Figure S1: Cartoon of mesenchymal stem cell delivery.

Figure S2: Flow diagram outlining the experiments.

Figure S3: Histomorphometric analysis of mesenchymal stem cell transplanted vessels (**M**) compared to outflow vein vessels removed from animals with AVF only (**C**) at day 7 and 21 after placement. (**A**) is semiquantitative analysis which shows a significant increase in the average lumen vessel area of **M** transplanted vessels when compared to control **C** group for day 7 (P<0.05) and 21 (P<0.05). (**B**) is semiquantitative analysis for the average area of the neointima/average area of the media/adventitia for both groups at day 7 and 21. By day 21, there was a significant decrease in the average area of the neointima/average area of the media/adventitia in the **M** transplanted vessels when compared to the **C** group (P<0.05) (**C**) is semiquantitative analysis for the average cell density in the neointima for both groups at days 7 and 21. By day 7, the average cell density of the neointima in the **M** transplanted vessels was significantly lower than the **C** group (P<0.0001) and remained lower by day 21 (P<0.05). Each bar represents a mean ± SEM of 4-6 animals per group. Two-way ANOVA followed by Student *t*-test with post hoc Bonferroni's correction was performed. Significant differences among **M** transplanted and **C** vessels is indicated by *P<0.05 or $^{\#\#}P$<0.0001.

Figure S4: Semiquantitative analysis for TUNEL and Ki-67 staining in murine AVF at day 7 and 21 after placement of AVF in outflow vein alone (**C**) and MSC transplanted vessels (**M**). **(A)** is the semiquantitative analysis for TUNEL staining for **M** transplanted and **C** vessels at days 7 and 21. By day 7, the average density of cells staining positive for TUNEL (brown staining nuclei) at the outflow vein of **M** transplanted vessels was significantly higher than the **C** group (P<0.0001) and by day 21, it remained significantly increased (P<0.05). **(B)** is the semiquantitative analysis of Ki-67 immunostaining at days 7 and 21. By day 7, there was a significant reduction in the average Ki-67 index in the **M** transplanted vessels when compared to **C** vessels (P<0.0001) and remained significantly lower by day 21 (P<0.05). Each bar represents a mean ± SEM of 4-6 animals. Two-way ANOVA followed by Student *t*-test with post hoc

Bonferroni's correction was performed. Significant differences among **M** transplanted and **C** vessels is indicated by *P<0.05, **P<0.001, or $^{\#\#}P$<0.0001.

Figure S5: Semiquantitative analysis for FSP-1 and α-SMA staining in murine AVF at day 7 and 21 after placement of AVF in outflow vein alone (**C**) and MSC transplanted vessels (**M**). **(A)** is the semiquantitative analysis of FSP-1 staining for **M** transplanted and **C** vessels at days 7 and 21. By day 7, the average density of cells staining positive for FSP-1 at the outflow vein of **M** transplanted vessels was significantly lower than the **C** group (P<0.001) and by day 21, it remained significantly increased (P<0.01). **(B)** is the semiquantitative analysis of α-SMA staining for **M** transplanted and **C** vessels at days 7 and 21. By day 21, the average density of cells staining positive for α-SMA at the outflow vein of **M** transplanted vessels was significantly lower than the **C** group (P<0.05). Each bar represents a mean ± SEM of 4-6 animals per group. Two-way ANOVA followed by Student *t*-test with post hoc Bonferroni's correction was performed. Significant differences among **M** transplanted and **C** vessels is indicated by *P<0.05, $^{\#}P$<0.01, or $^{\#\#}P$<0.0001.

Figure S6: Semiquantitative analysis for HIF-1α and CD68 staining in murine AVF at day 7 and 21 after placement in outflow vein alone (**C**) and MSC transplanted vessels (**M**). **(A)** is the semiquantitative analysis of HIF-1α staining for **M** transplanted and **C** vessels at days 7 and 21. By day 7, the average density of cells staining positive for HIF-1α at the outflow vein of **M** transplanted vessels was significantly lower than the **C** group (P<0.0001) and by day 21, it remained significantly increased (P<0.0001). **(B)** is the semiquantiative analysis of CD68 staining for **M** transplanted and **C** vessels at days 7 and 21. By day 7, the average density of cells staining positive for CD68 at the outflow vein of **M** transplanted vessels was significantly lower than the **C** group (P<0.05). Each bar represents a mean ± SEM of 4-6 animals per group. Two-way ANOVA followed by Student *t*-test with post hoc Bonferroni's correction was performed. Significant differences among **M** transplanted and **C** vessels is indicated by *P<0.05 or $^{\#\#}P$<0.0001.

