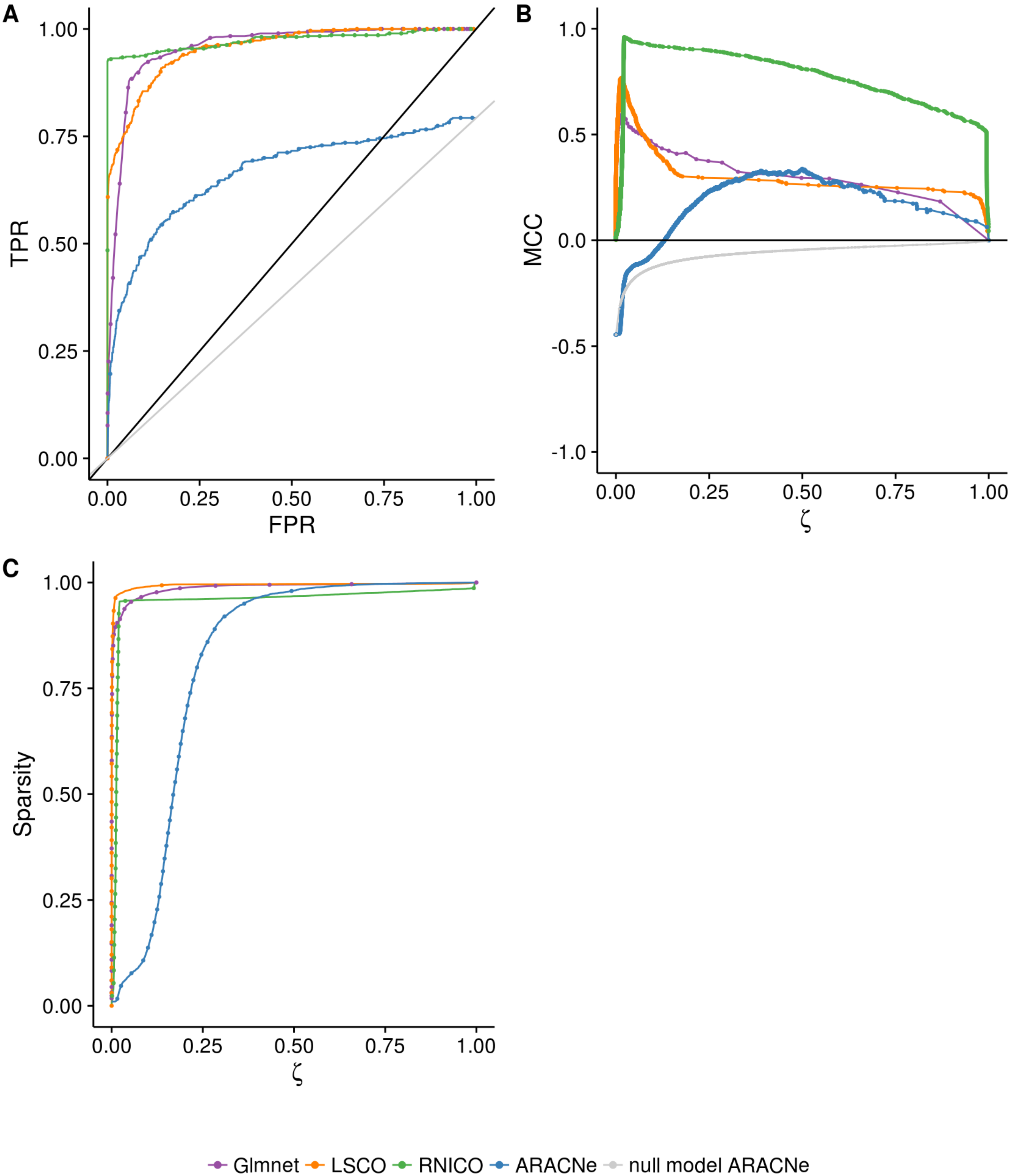
Case smallworld N50 SNR100 high IAA



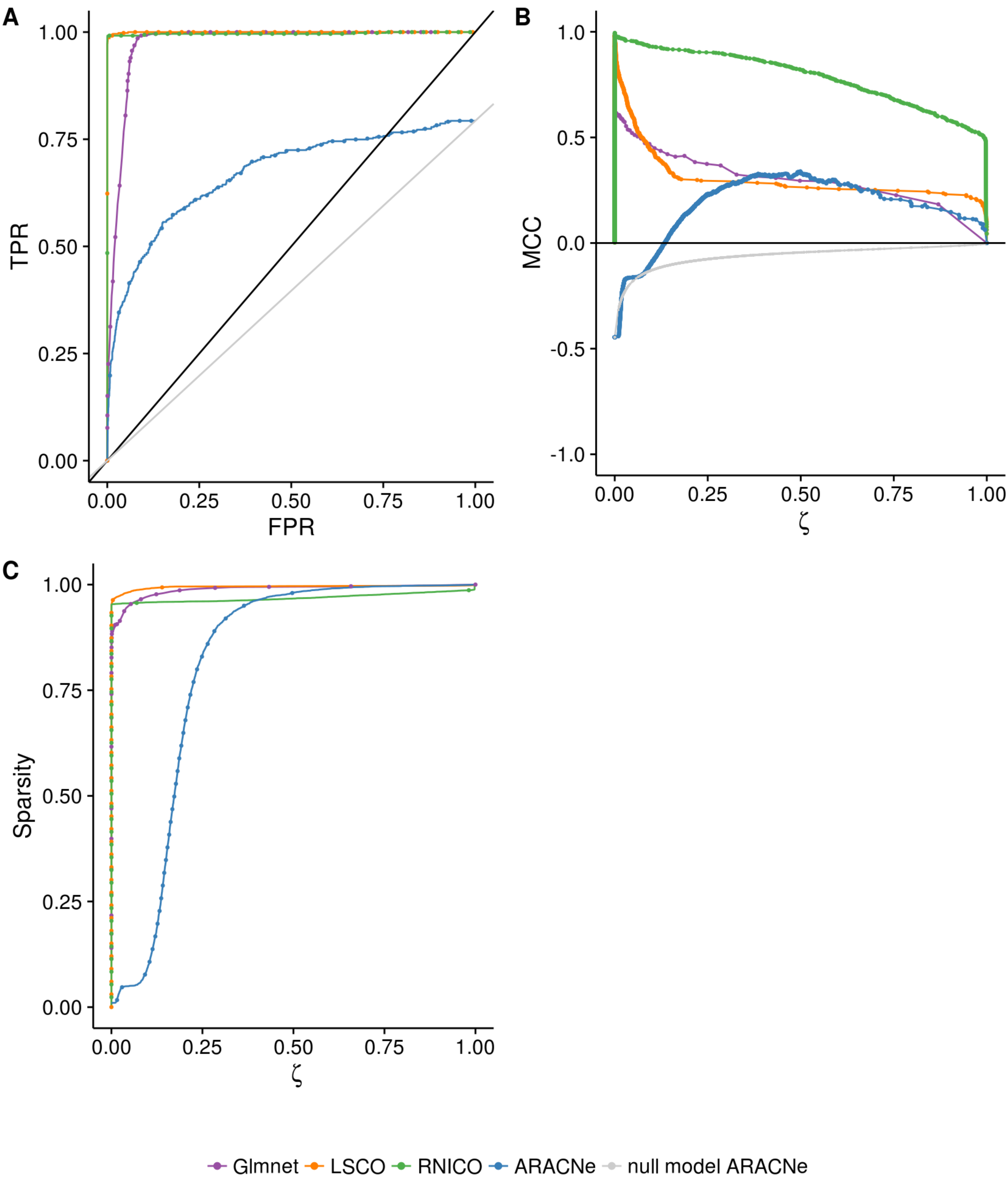
Case smallworld N100 SNR0.01 high IAA



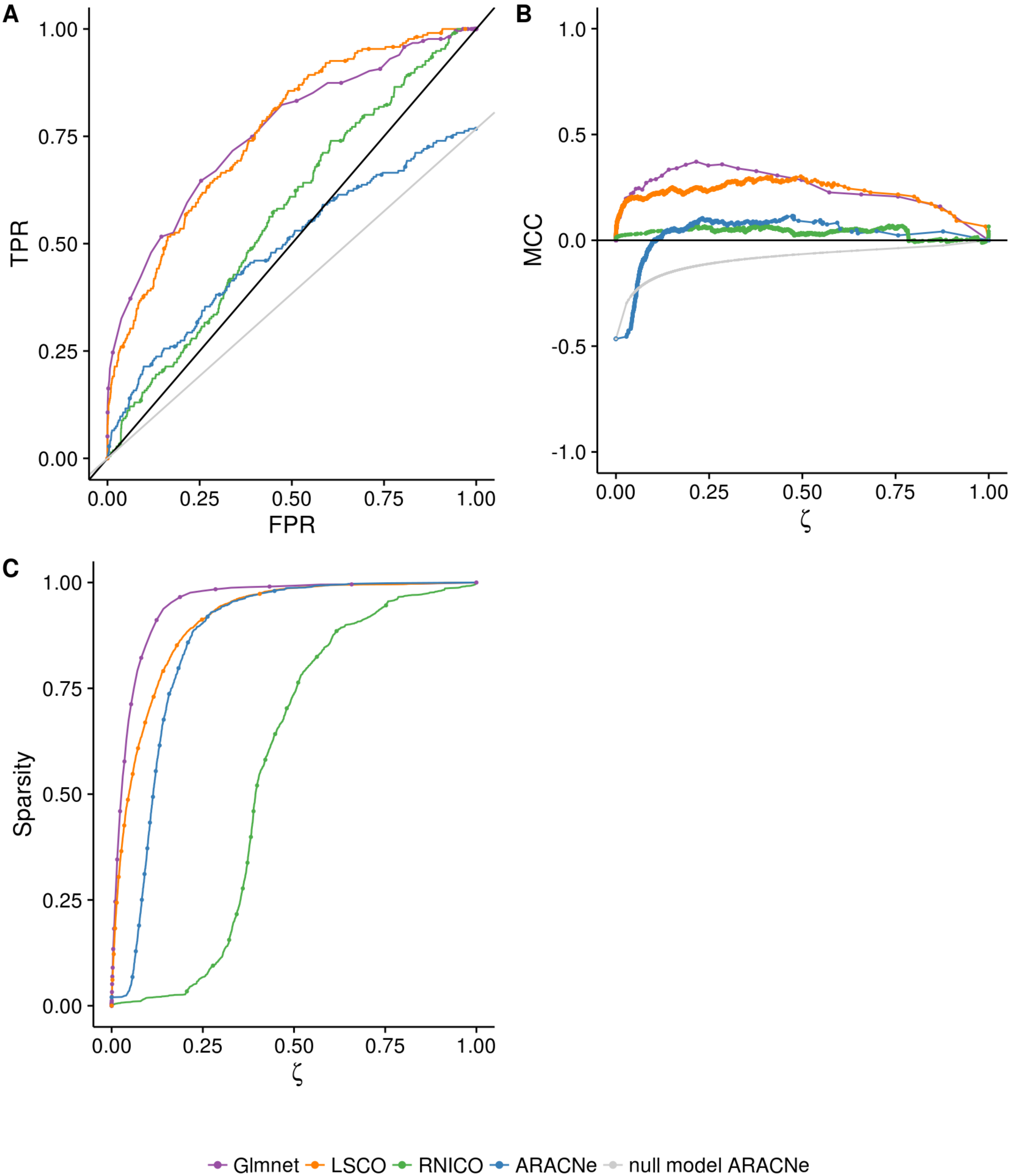
Case smallworld N100 SNR1 high IAA



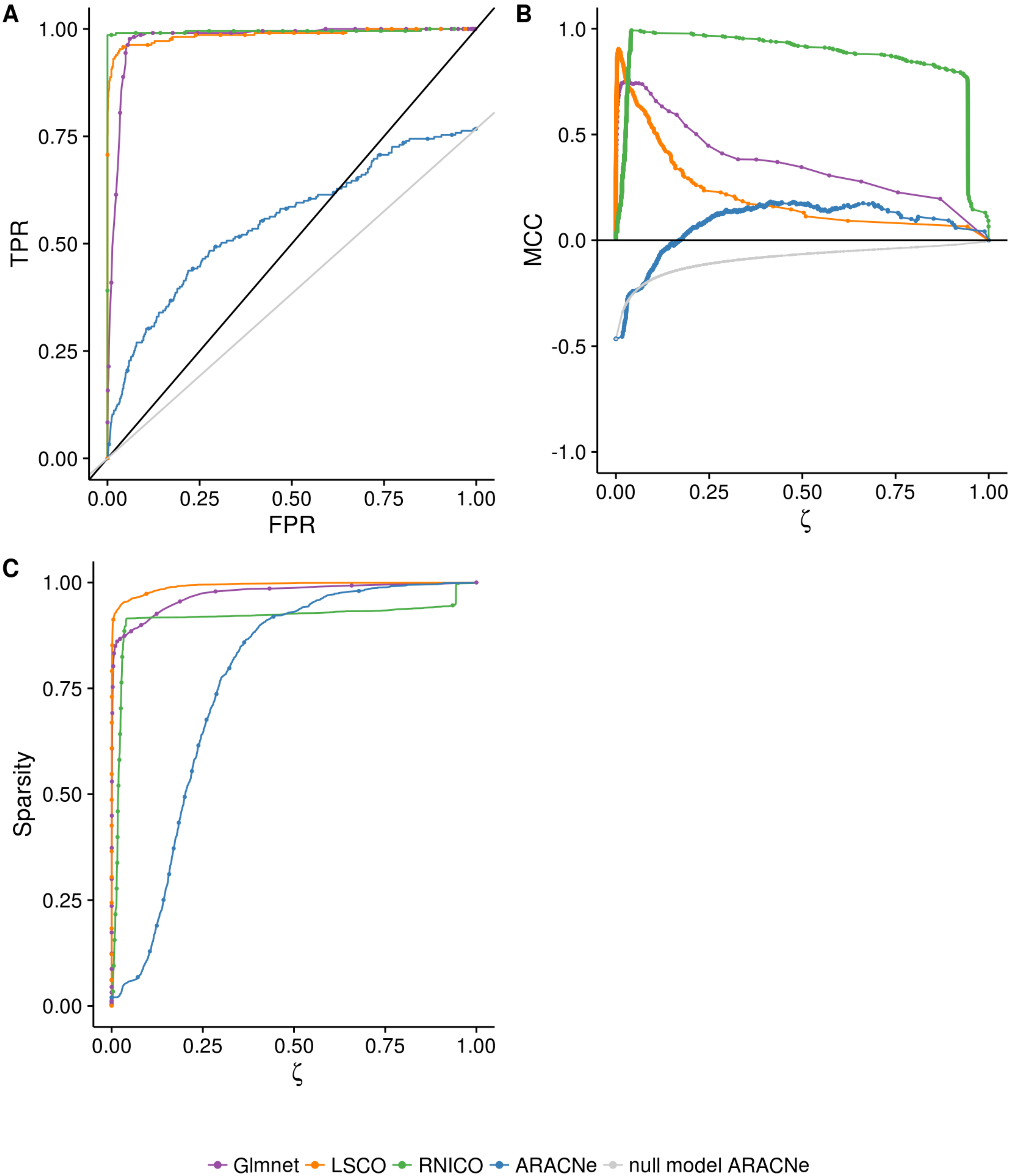
Case smallworld N100 SNR100 high IAA



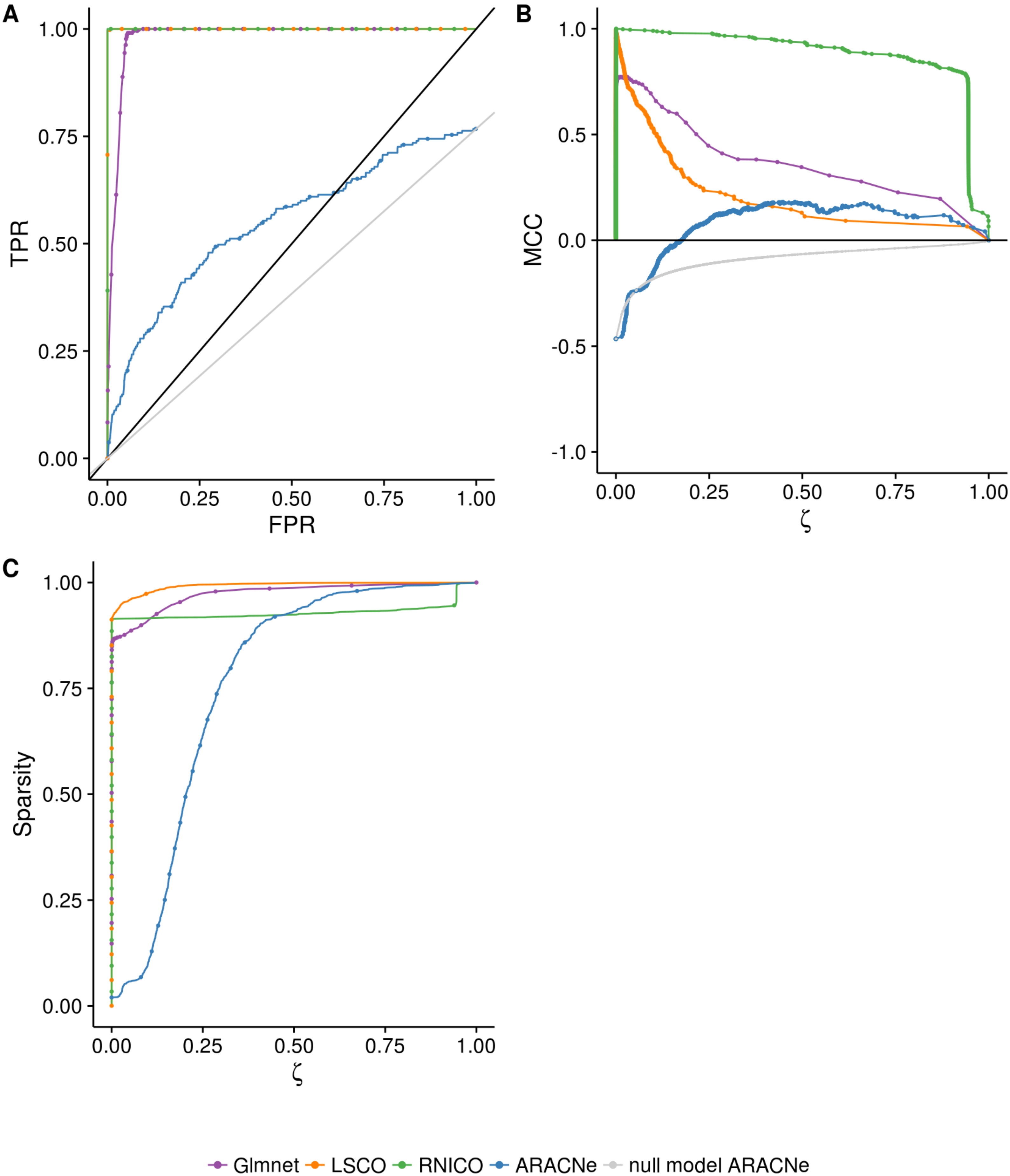
Case smallworld scalefree N50 SNR0.01 high IAA



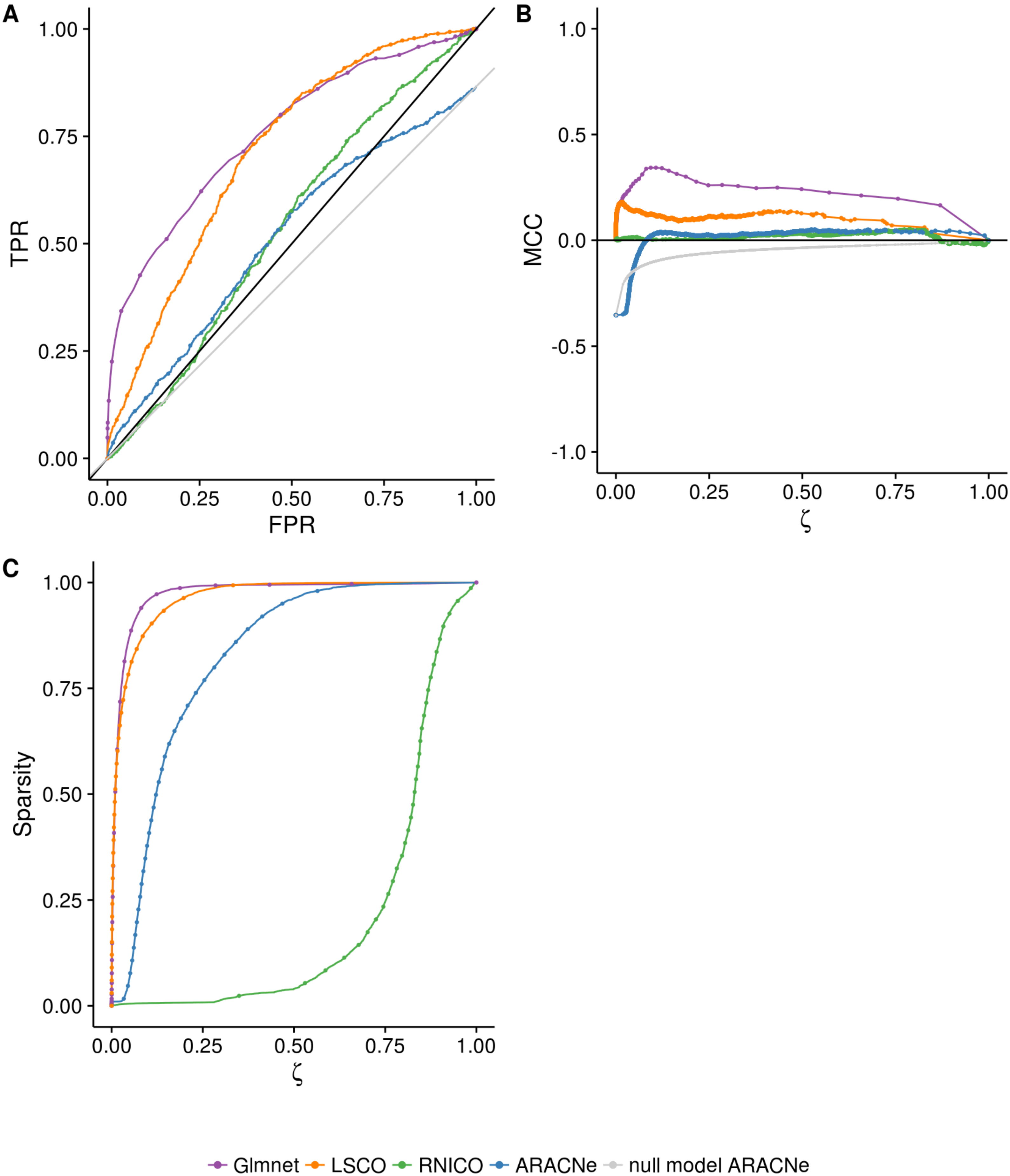
Case smallworld scalefree N50 SNR1 high IAA



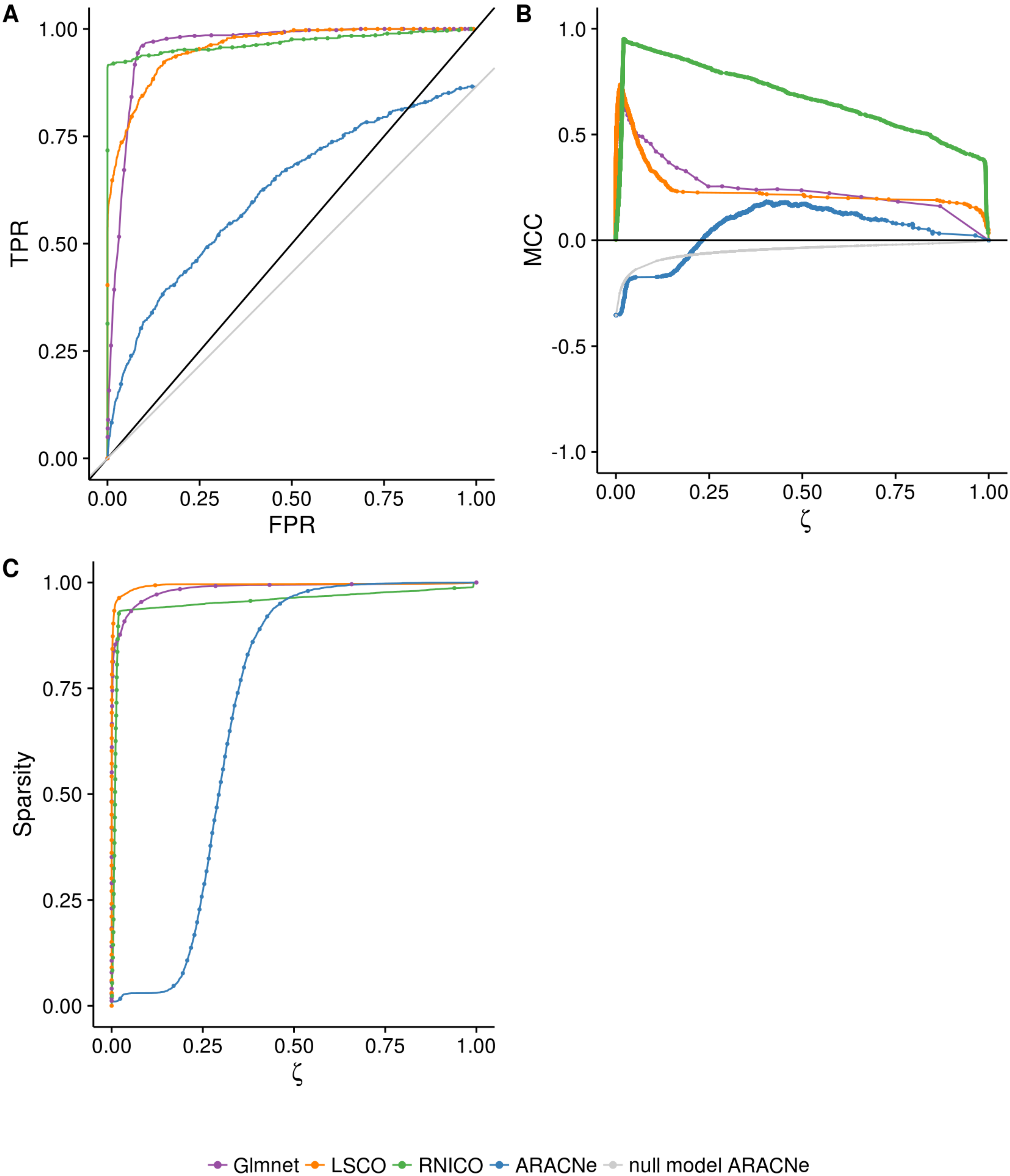
Case smallworld scalefree N50 SNR100 high IAA



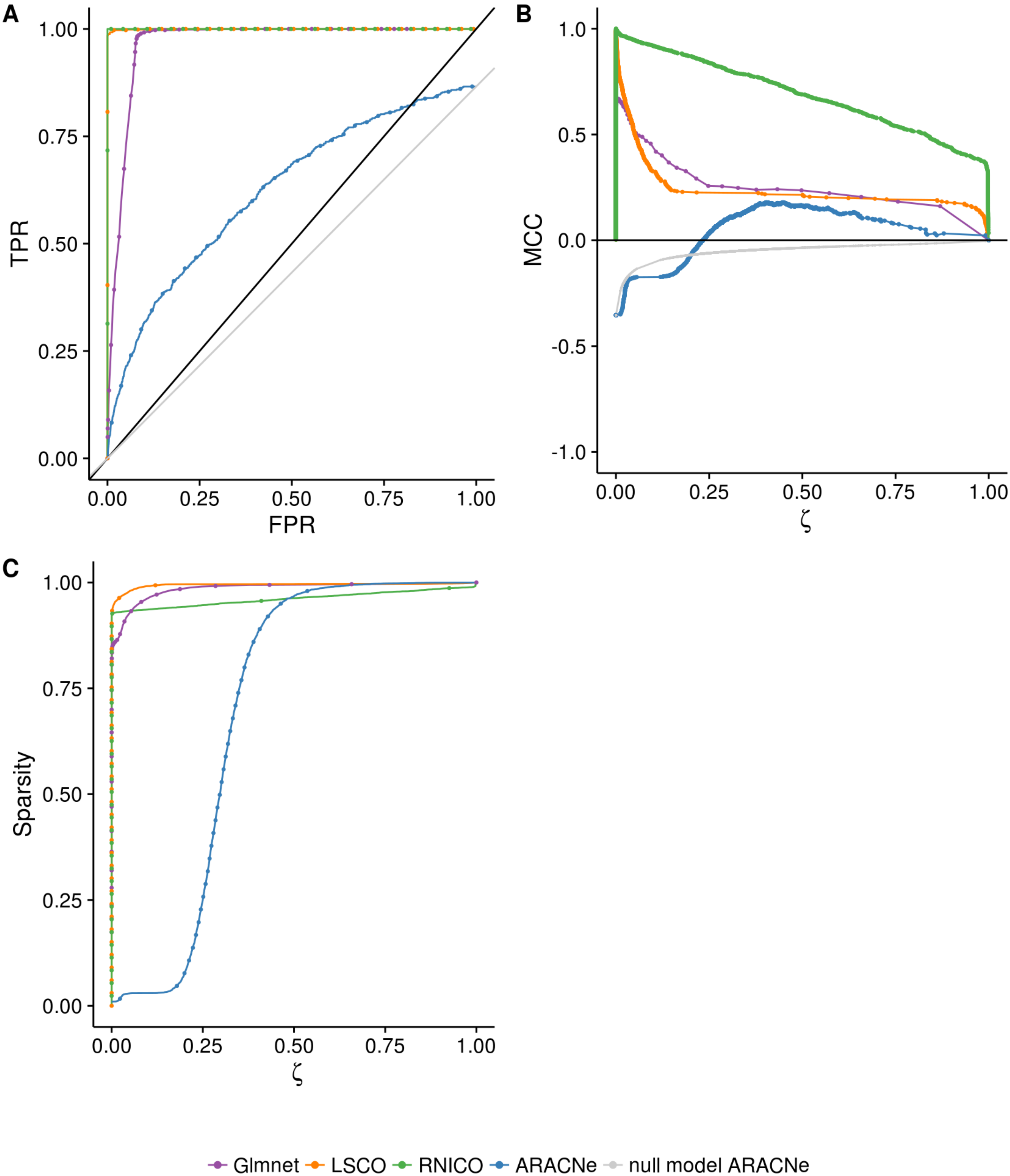
Case smallworld scalefree N100 SNR0.01 high IAA



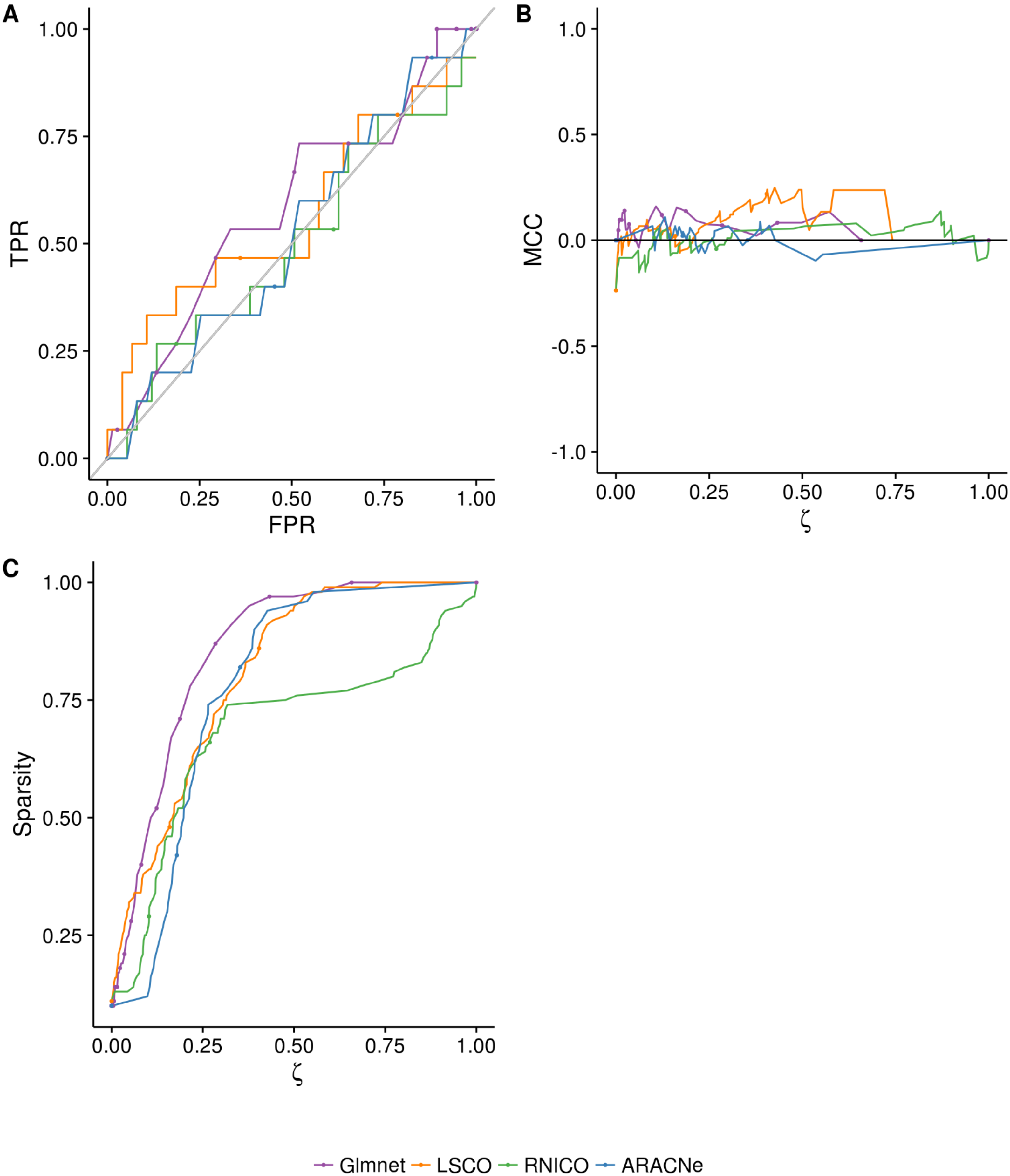
Case smallworld scalefree N100 SNR1 high IAA



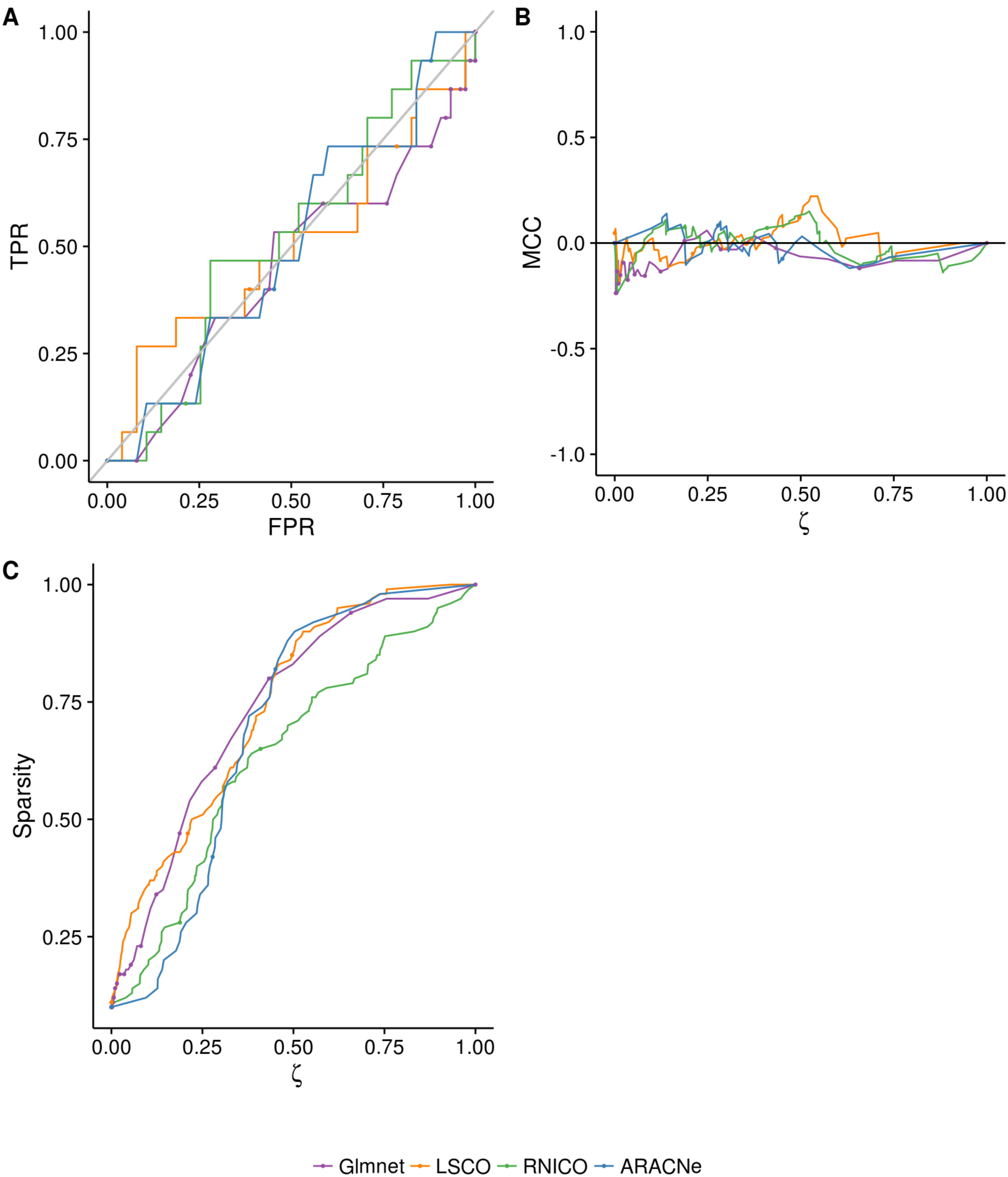
Case smallworld scalefree N100 SNR100 high IAA

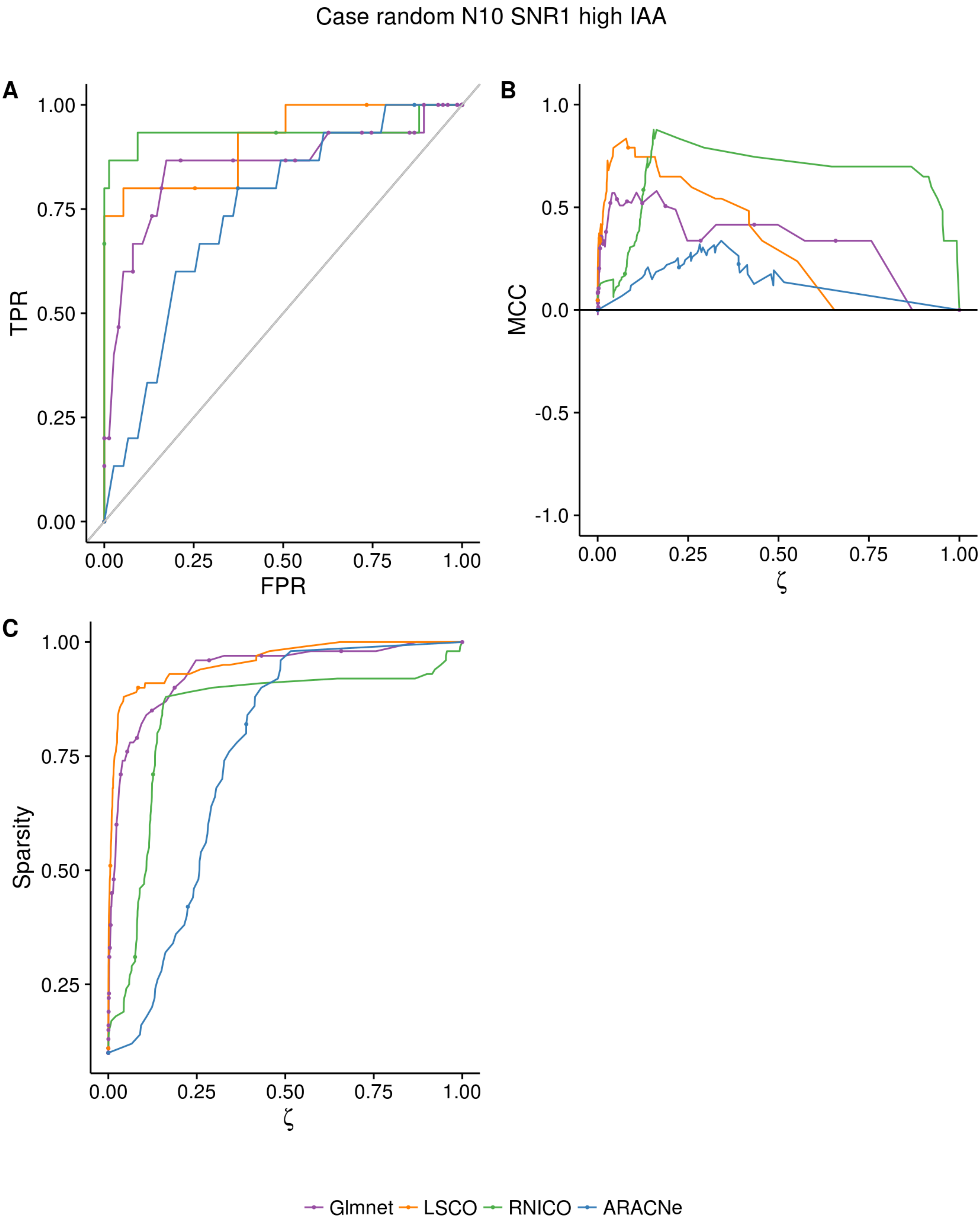


Case random N10 SNR0.01 high IAA



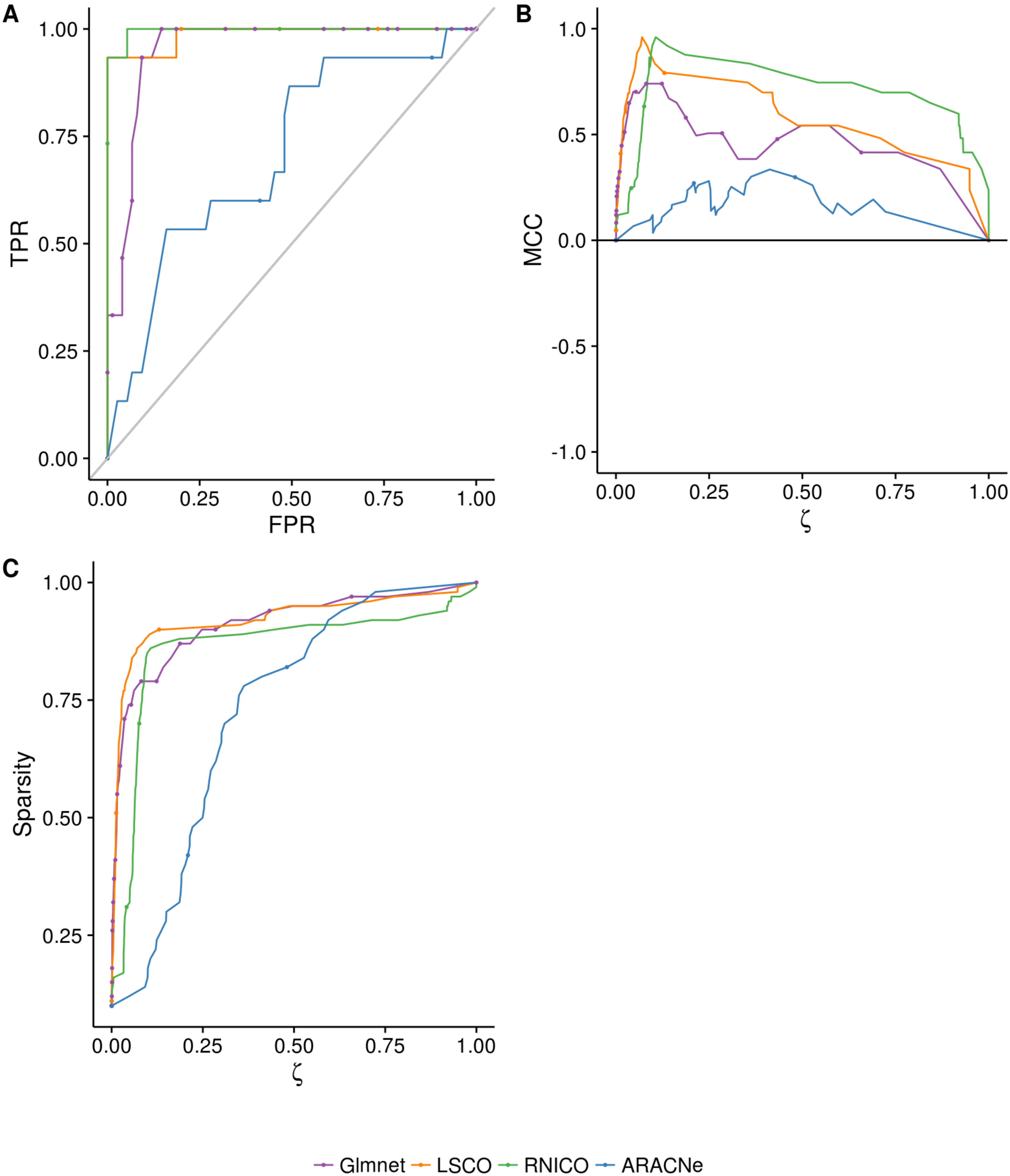
Case random N10 SNR0.01 low IAA



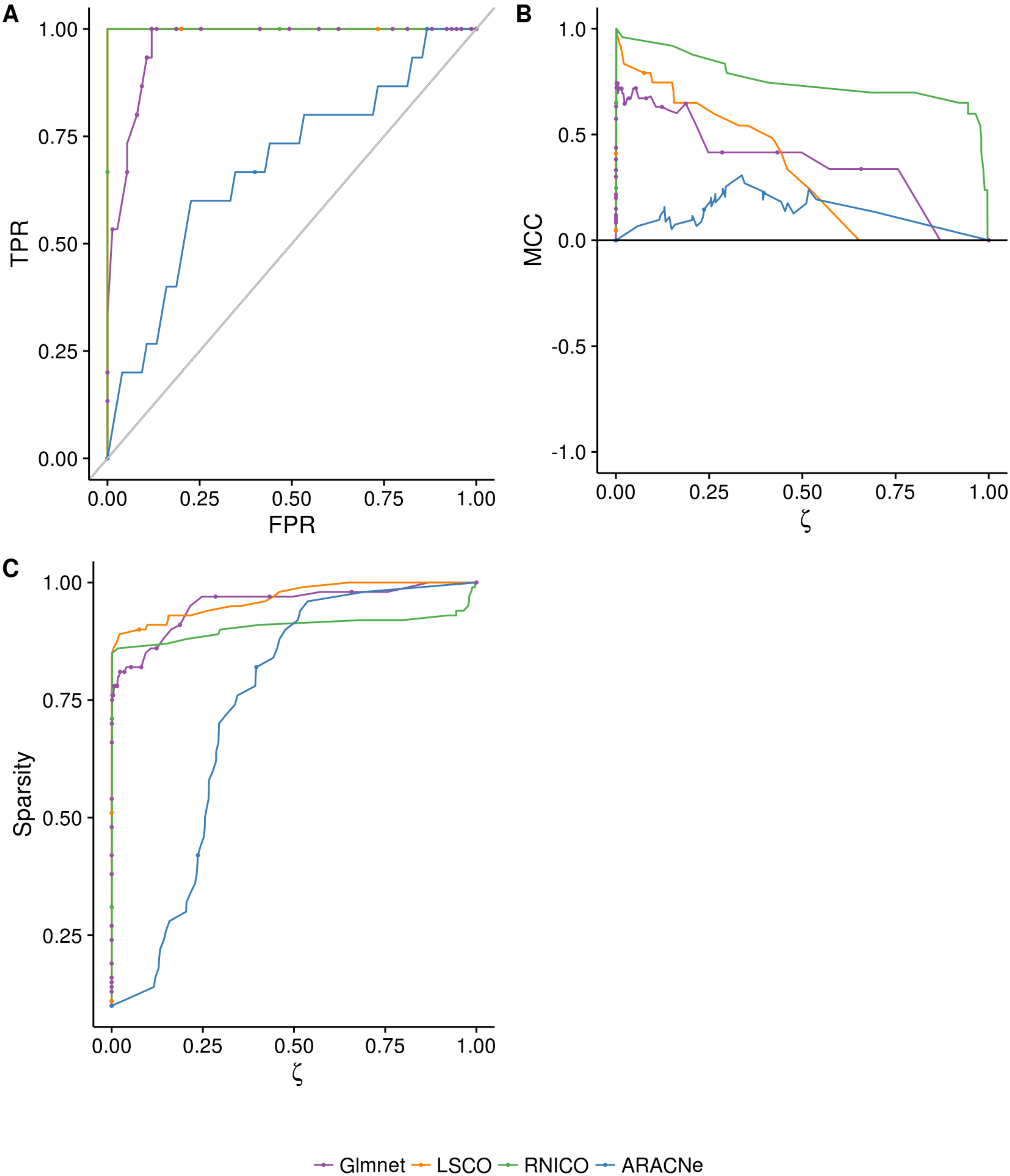


Case random N10 SNR1 high IAA
A
B
C
TPR
FPR
MCC
ζ
Sparsity
1.00
0.75
0.50
0.25
0.00
1.0
0.5
0.0
-0.5
-1.0
Glmnet
LSCO
RNICO
ARACNe