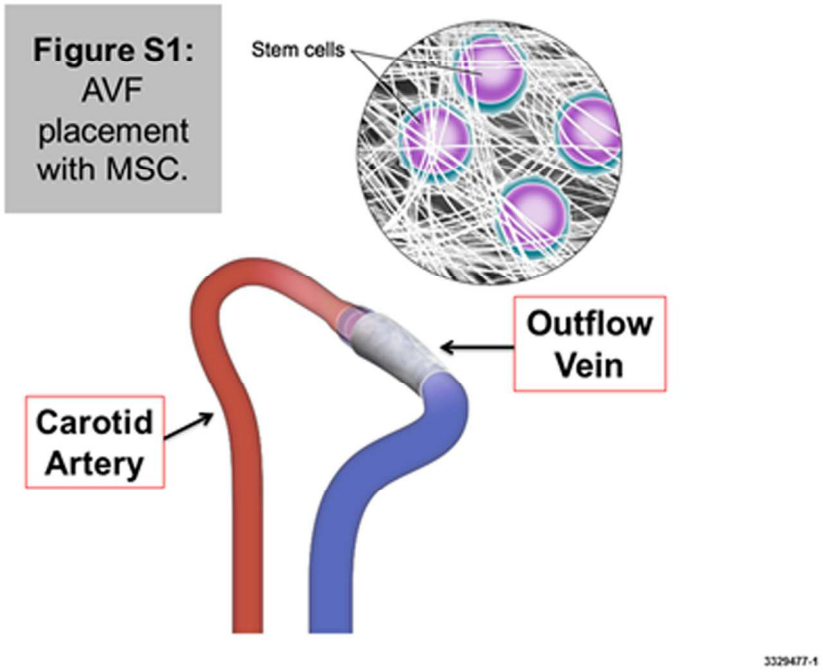

Figure s1
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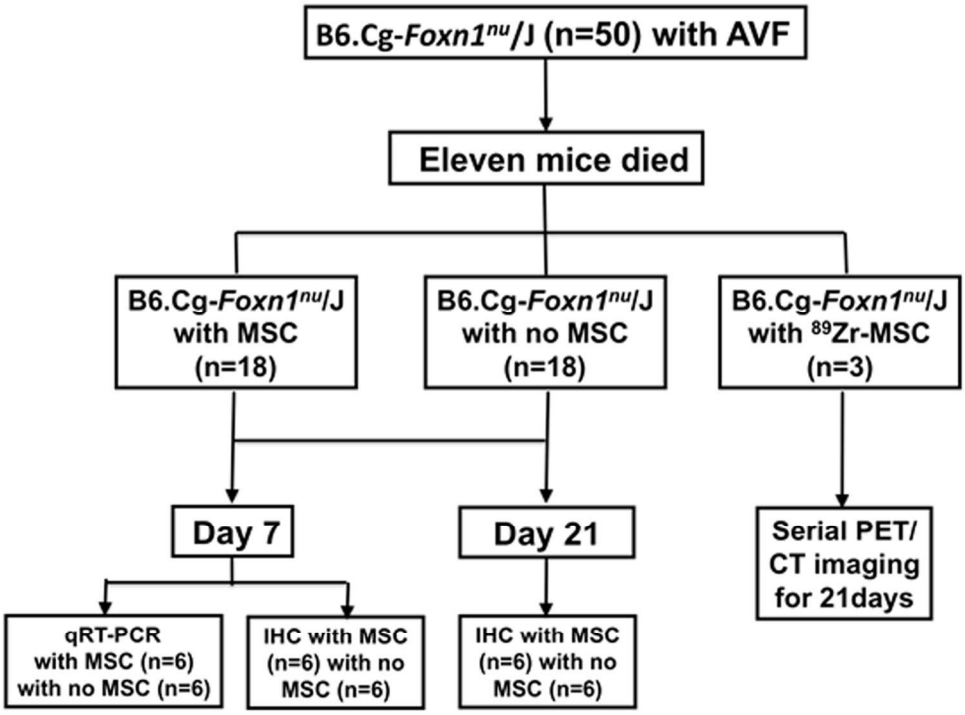

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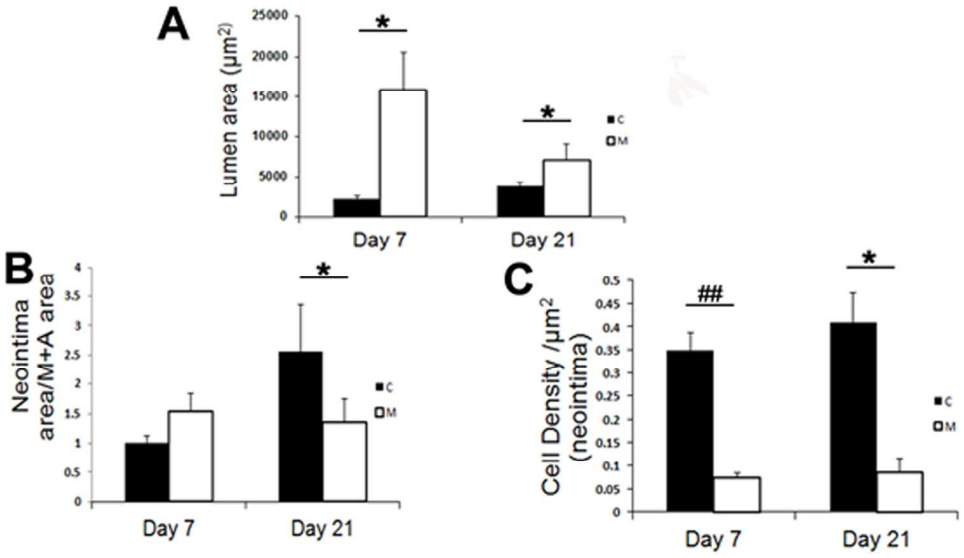