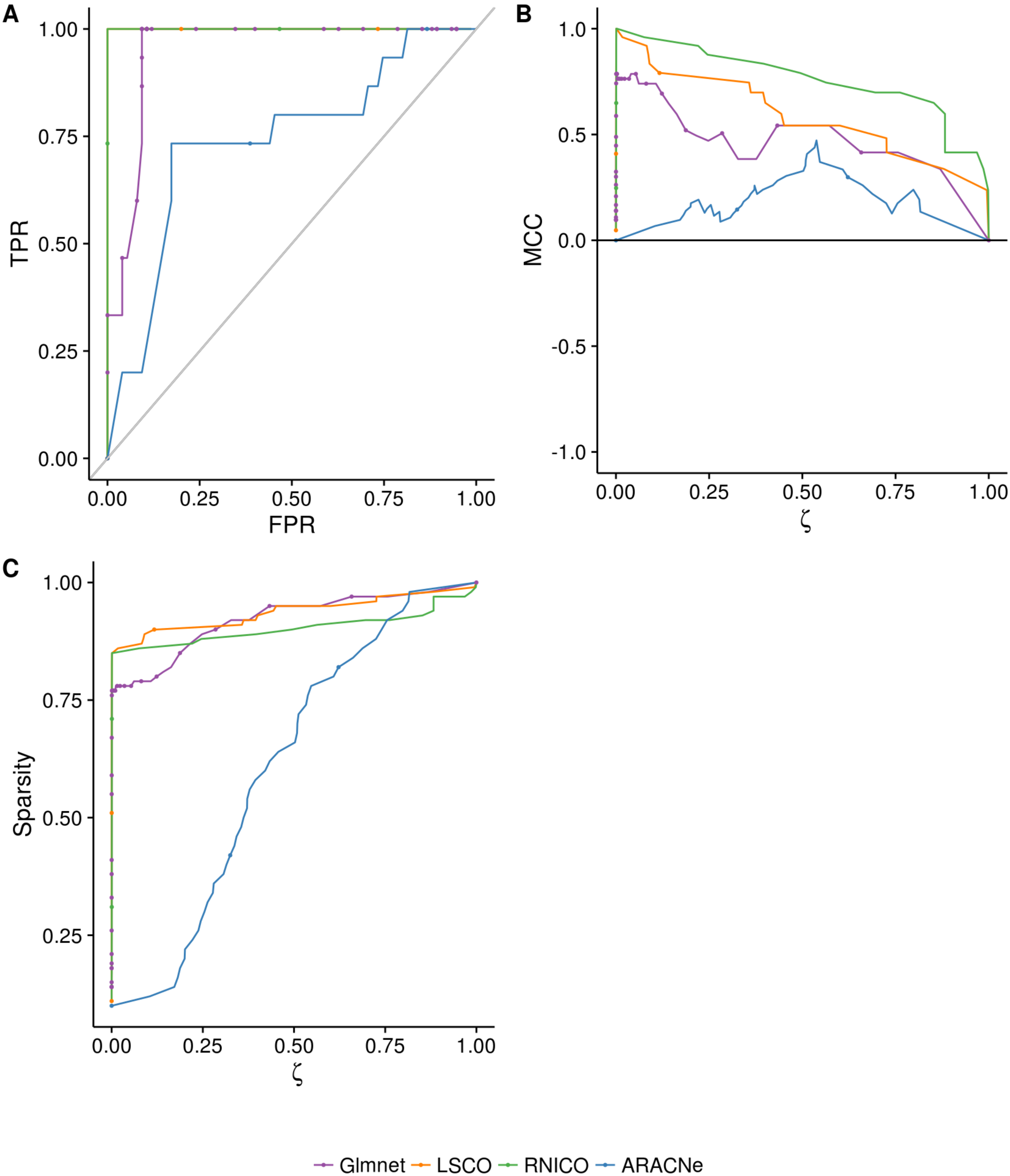
Case random N10 SNR1 low IAA



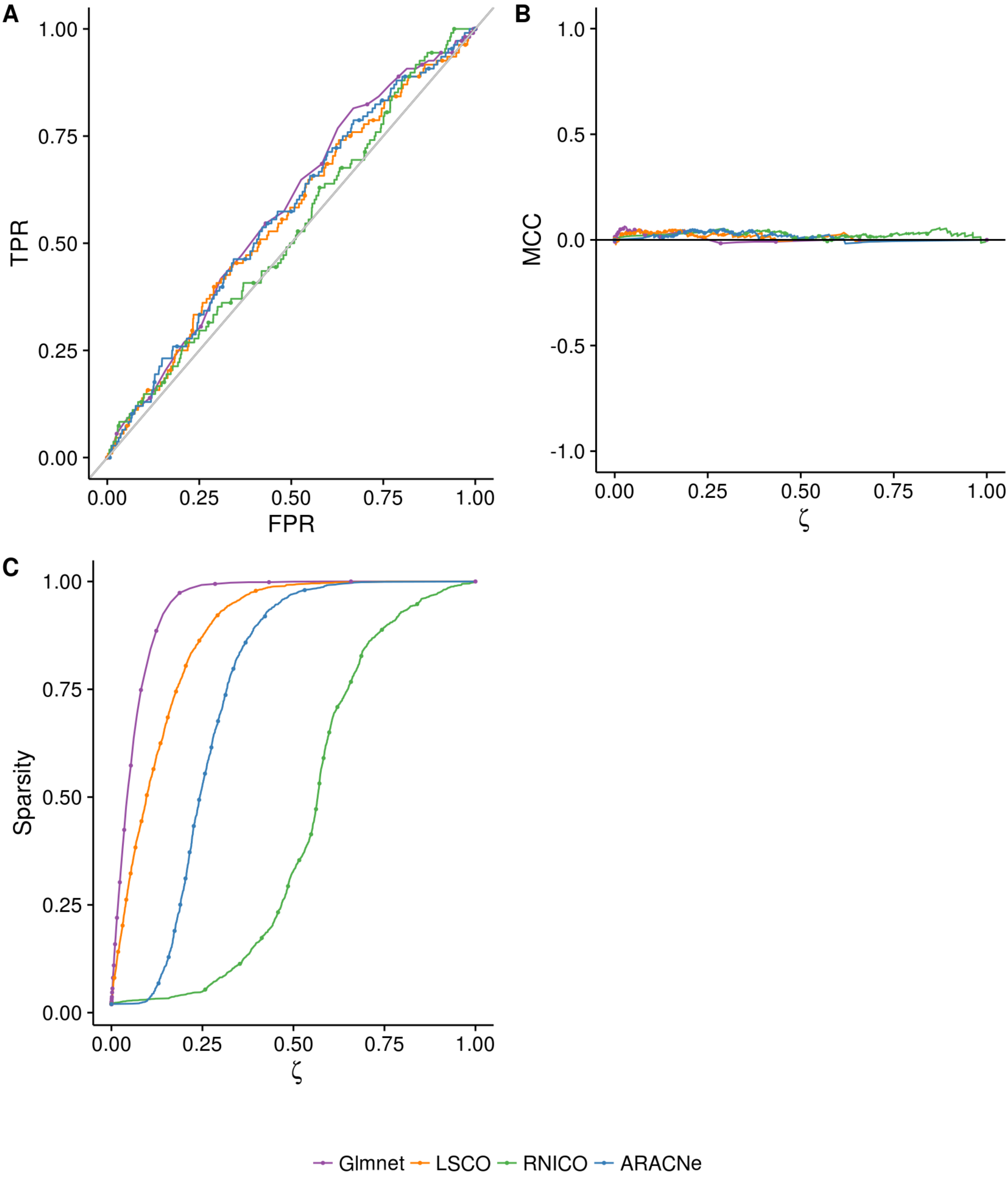
Case random N10 SNR100 high IAA



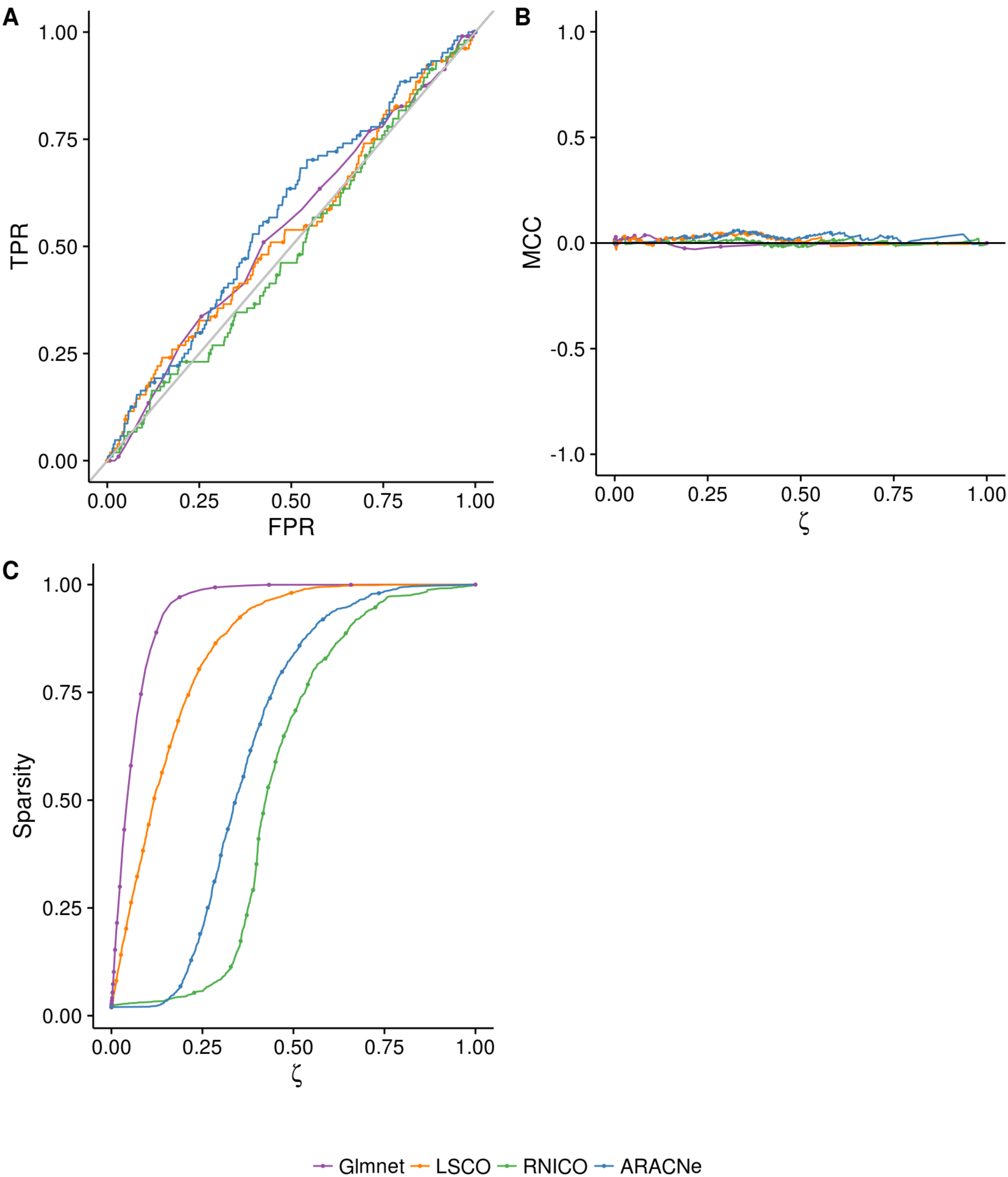
Case random N10 SNR100 low IAA



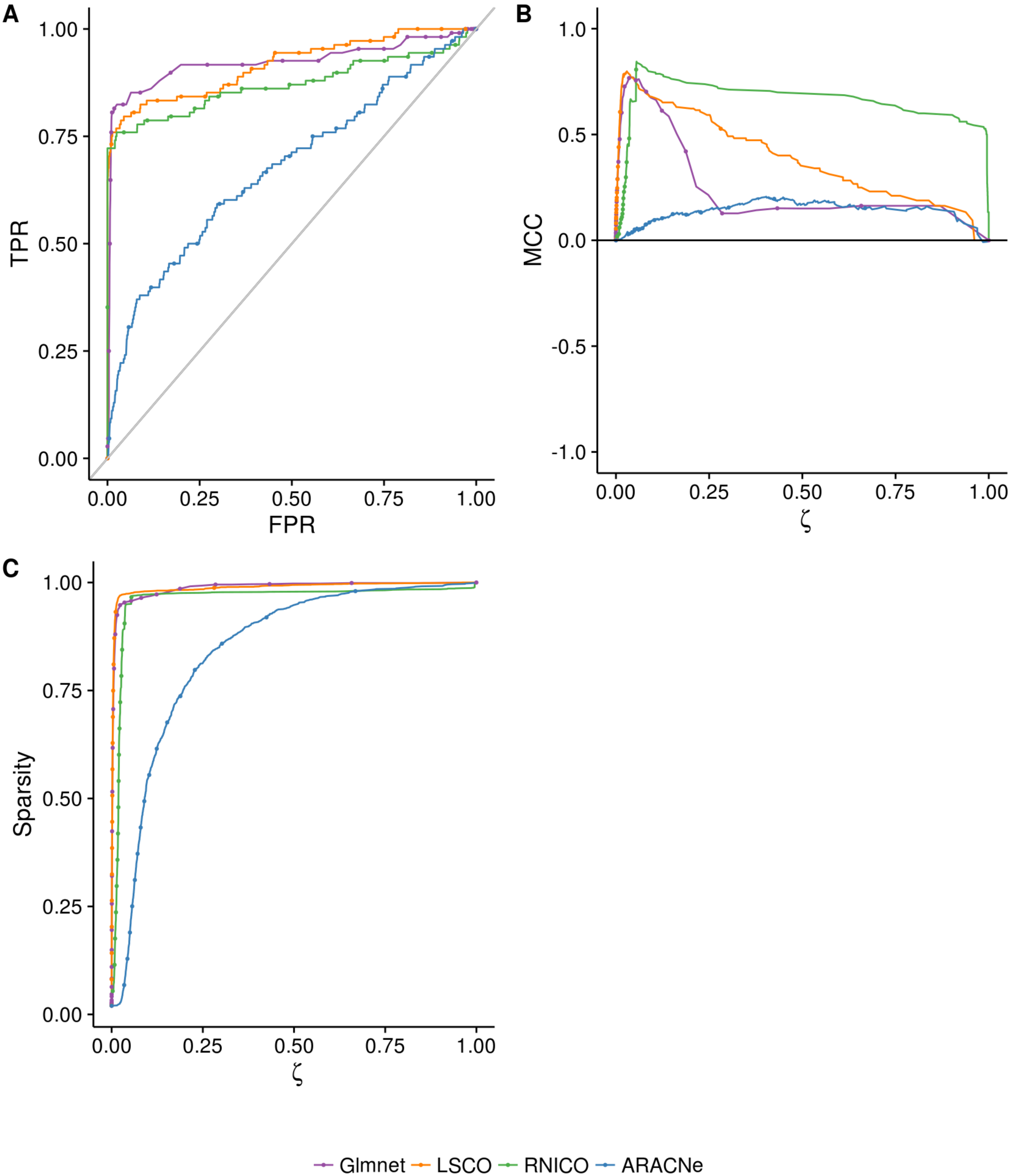
Case random N50 SNR0.01 high IAA



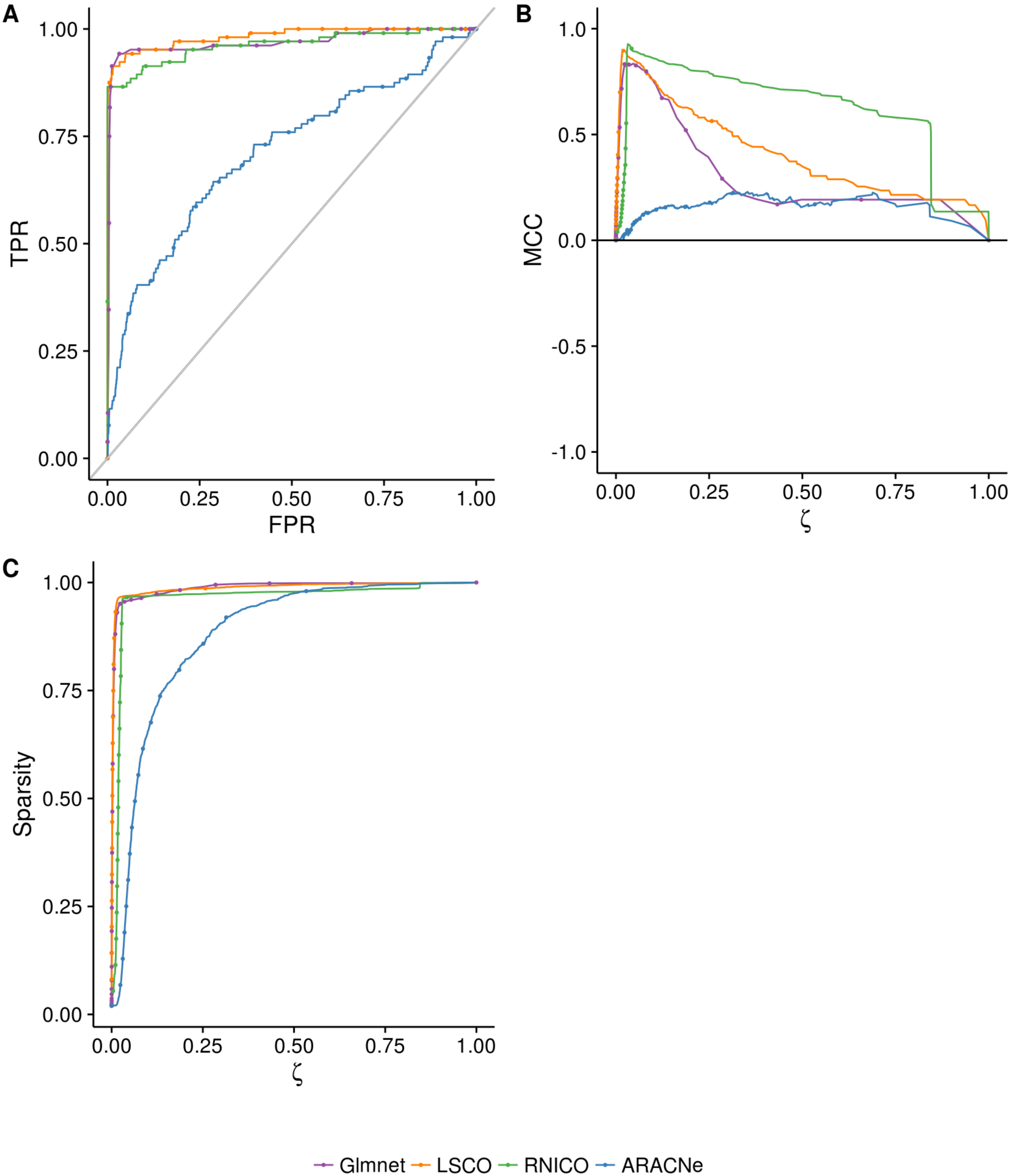
Case random N50 SNR0.01 low IAA



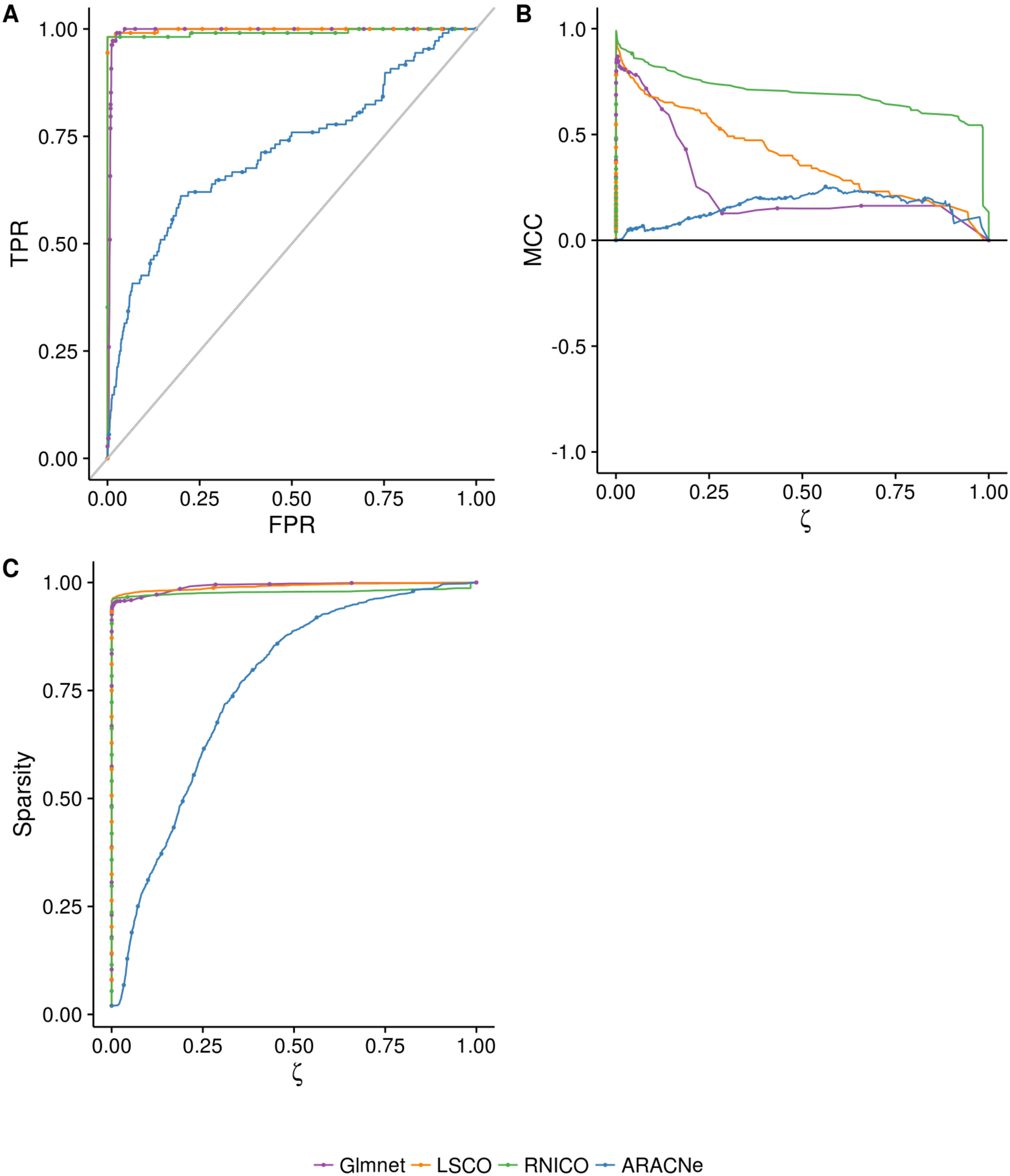
Case random N50 SNR1 high IAA



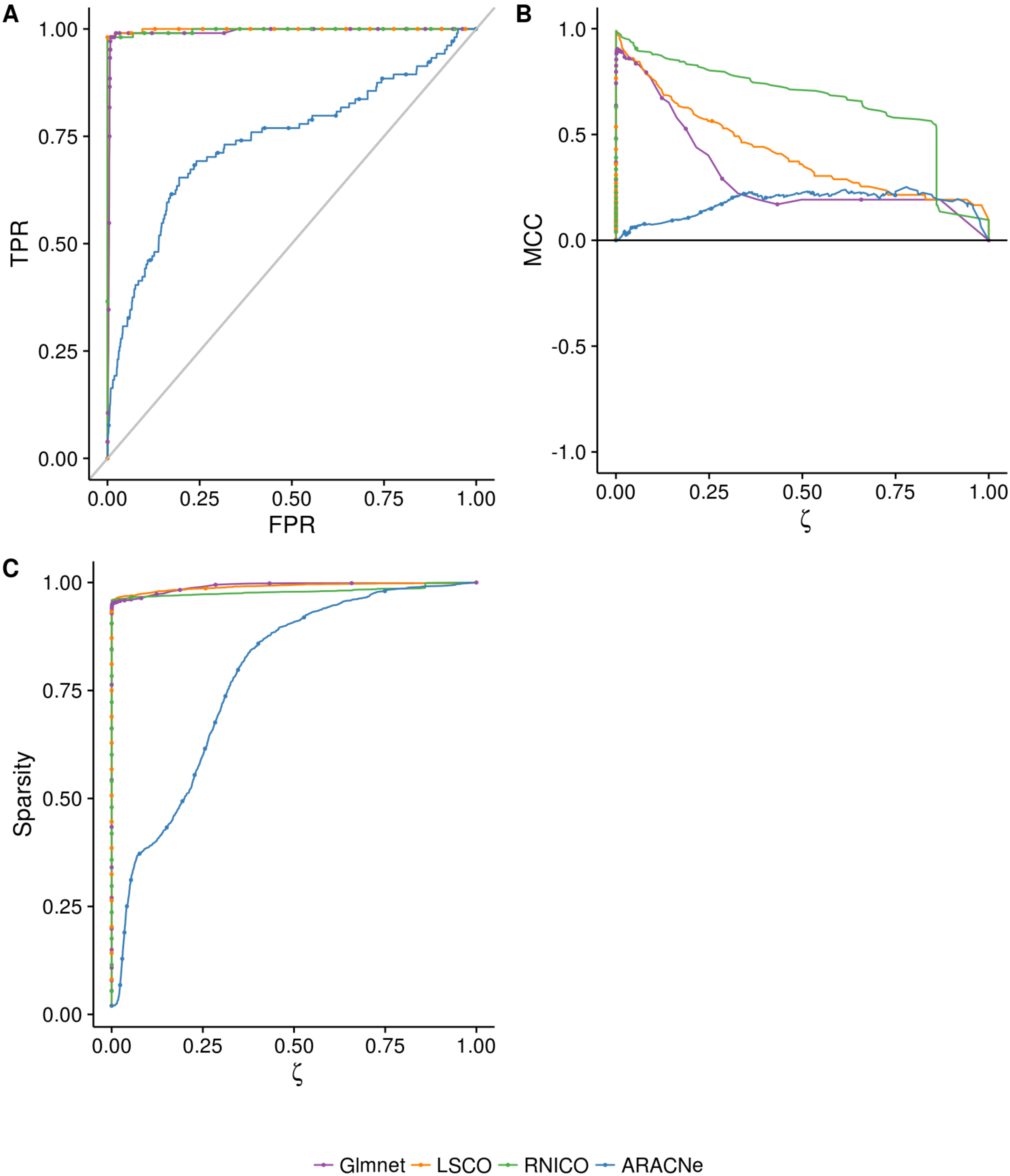
Case random N50 SNR1 low IAA



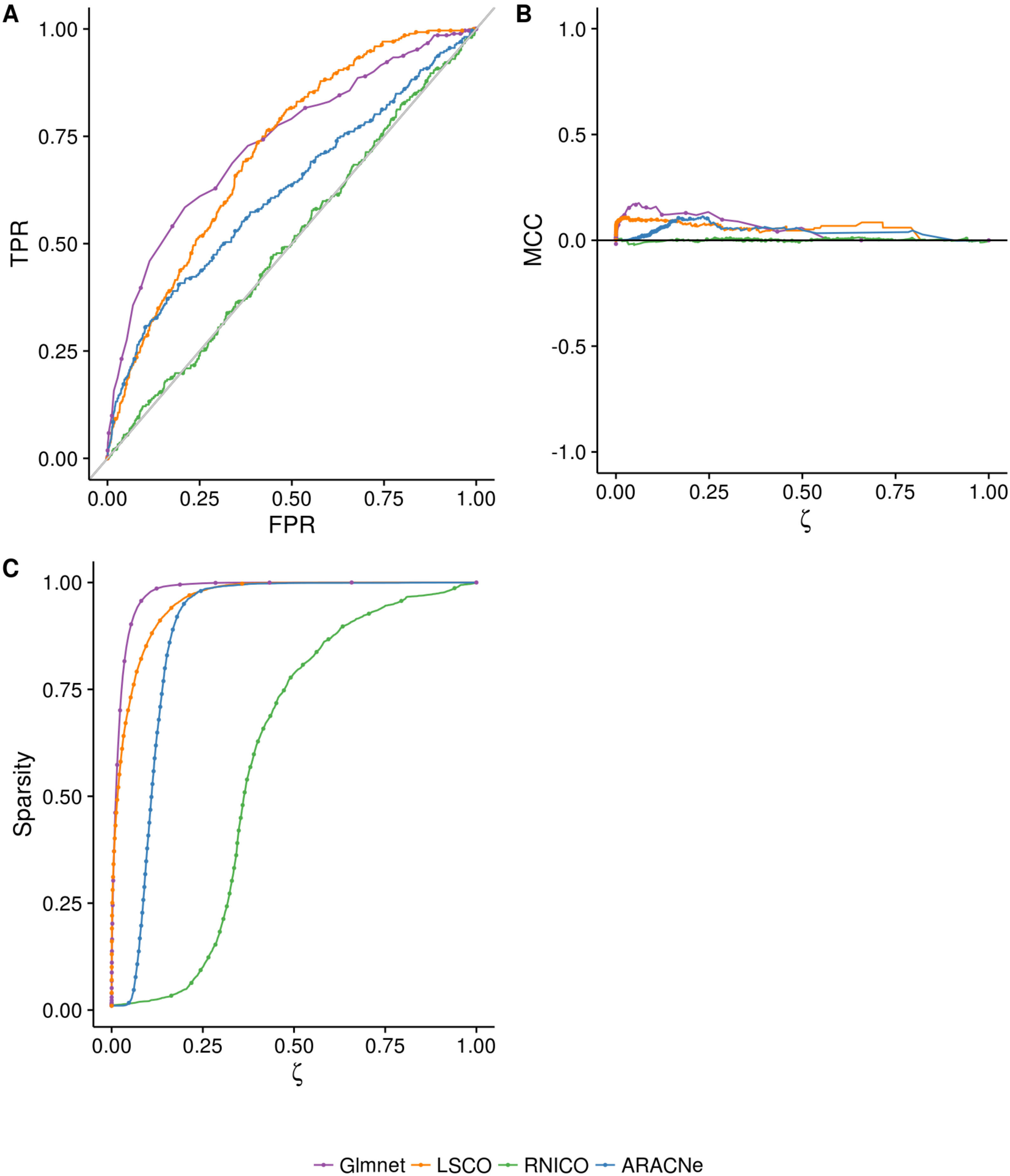
Case random N50 SNR100 high IAA

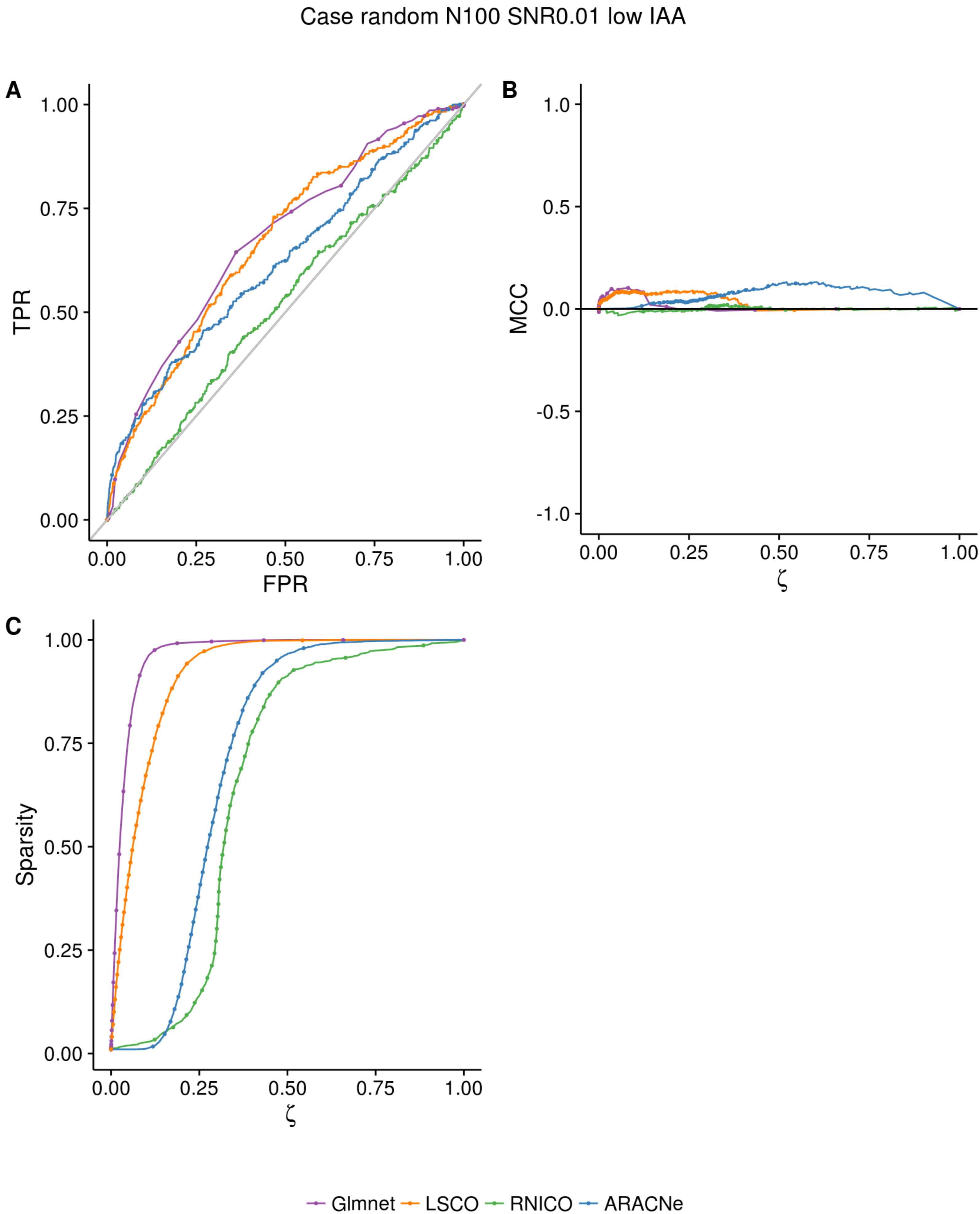


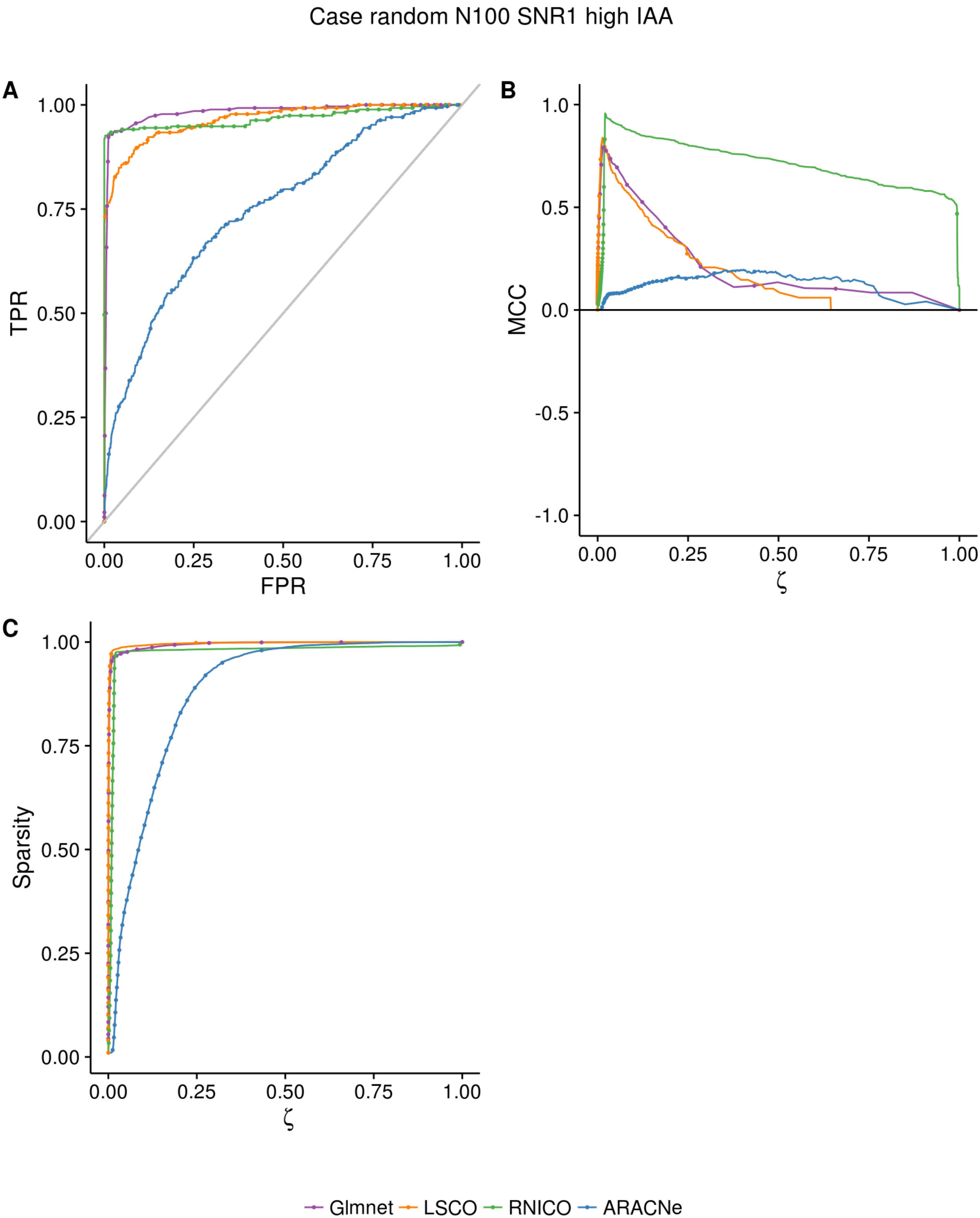
Case random N50 SNR100 low IAA



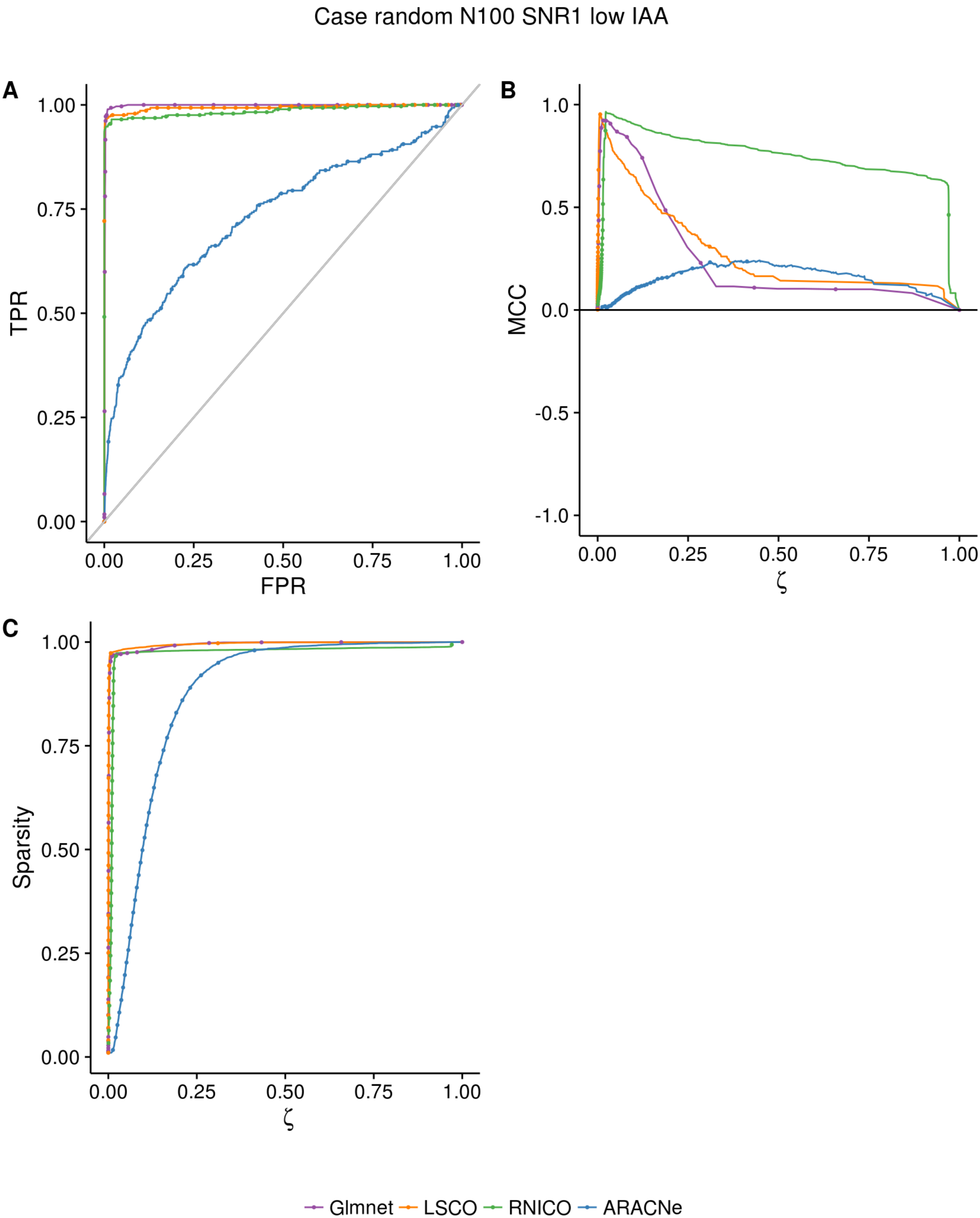
Case random N100 SNR0.01 high IAA



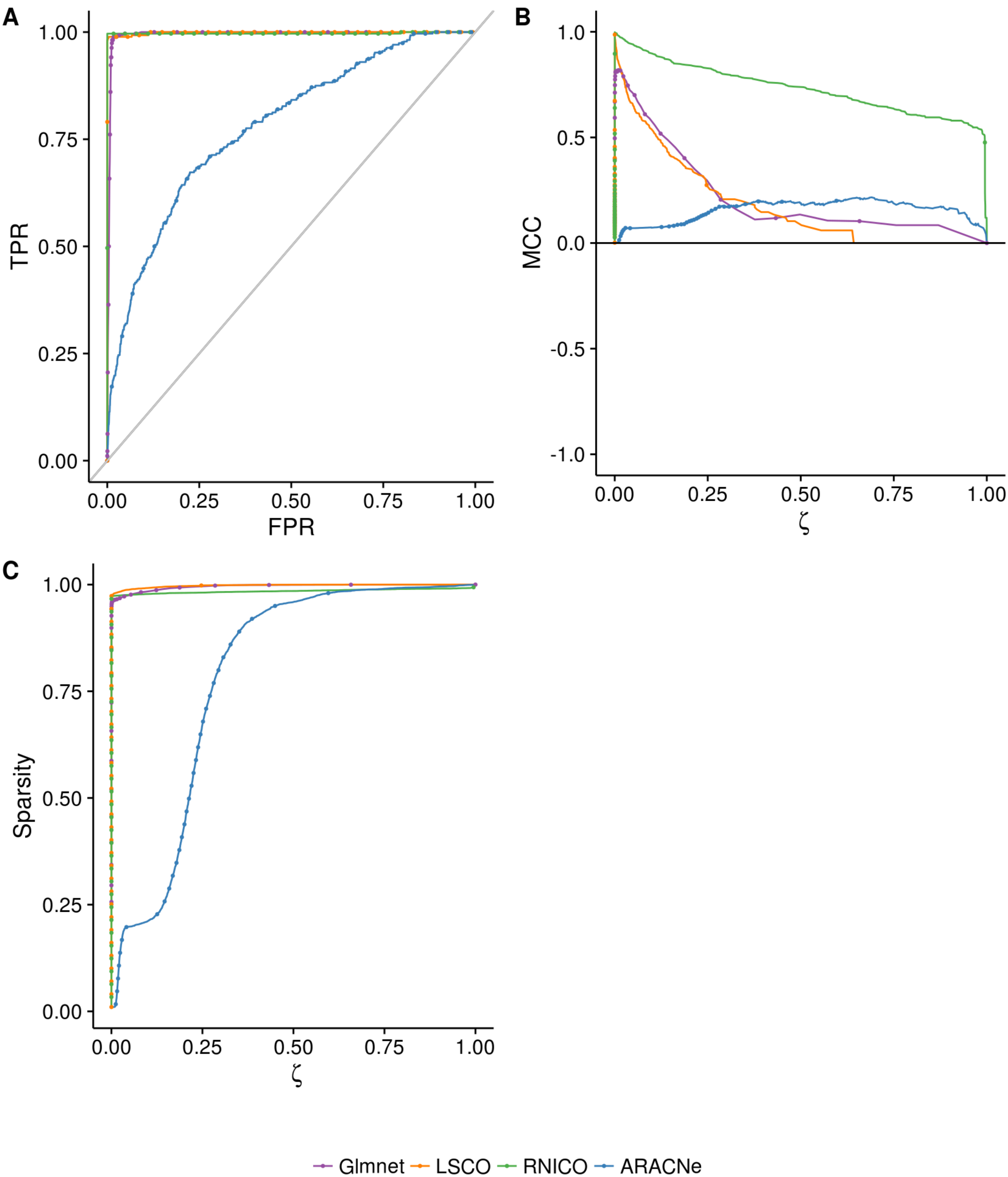

Case random N100 SNR0.01 low IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
0.00
0.25
0.50
0.75
1.00
C
Sparsity
ζ
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Glmnet
LSCO
RNICO
ARACNe



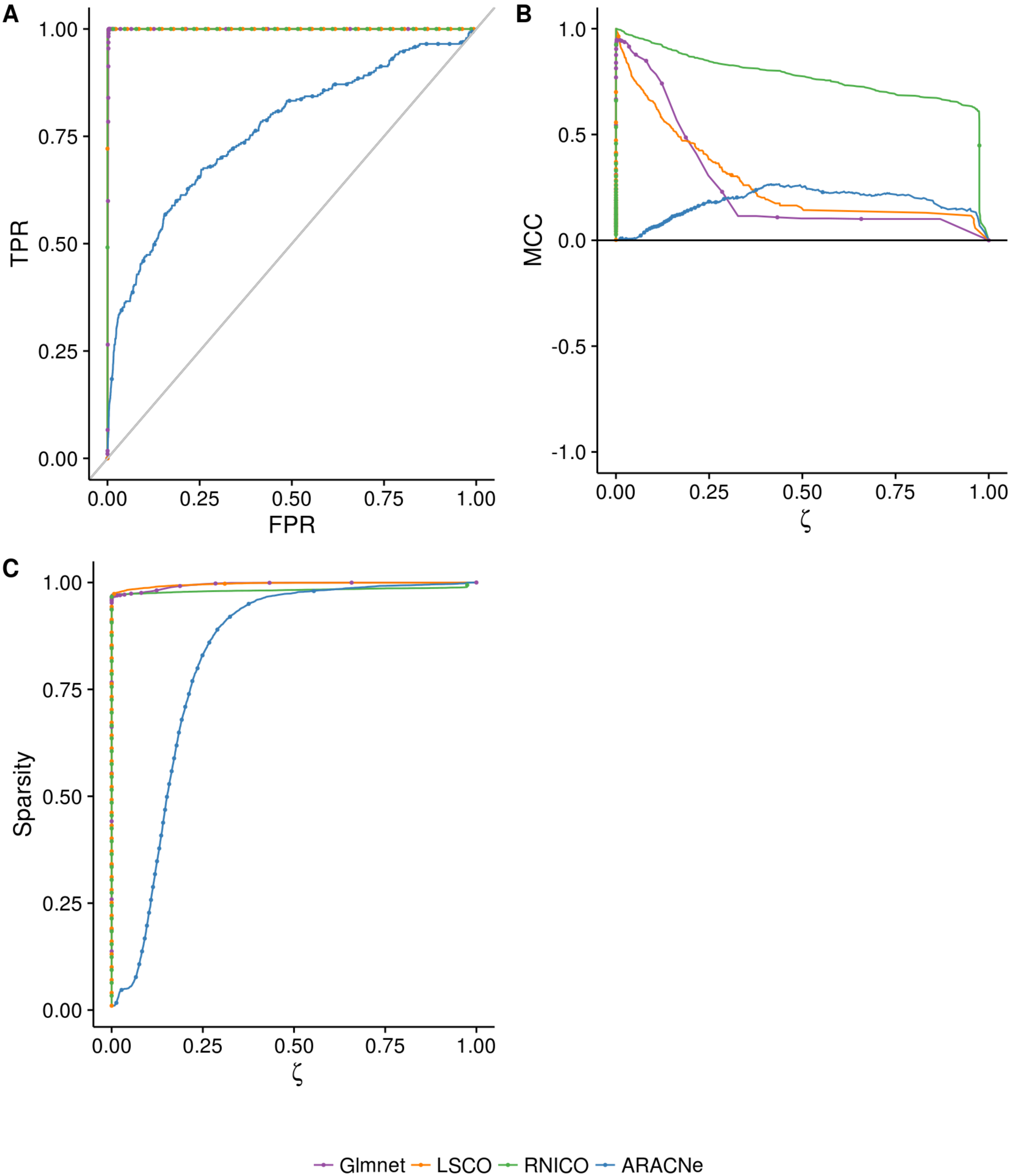
Case random N100 SNR1 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
0.00
0.25
0.50
0.75
1.00
C
Sparsity
ζ
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Glmnet
LSCO
RNICO
ARACNe


Case random N100 SNR1 low IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
0.00
0.25
0.50
0.75
1.00
C
Sparsity
ζ
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Glmnet
LSCO
RNICO
ARACNe