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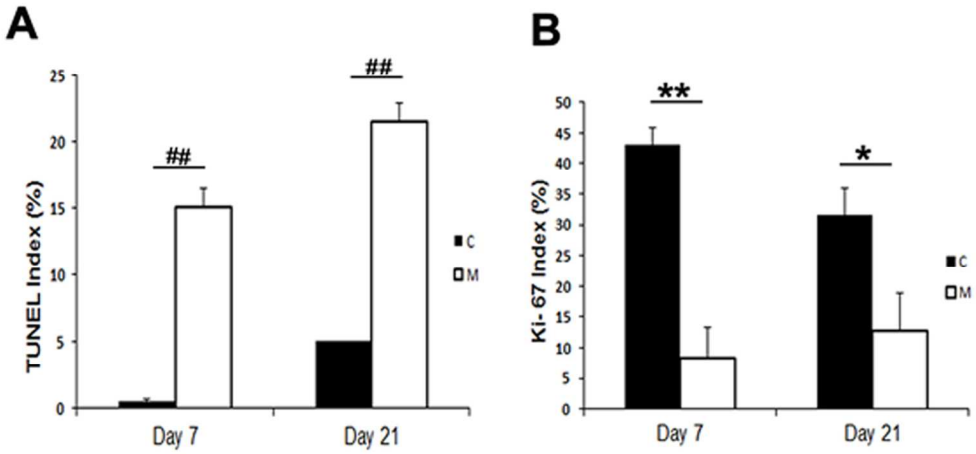

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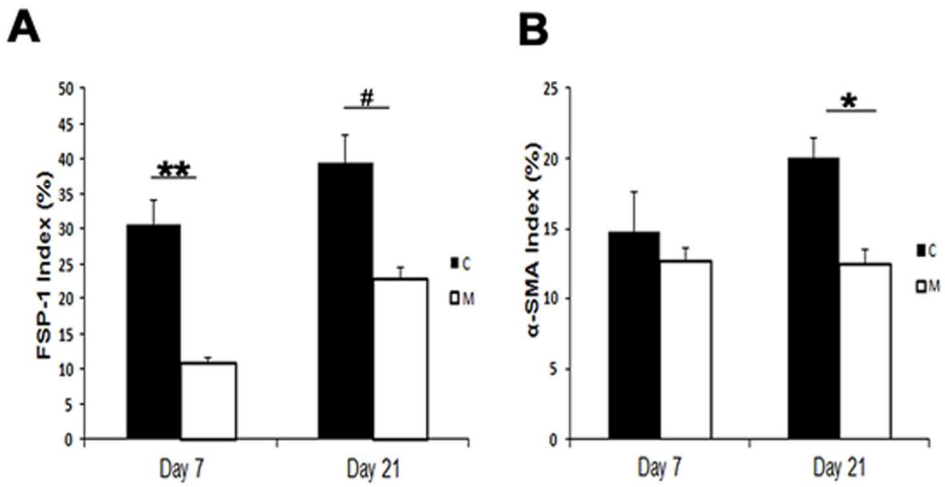

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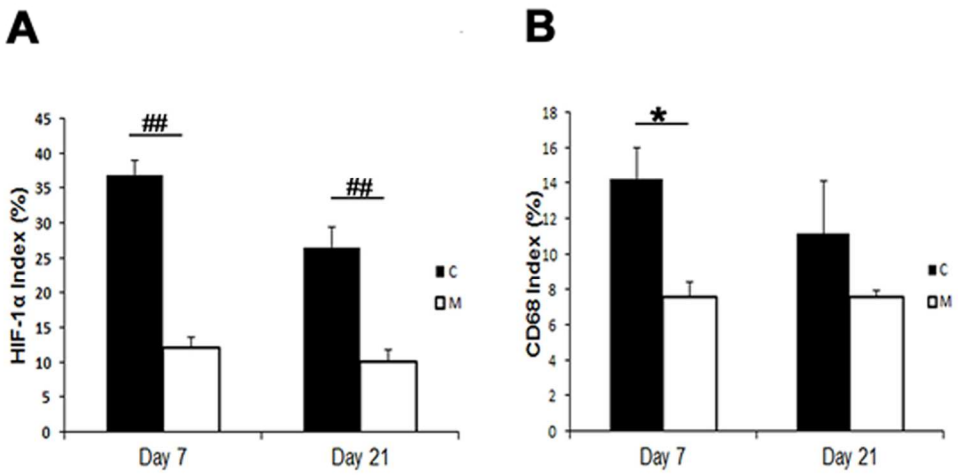

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