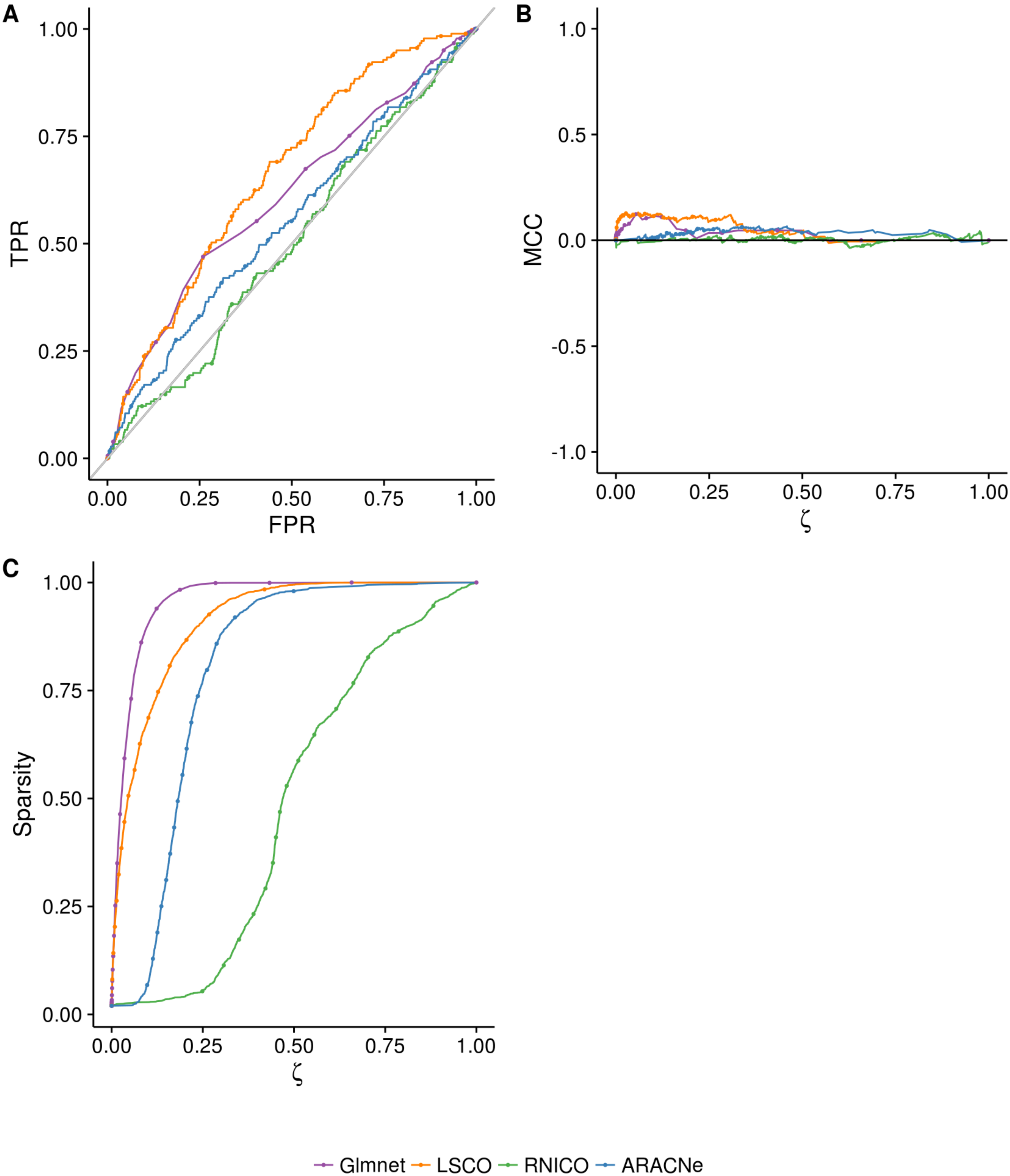
Case random N100 SNR100 high IAA



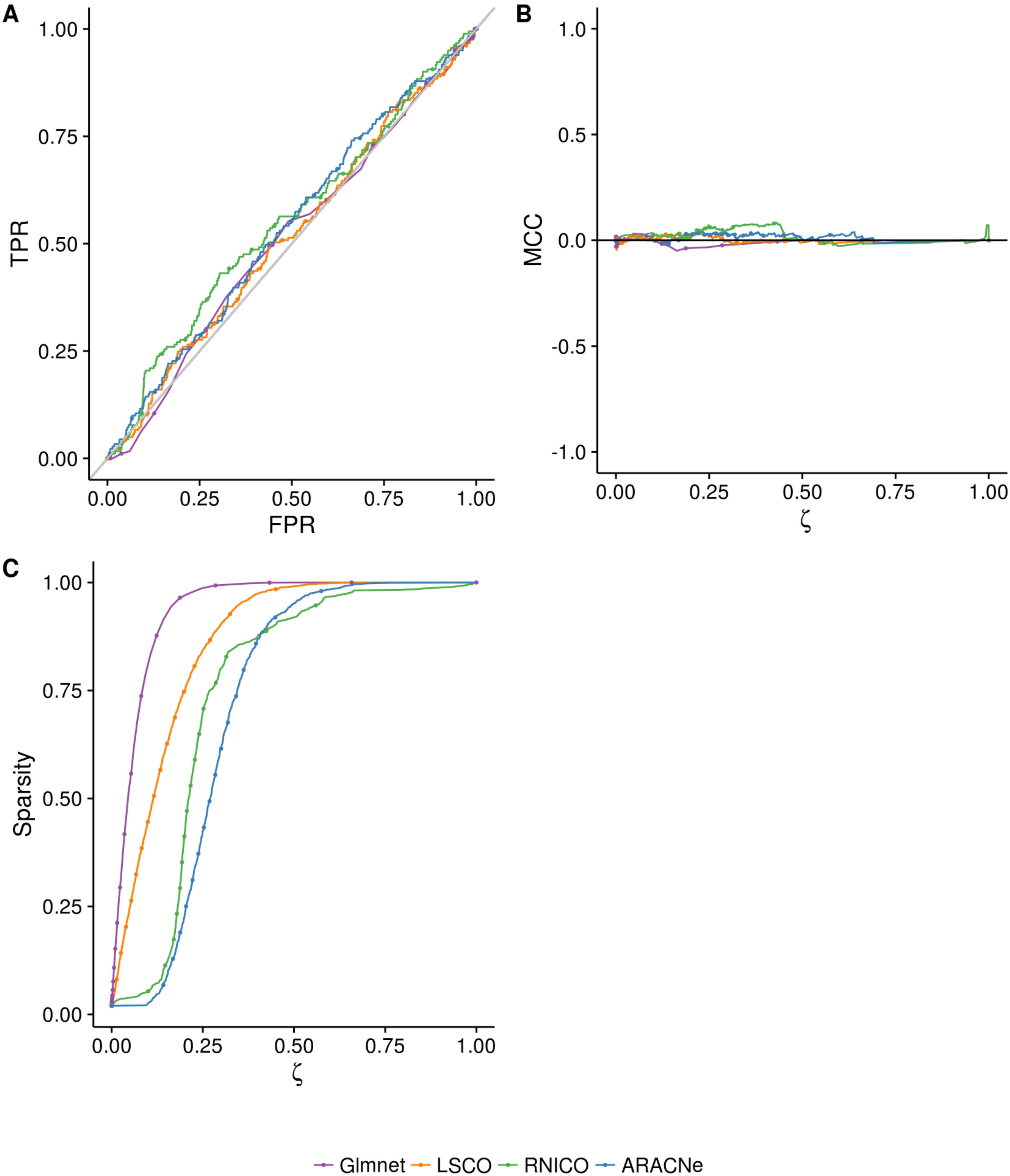
Case random N100 SNR100 low IAA



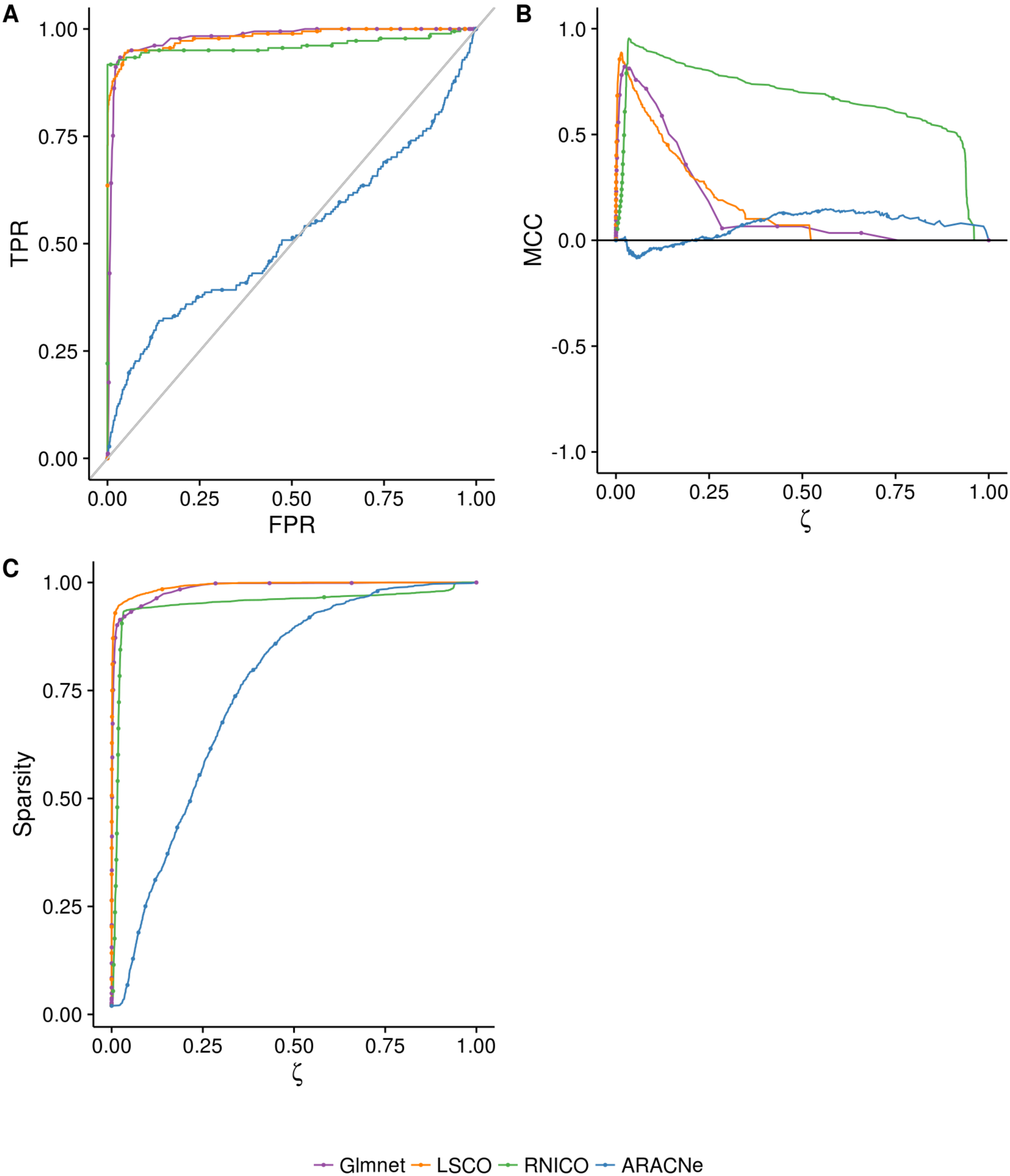
Case scalefree N50 SNR0.01 high IAA



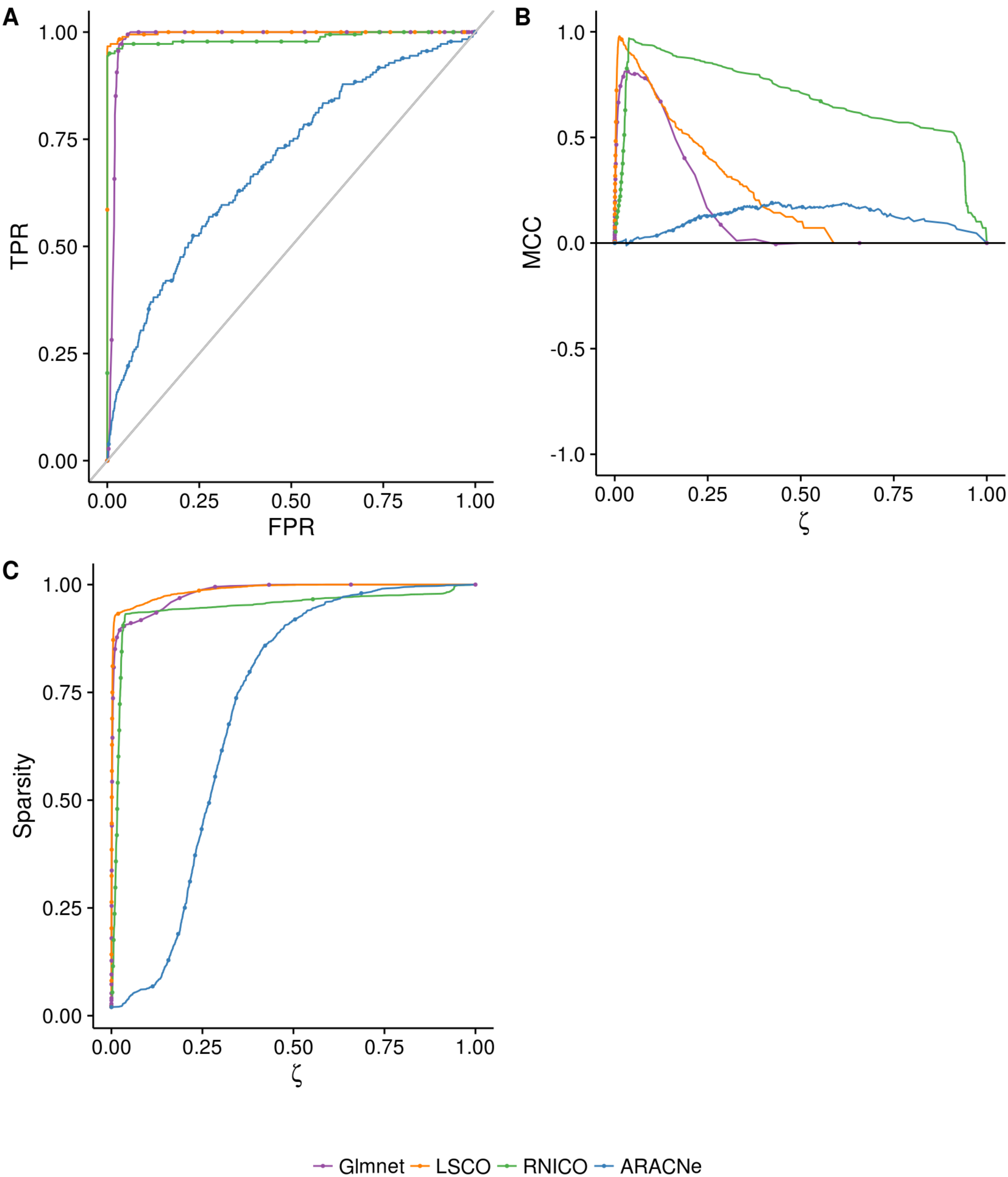
Case scalefree N50 SNR0.01 low IAA



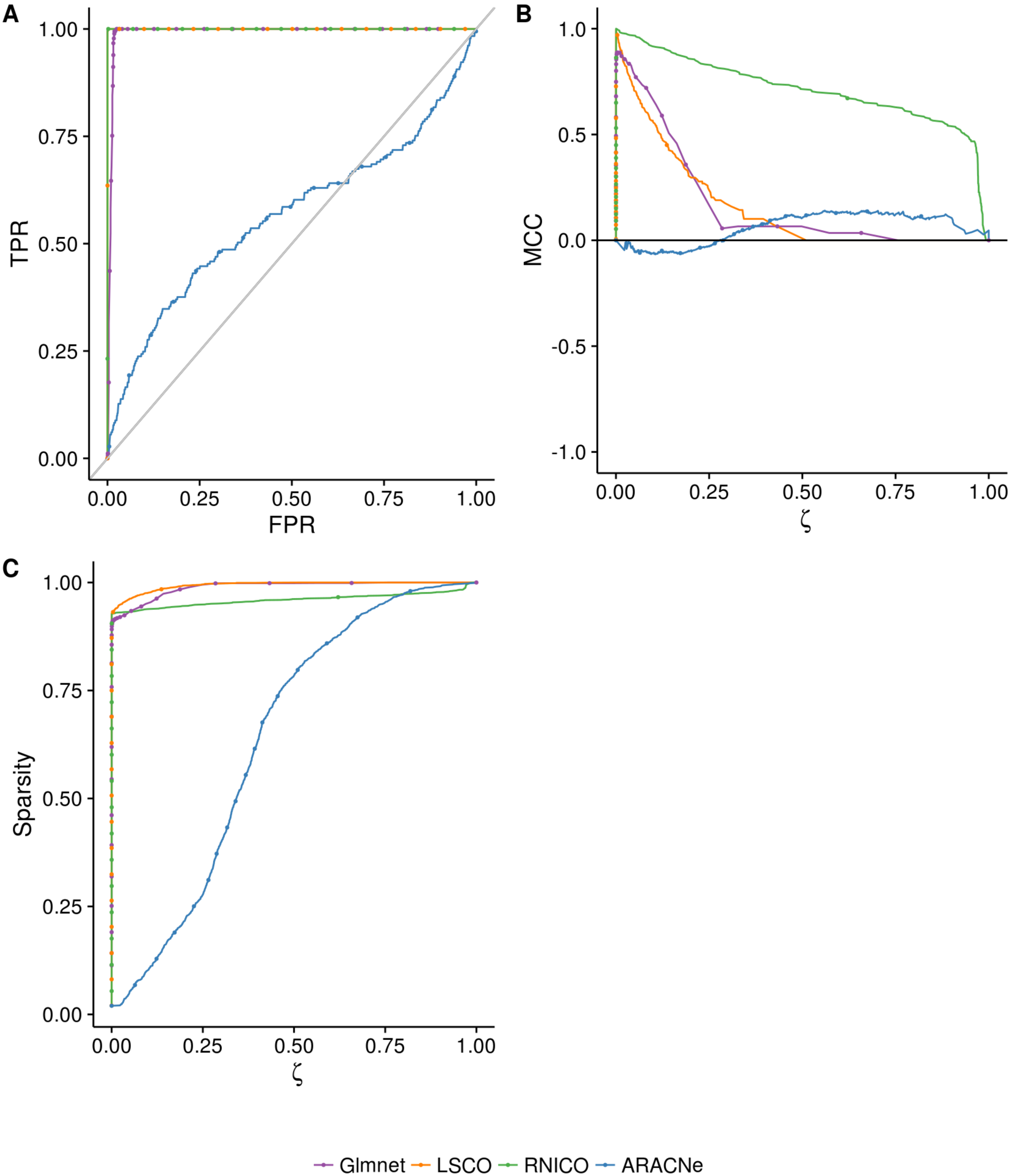
Case scalefree N50 SNR1 high IAA



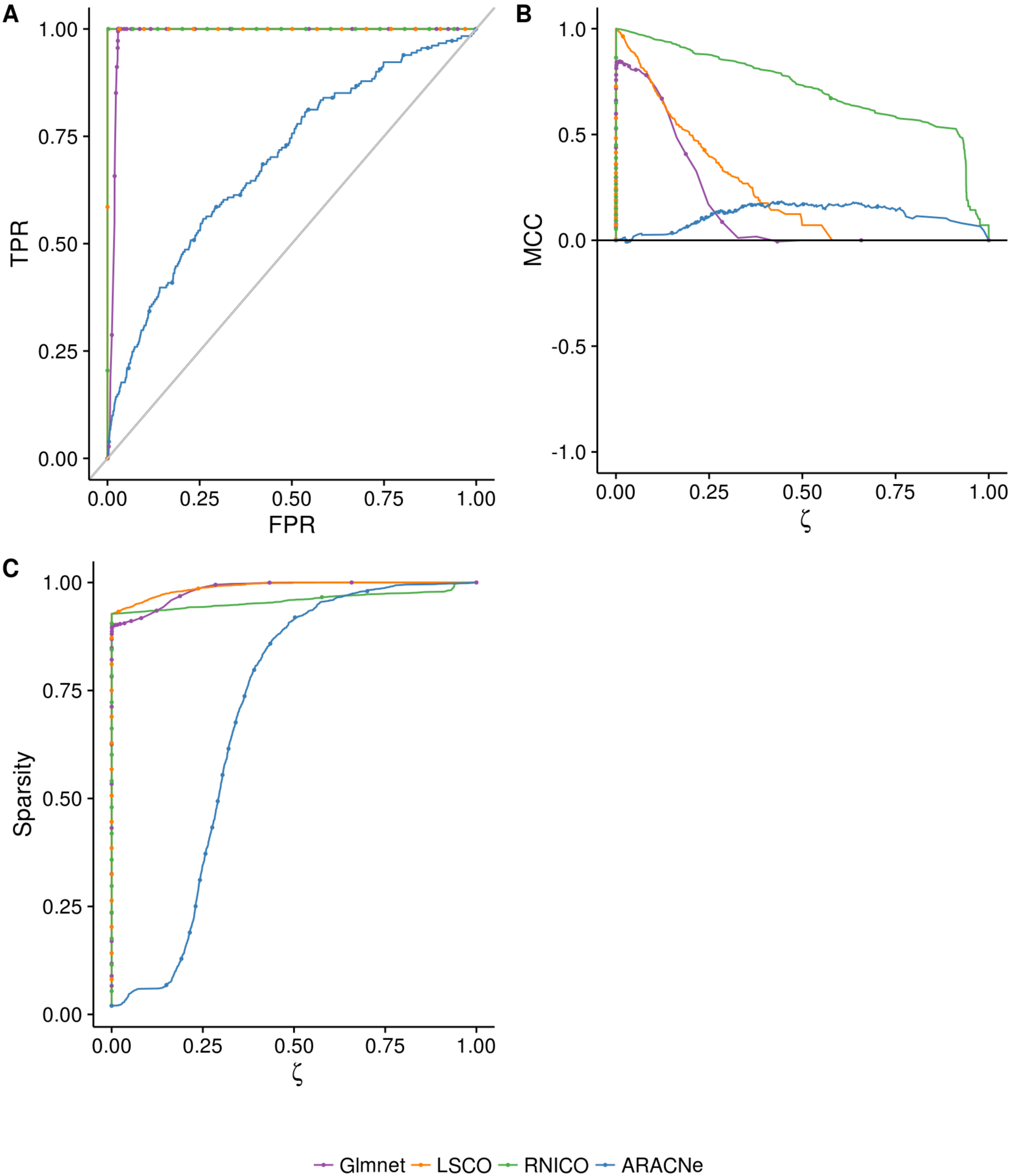
Case scalefree N50 SNR1 low IAA

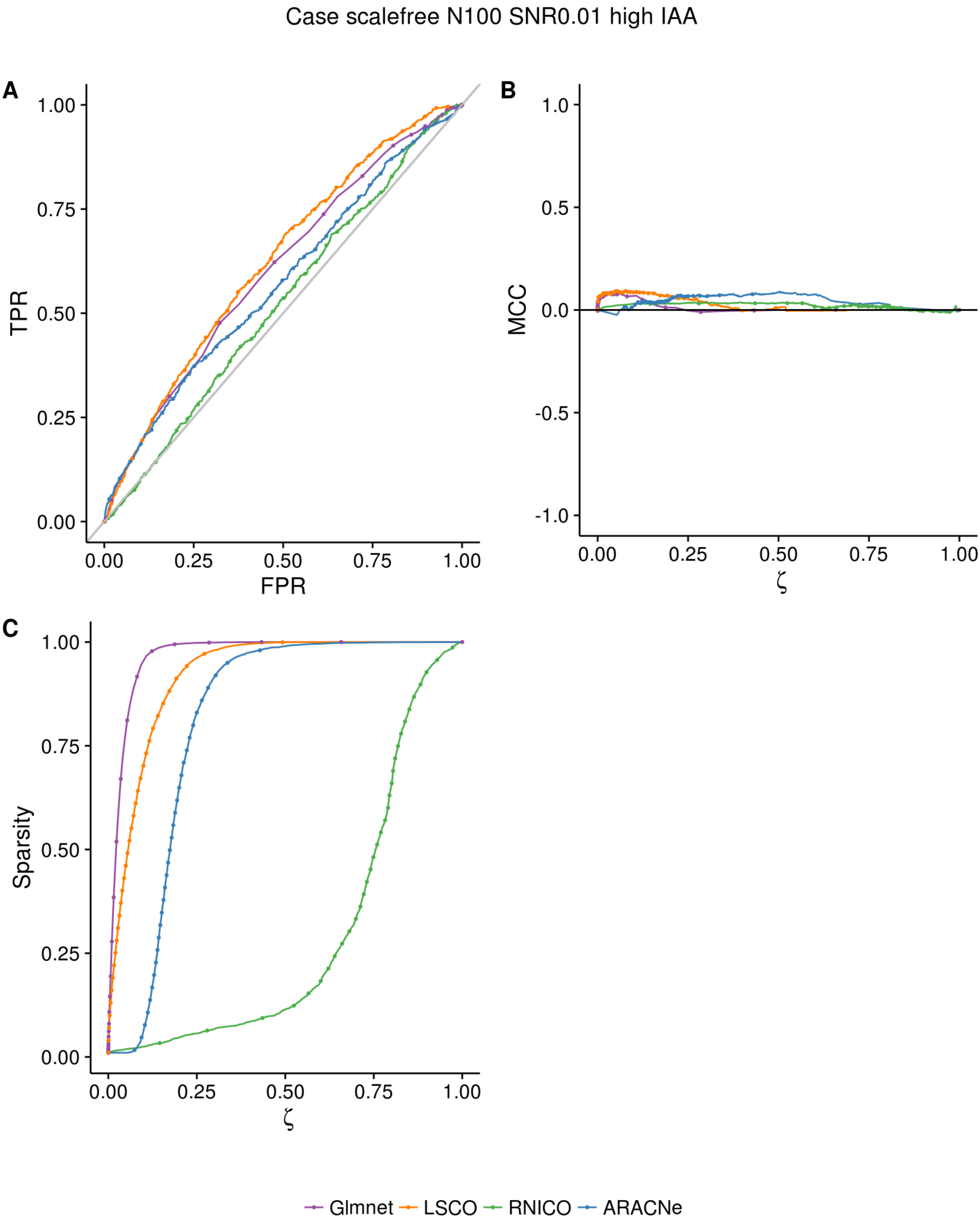


Case scalefree N50 SNR100 high IAA



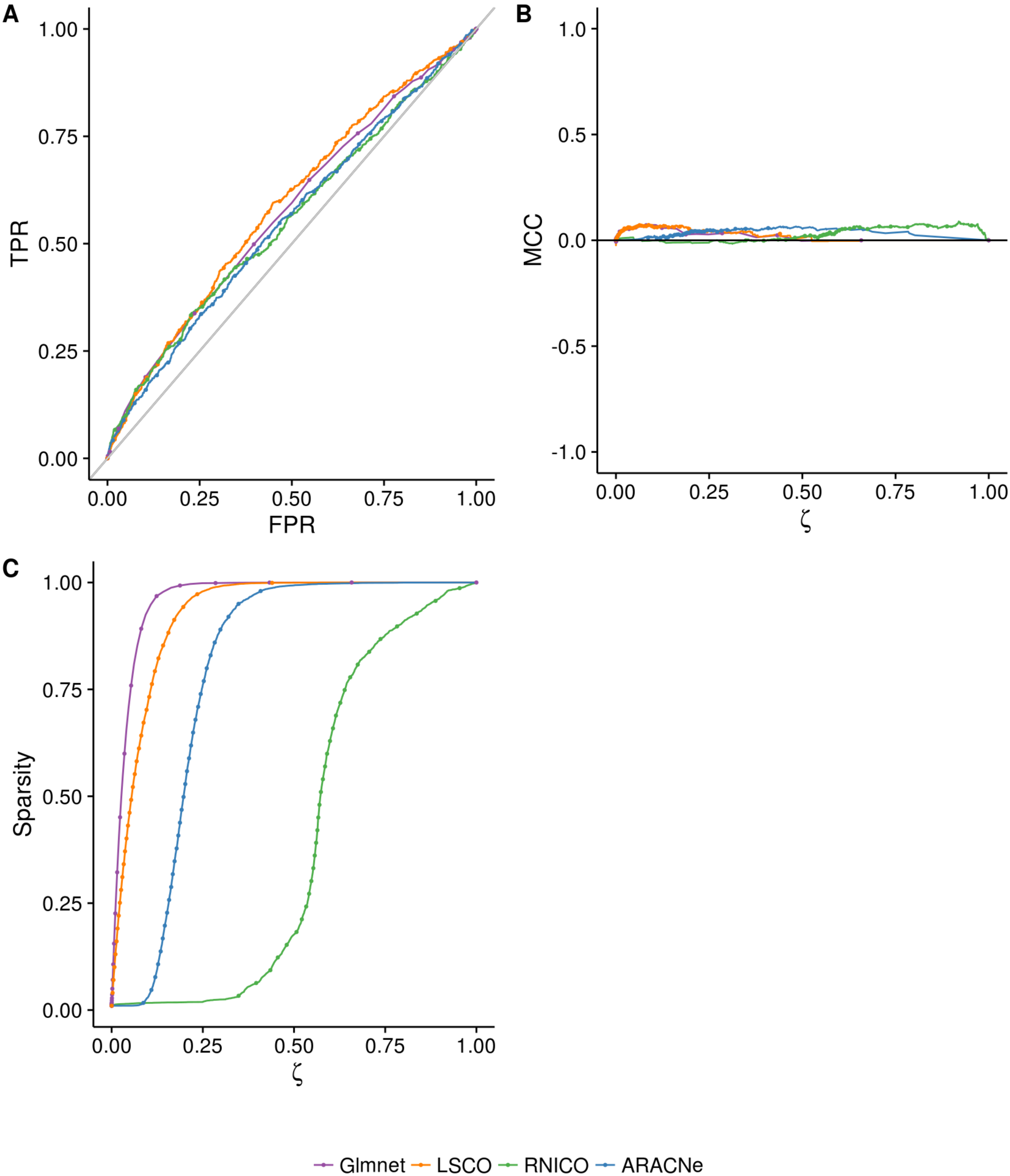
Case scalefree N50 SNR100 low IAA

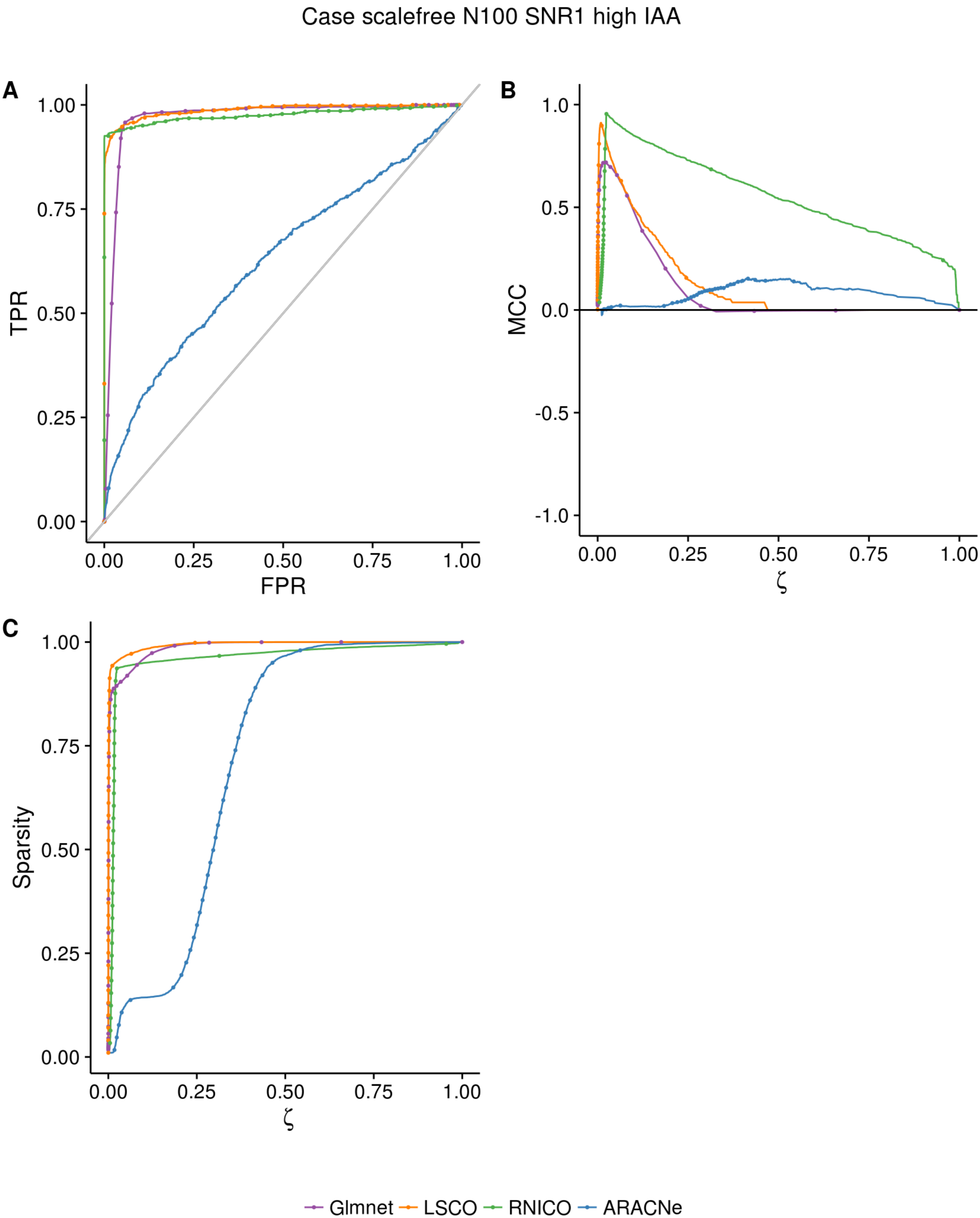




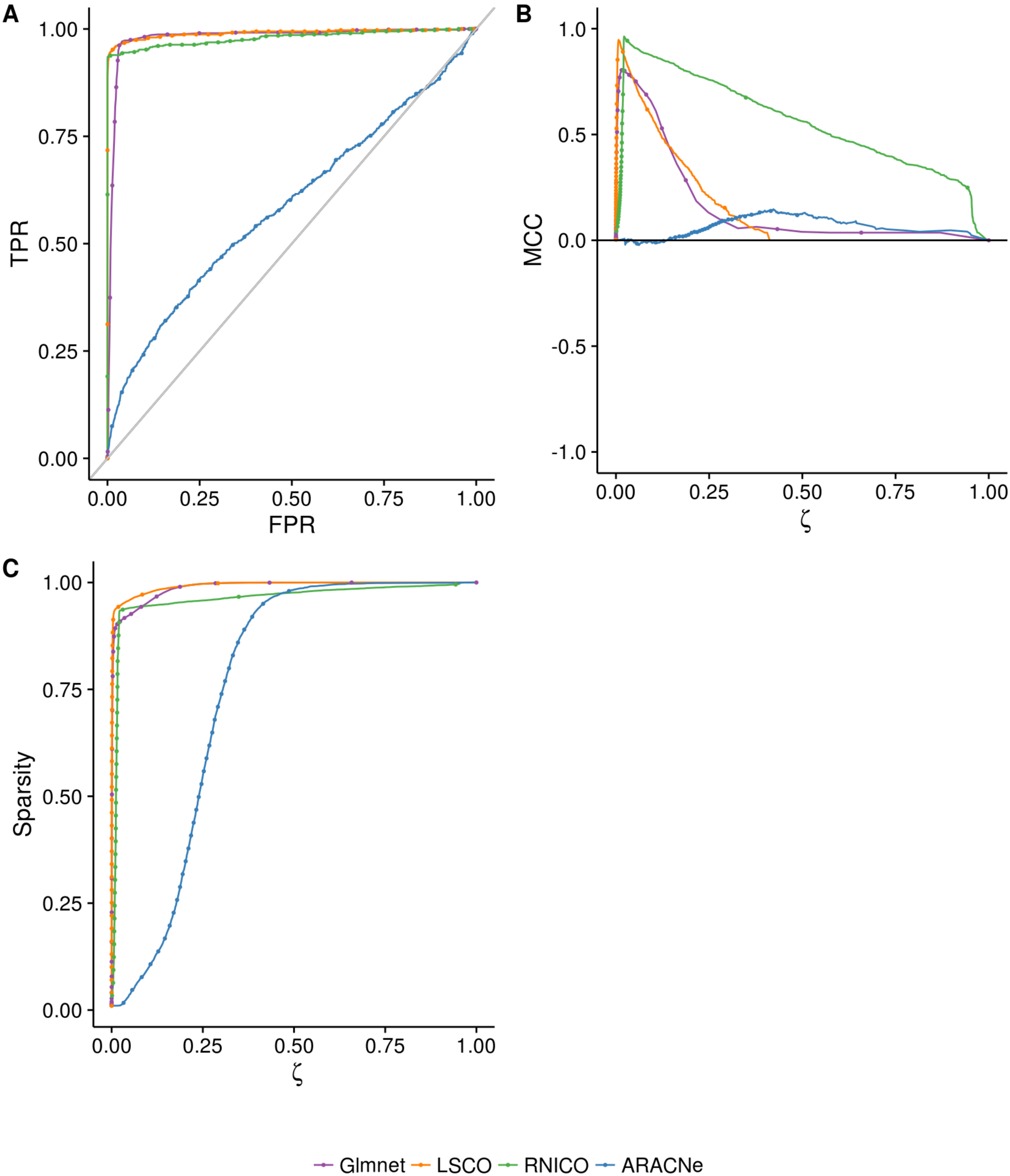
Case scalefree N100 SNR0.01 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
B
MCC
1.0
0.5
0.0
-0.5
-1.0
ζ
C
Sparsity
ζ
Glmnet
LSCO
RNICO
ARACNe

Case scalefree N100 SNR0.01 low IAA

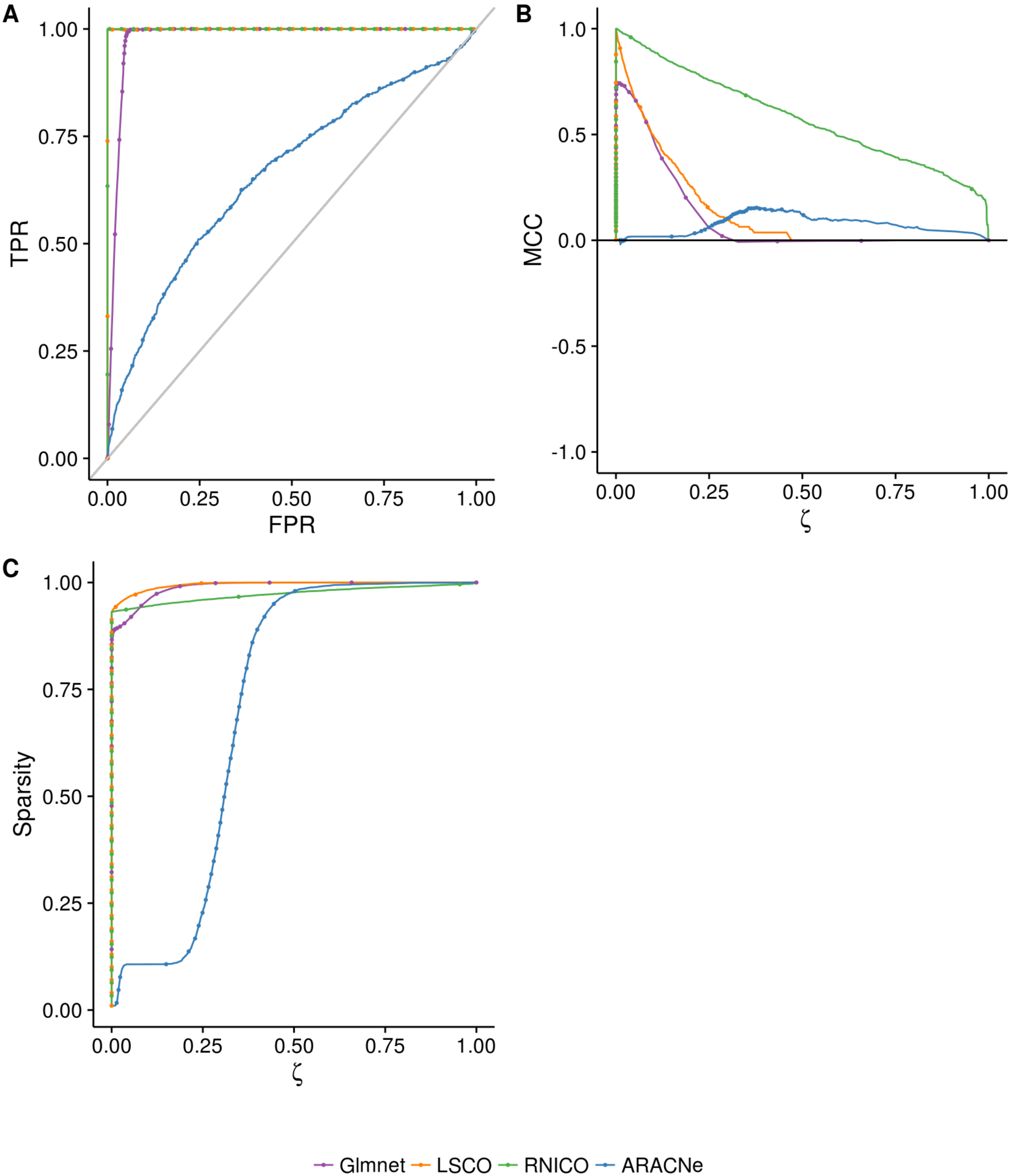



Case scalefree N100 SNR1 high IAA
A
B
C
TPR
FPR
MCC
ζ
Sparsity
1.00
0.75
0.50
0.25
0.00
1.0
0.5
0.0
-0.5
-1.0
Glmnet
LSCO
RNICO
ARACNe

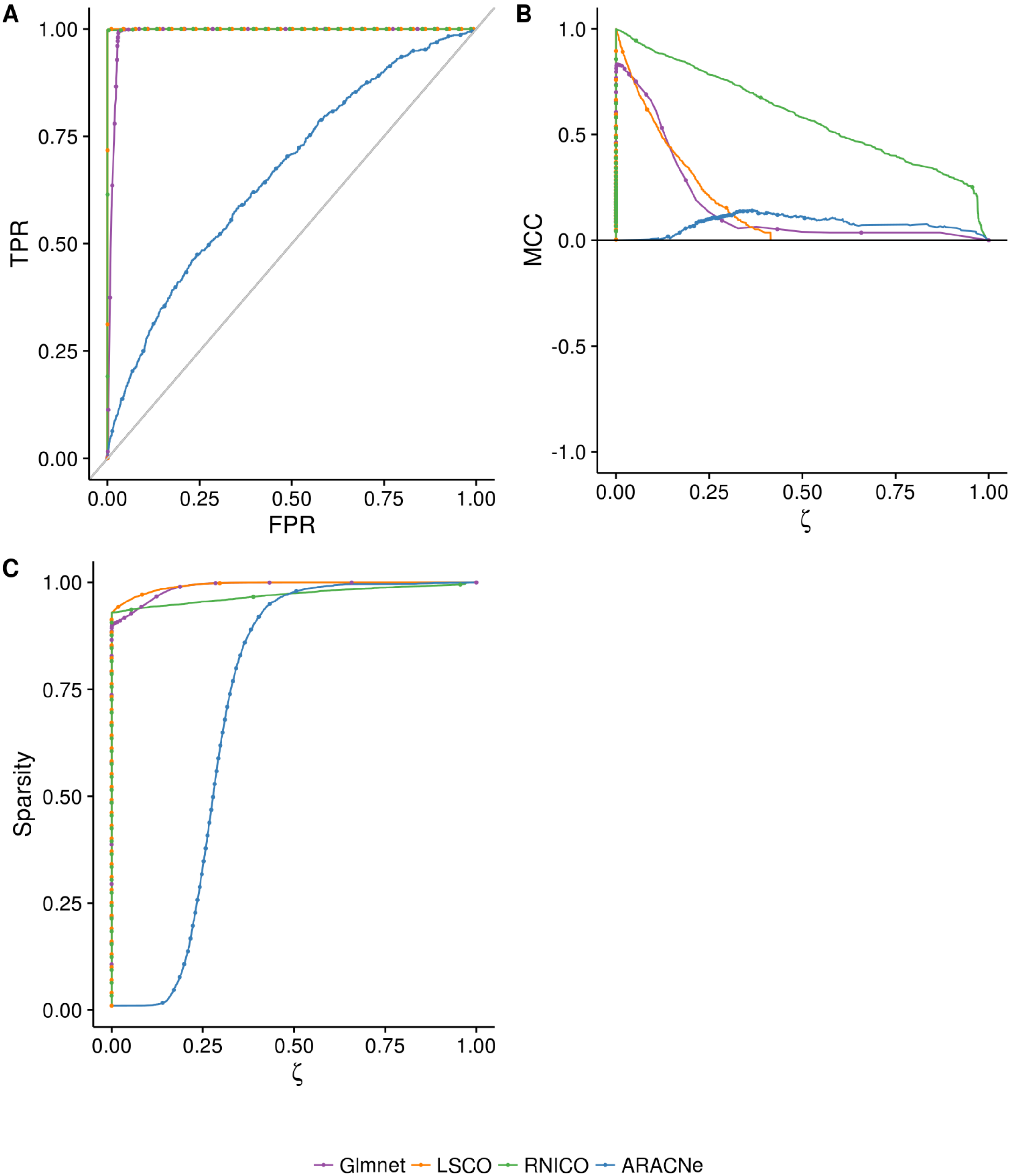
Case scalefree N100 SNR1 low IAA

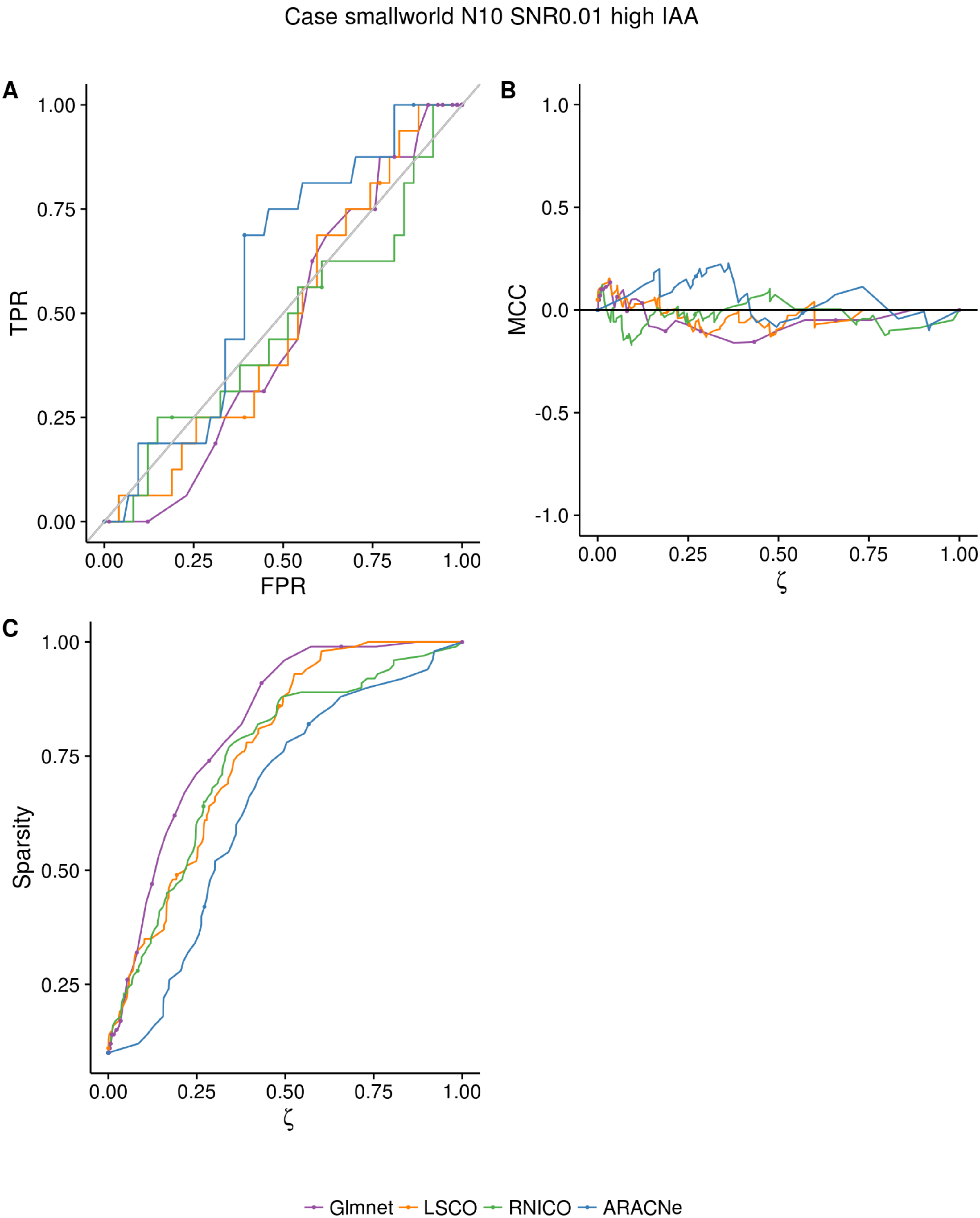


Case scalefree N100 SNR100 high IAA



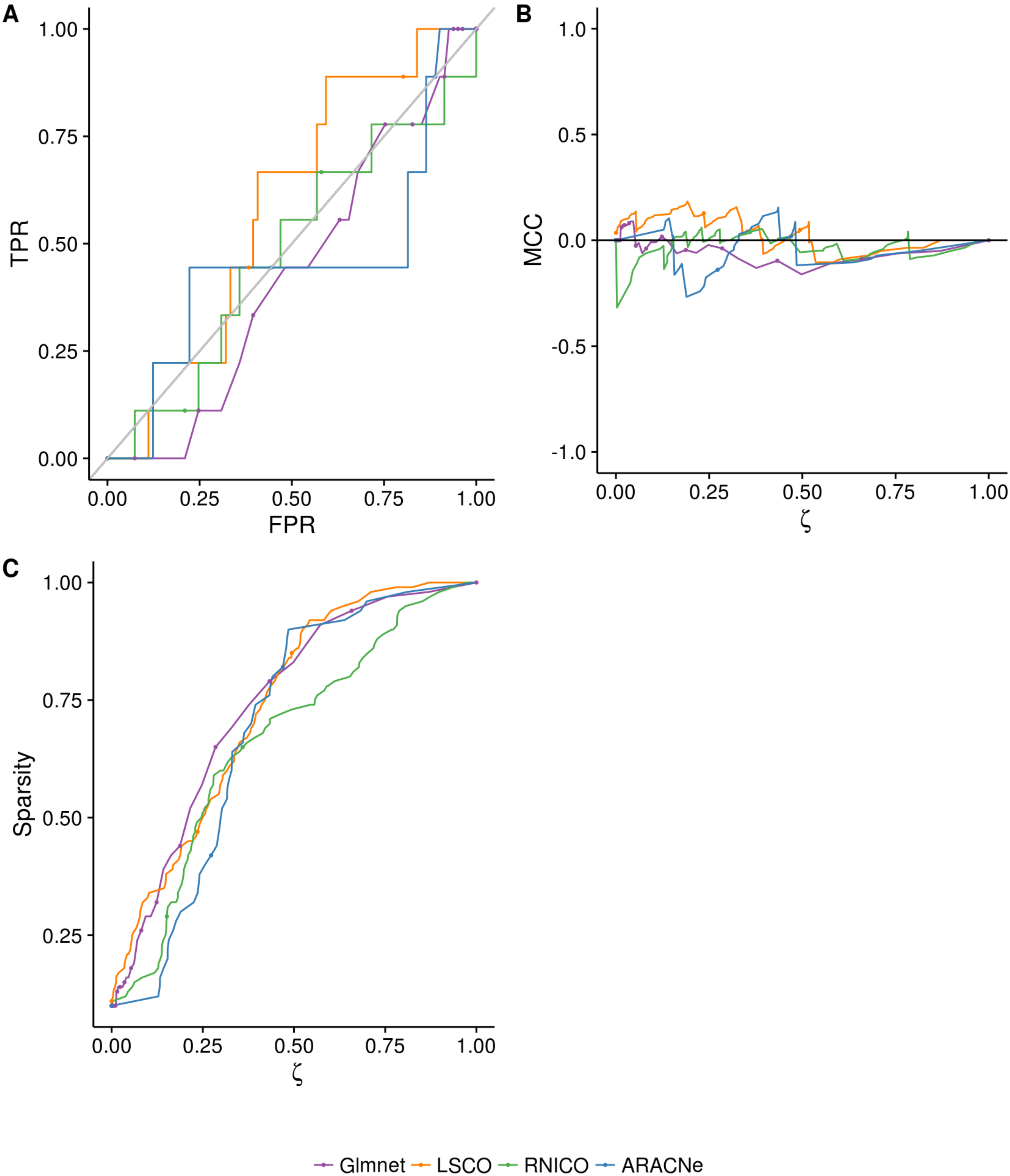
Case scalefree N100 SNR100 low IAA



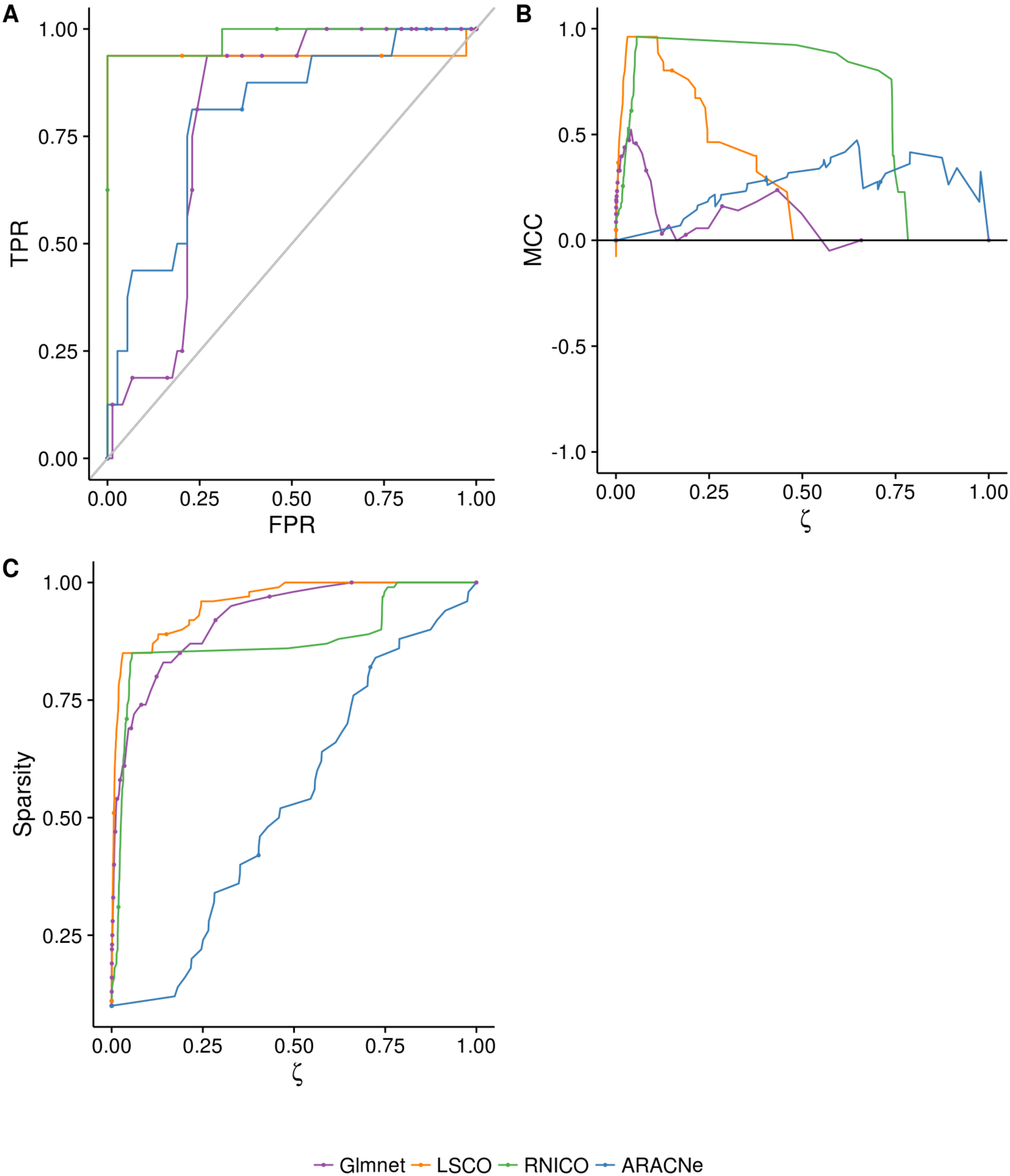


Case smallworld N10 SNR0.01 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
C
Sparsity
ζ
Glmnet
LSCO
RNICO
ARACNe

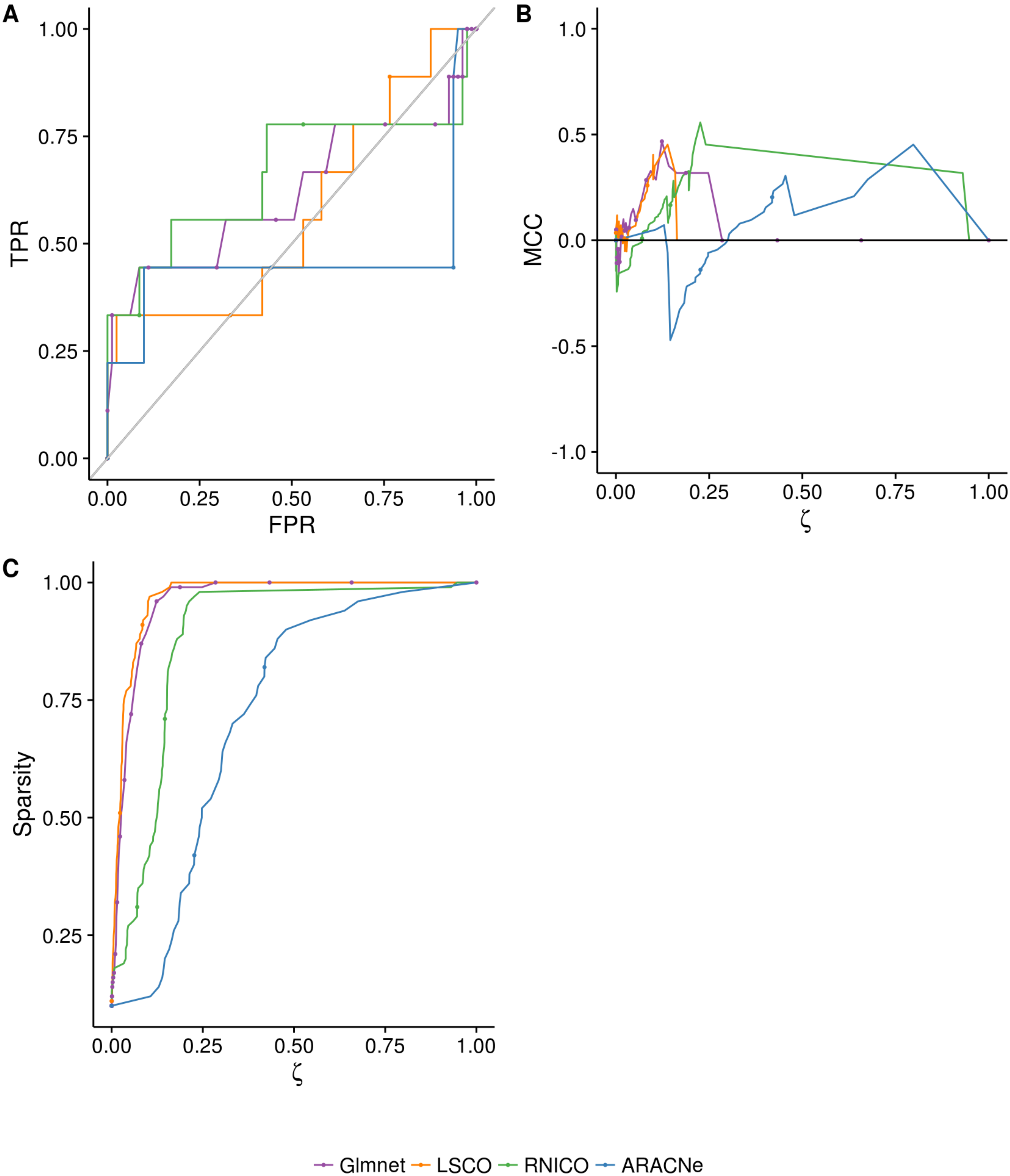
Case smallworld N10 SNR0.01 low IAA



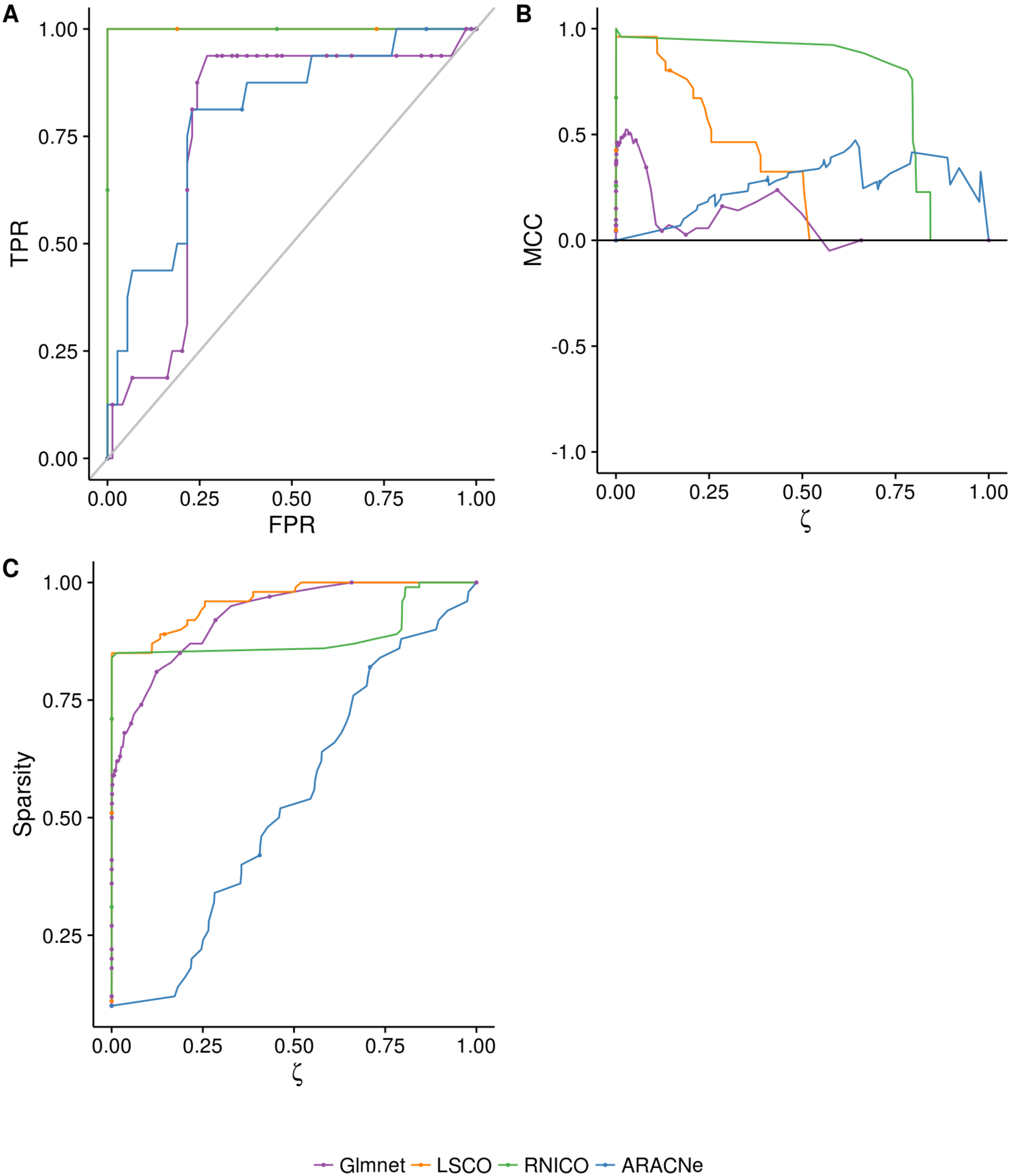
Case smallworld N10 SNR1 high IAA



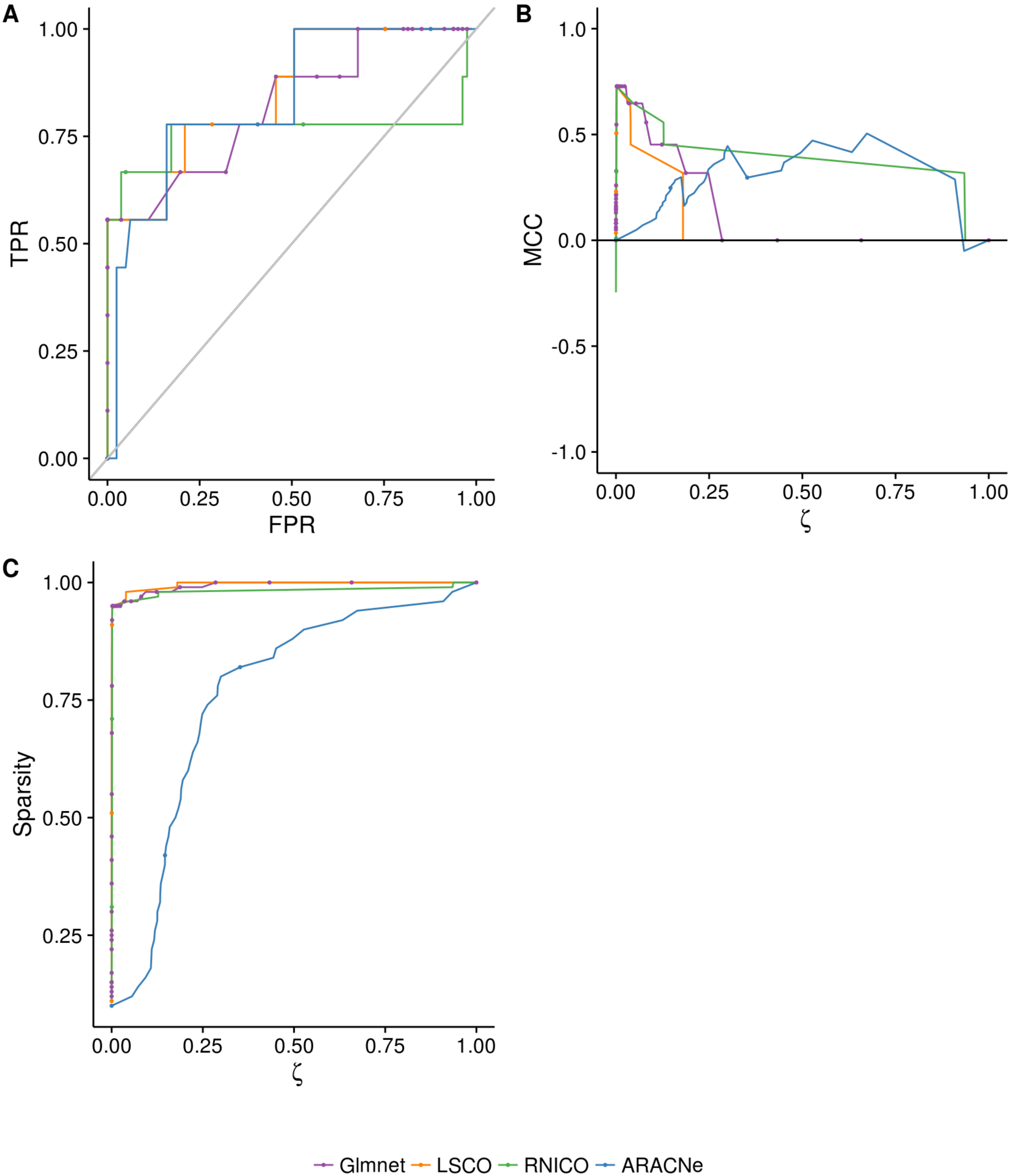
Case smallworld N10 SNR1 low IAA



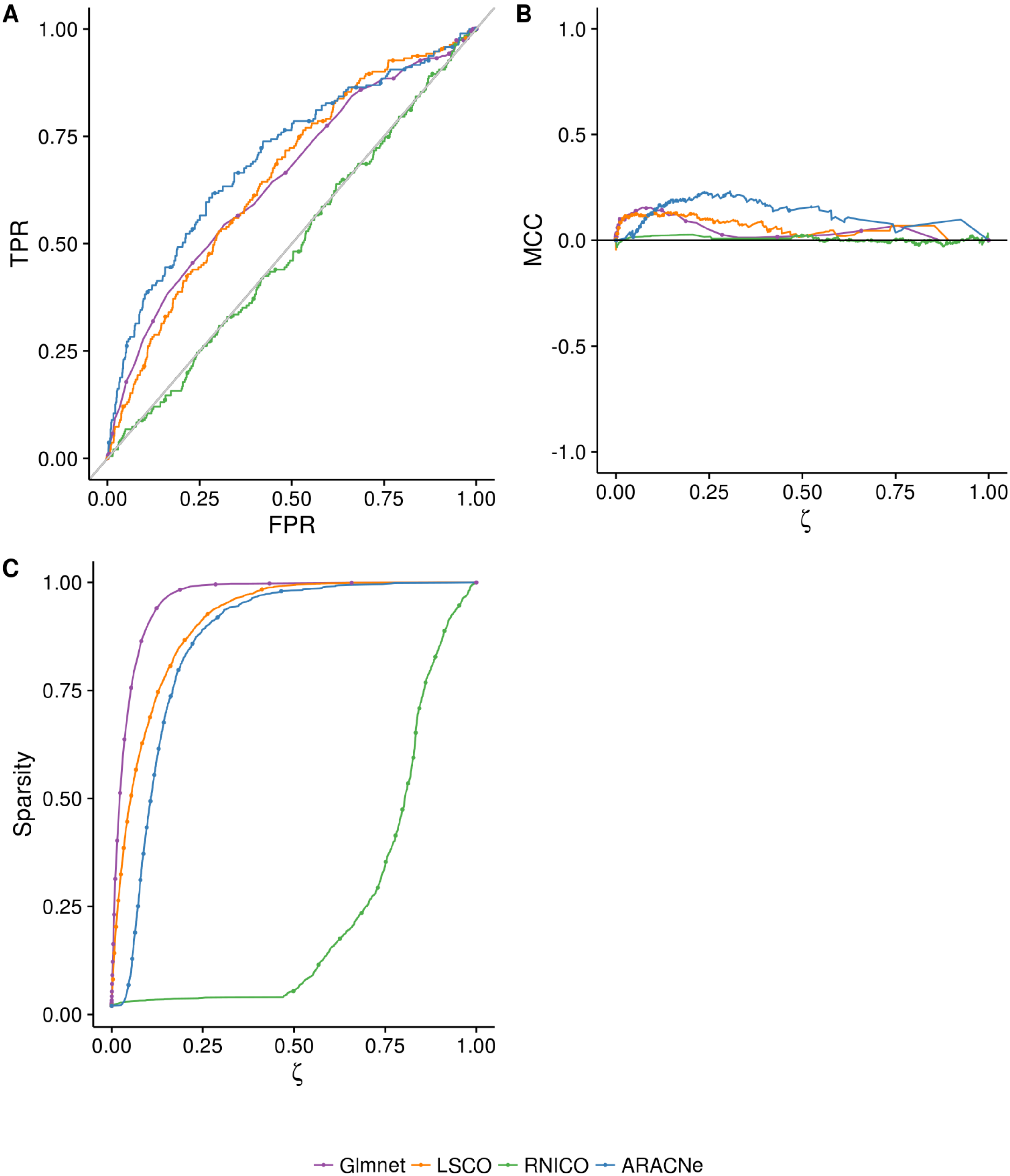
Case smallworld N10 SNR100 high IAA



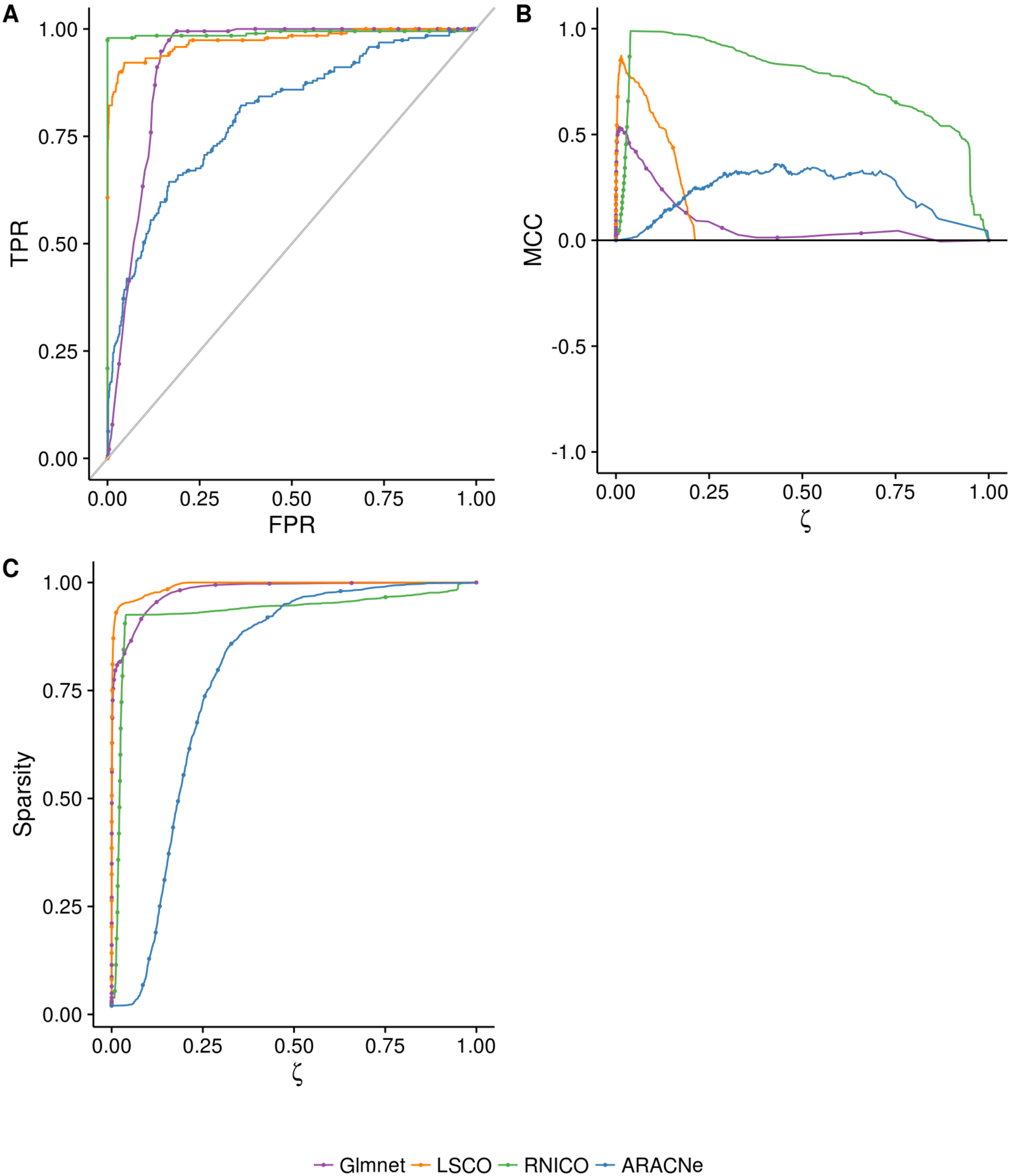
Case smallworld N10 SNR100 low IAA

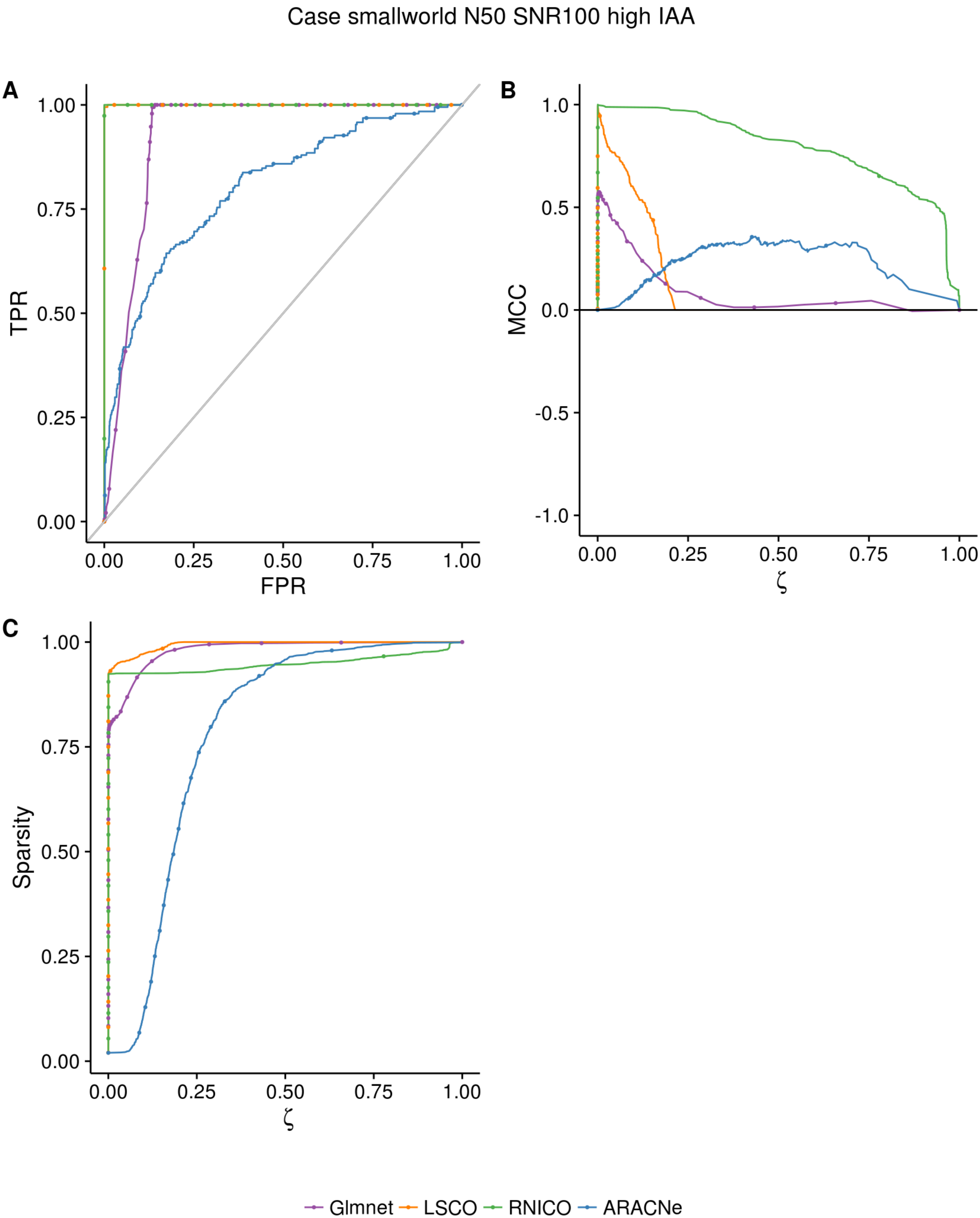


Case smallworld N50 SNR0.01 high IAA



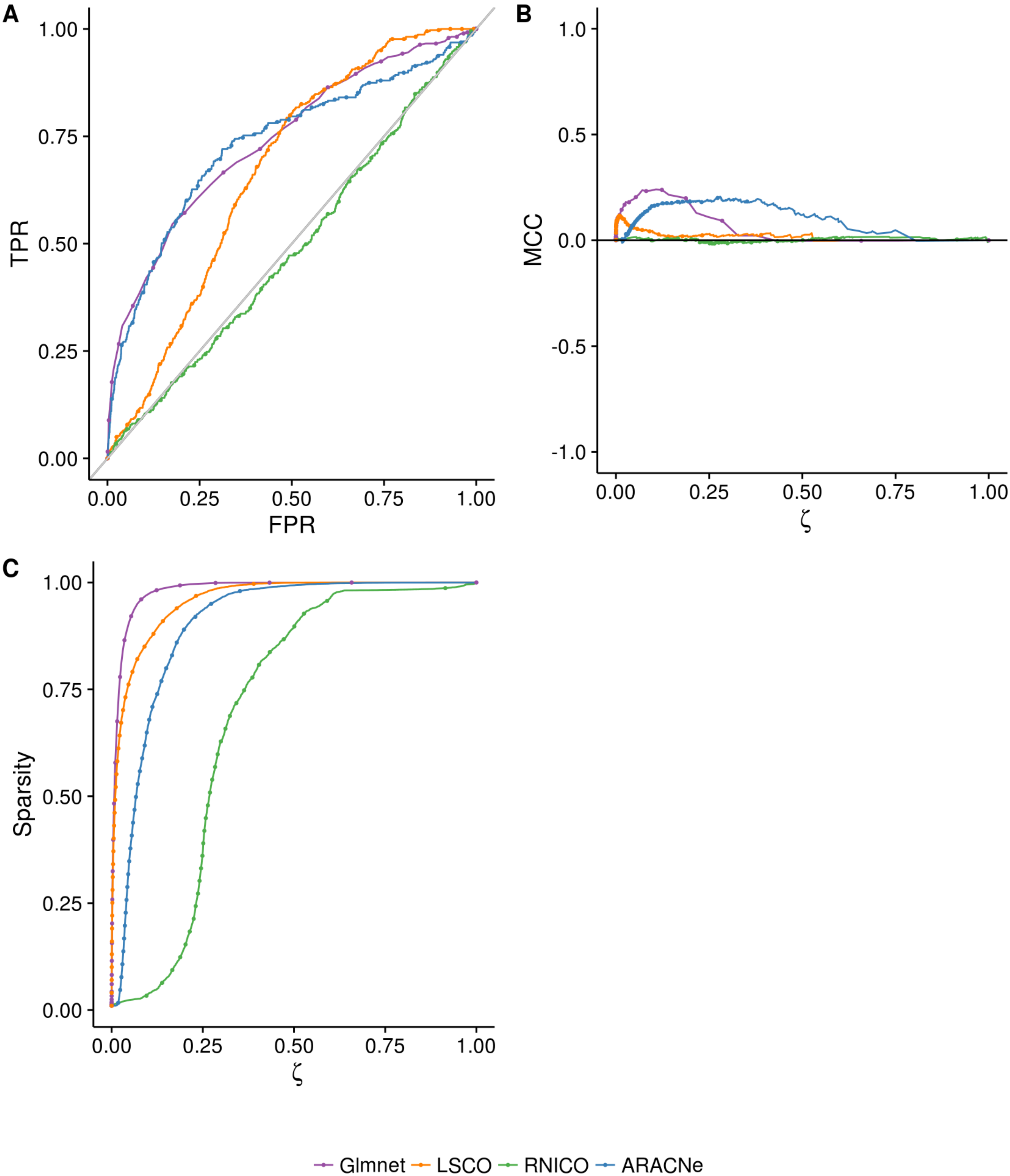
Case smallworld N50 SNR1 high IAA



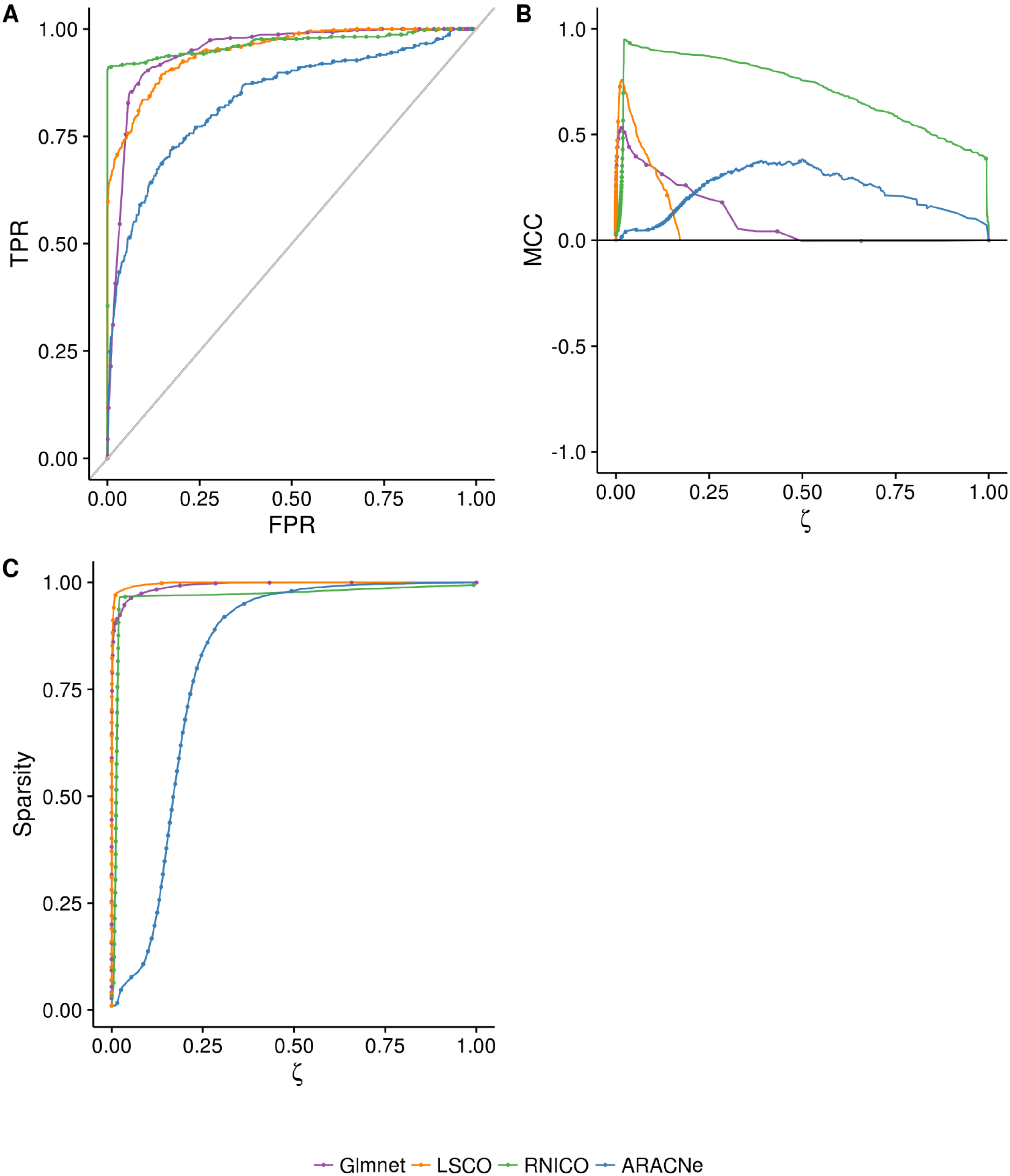


Case smallworld N50 SNR100 high IAA
A
TPR
FPR
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
C
Sparsity
ζ
Glmnet
LSCO
RNICO
ARACNe

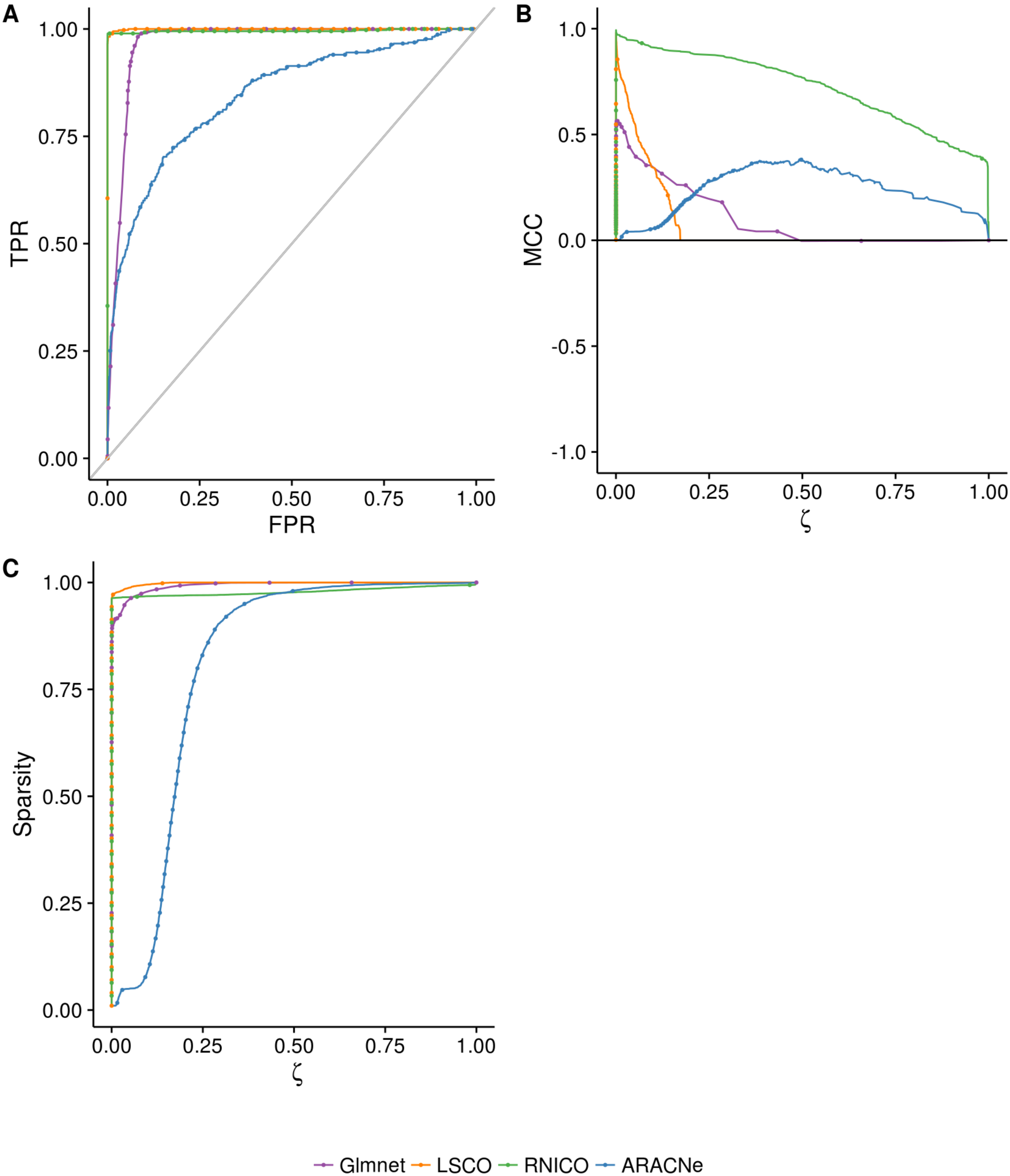
Case smallworld N100 SNR0.01 high IAA



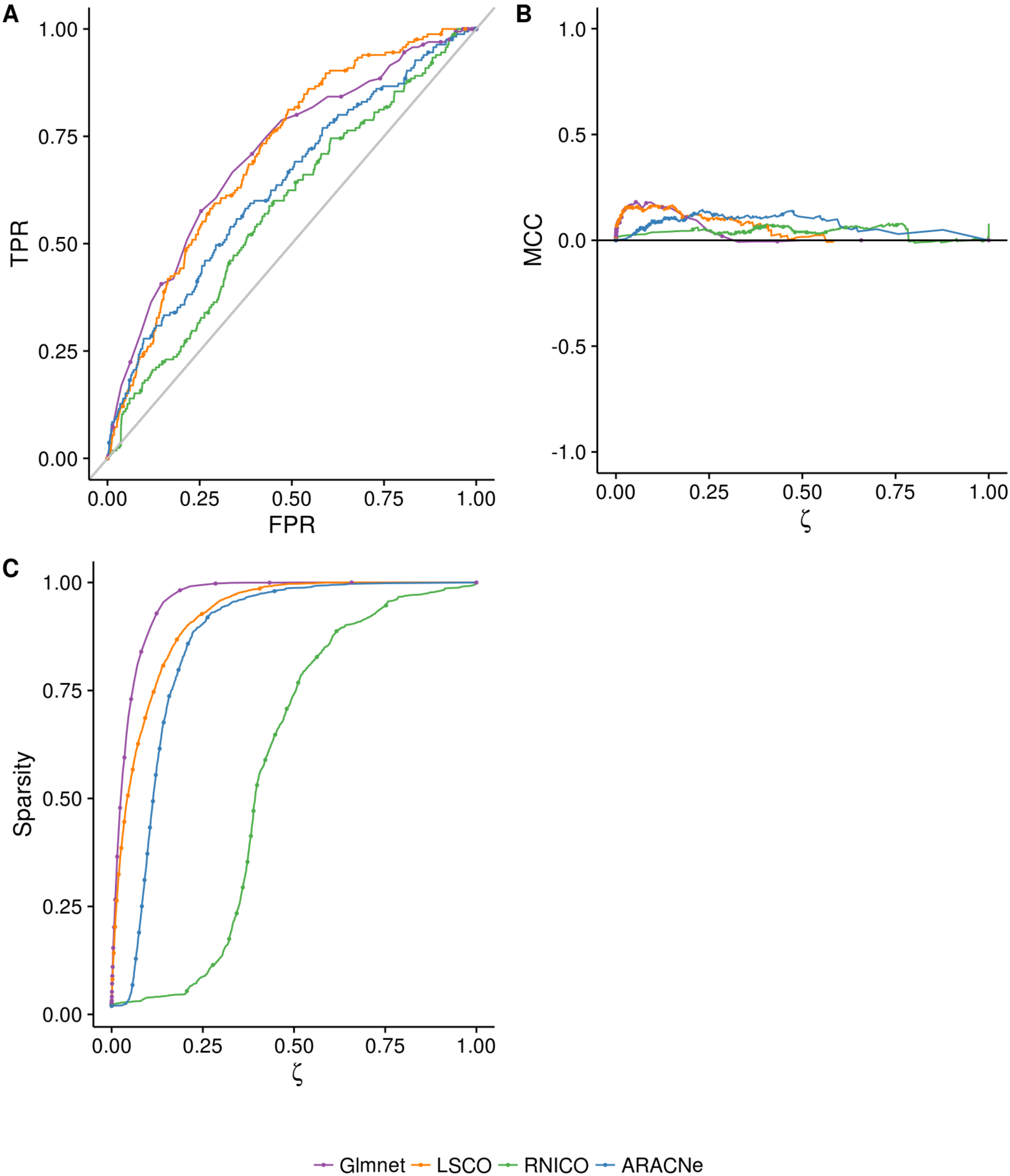
Case smallworld N100 SNR1 high IAA



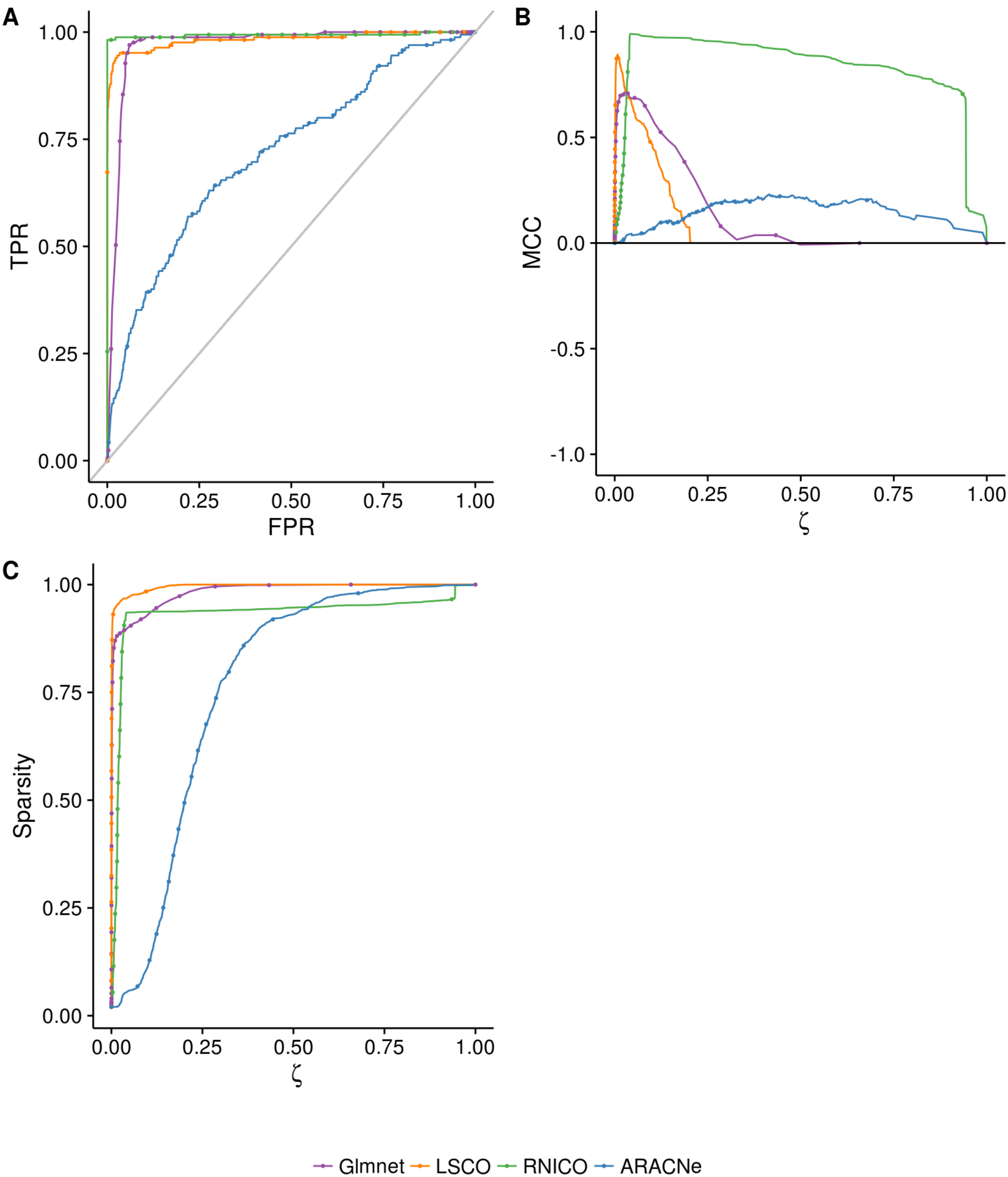
Case smallworld N100 SNR100 high IAA

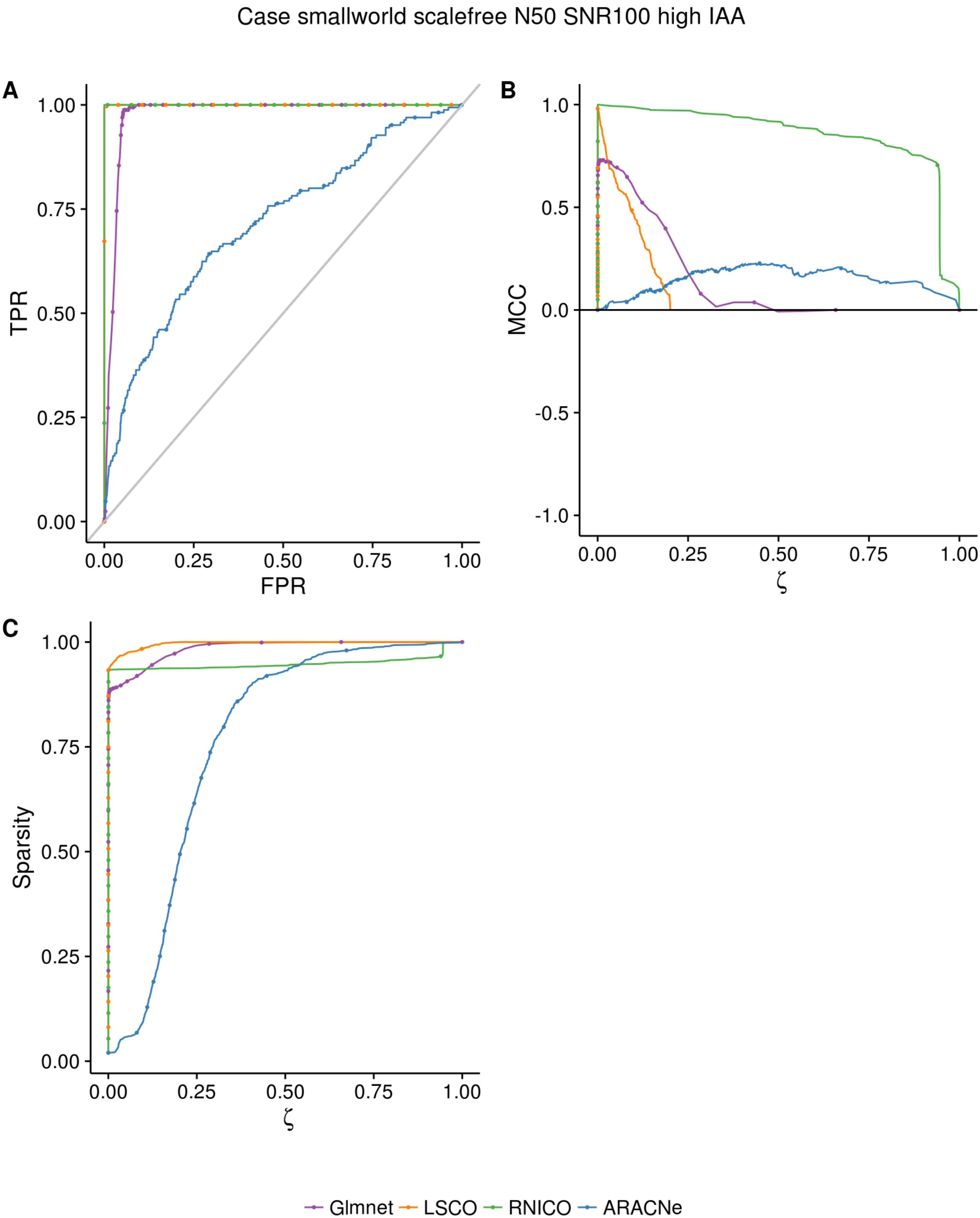


Case smallworld scalefree N50 SNR0.01 high IAA



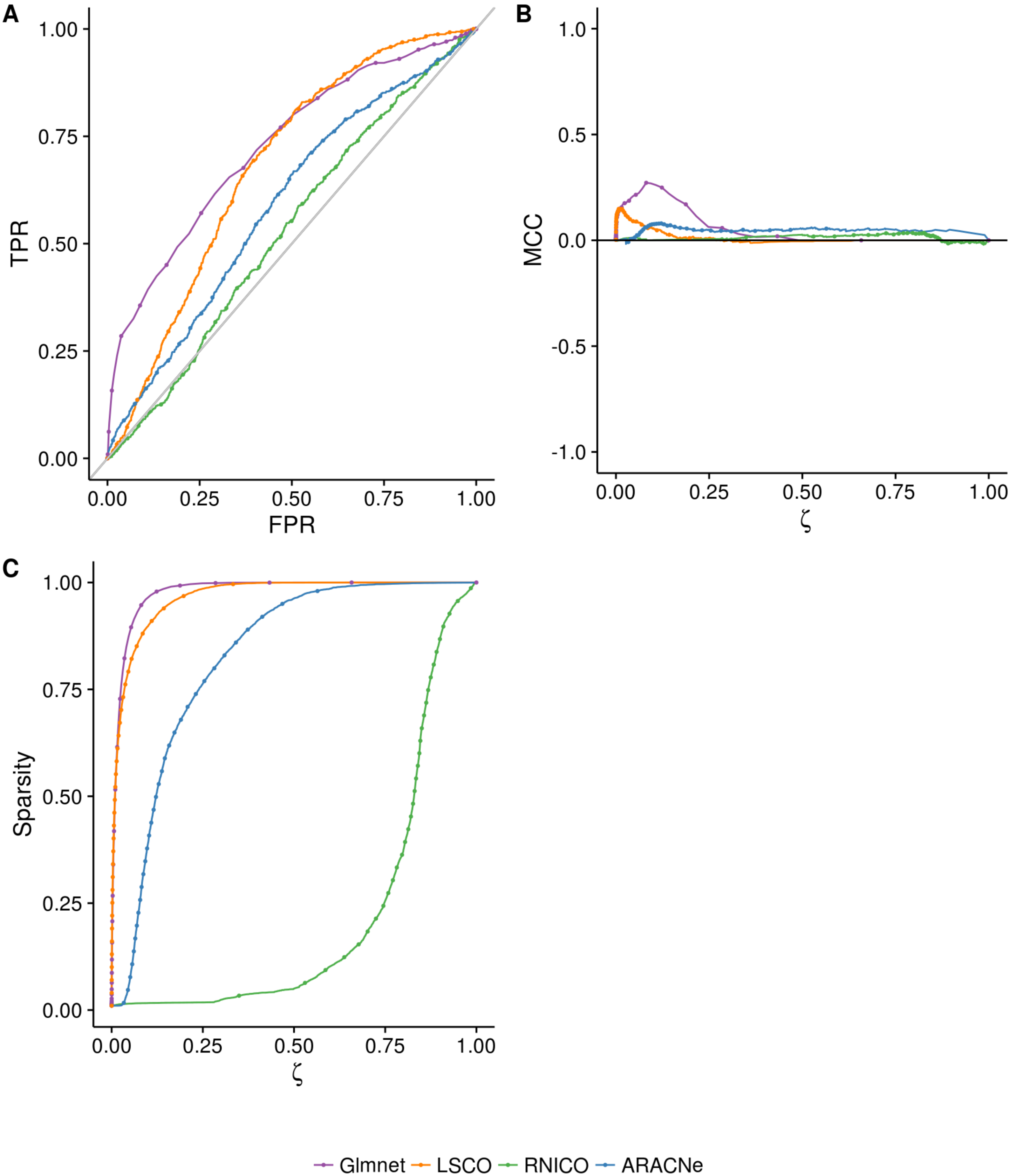
Case smallworld scalefree N50 SNR1 high IAA



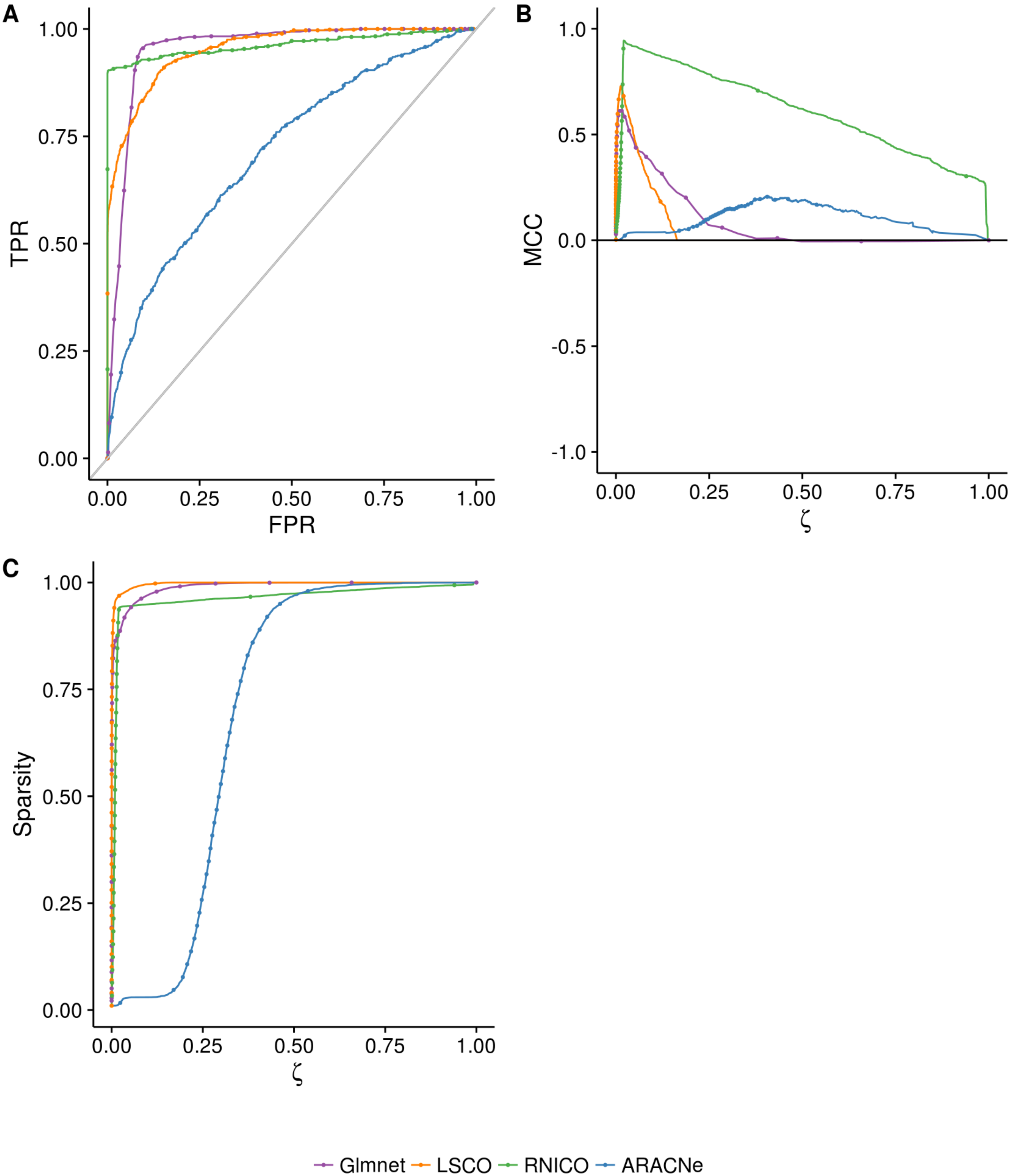


Case smallworld scalefree N50 SNR100 high IAA
A
TPR
FPR
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
B
MCC
ζ
1.0
0.5
0.0
-0.5
-1.0
0.00
0.25
0.50
0.75
1.00
C
Sparsity
ζ
1.00
0.75
0.50
0.25
0.00
0.00
0.25
0.50
0.75
1.00
Glmnet
LSCO
RNICO
ARACNe

Case smallworld scalefree N100 SNR0.01 high IAA



Case smallworld scalefree N100 SNR1 high IAA



Case smallworld scalefree N100 SNR100 high IAA