SUPPLEMENTAL DATA

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Fig. S1a

Segment length 5 seconds

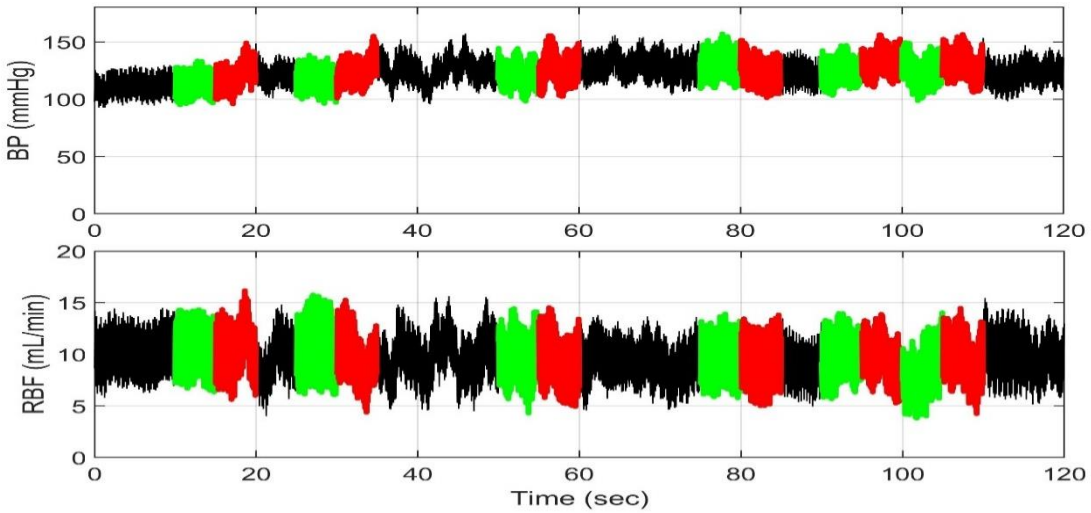

Fig. S1b

Segment length 10 seconds

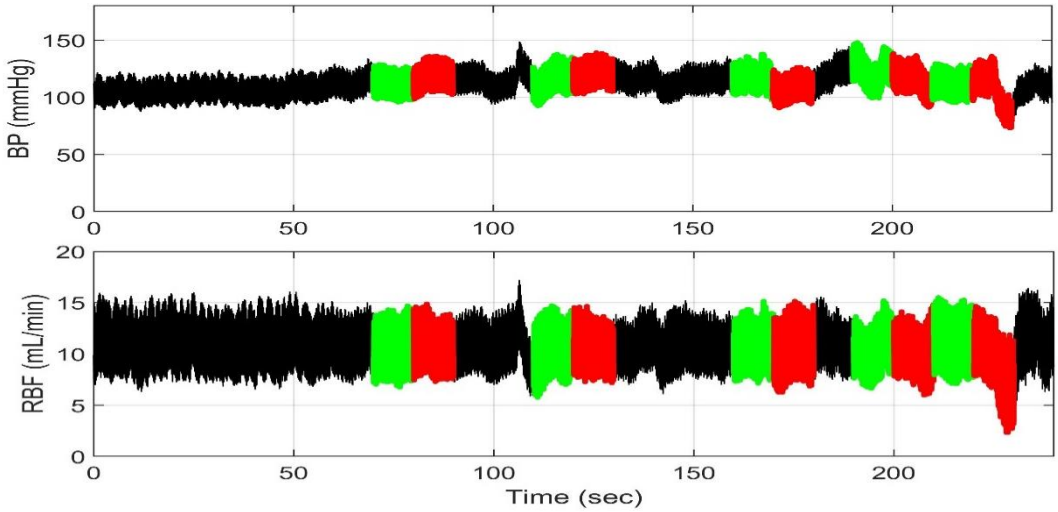

Fig. S1c

Step-autoregulation

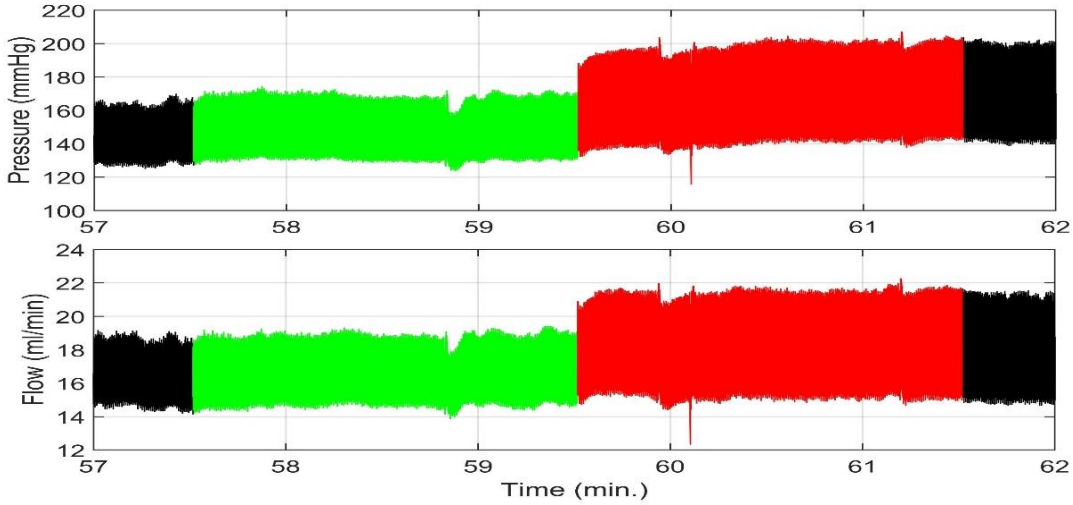

Figure S1: Illustration of the methodologies for short segment autoregulatory indices (SSARI) analysis employed for the BP and RBF recordings obtained both in the conscious state and under anesthesia. For the conscious recordings, adjacent segments of increasing length (0.5, 1.0, 2.5, 5.0,

10 and 20 seconds) that exhibit a mean arterial pressure (MAP) difference of at least 5 mmHg are identified. Autoregulatory indices are calculated for each adjacent segment pair (fractional change in RBF/fractional change in MAP). Illustrated are such adjacent pairs with segment lengths of 5 seconds (Fig. S1a) and 10 seconds (Fig. S1b) from recordings in conscious RK-NX rats. Also shown (Fig. S1c) is a BP and RBF record of a RK-NX rat under anesthesia before and after a step BP increase is imposed. SSARI are calculated from segments of varying lengths before and after the BP change (see Methods for more detail).

Table S1. Number of segments used for SSARI calculations for BP change event of at least 10 mmHg between adjacent segment and the mean BP change for each segment length. Mean ± SEM

Group Parameters	0.5 sec	1 sec	2.5 sec	5.0 sec	10 sec	20 sec
Intact (n=10)						
# segments	60 ± 11	75 ± 14	48 ± 8	25 ± 4	8 ± 2	4 ± 1
BP change (mmHg)	12.0 ± 0.18	12.5 ± 0.15	12.6 ± 0.20	12.6 ± 0.32	12.9 ± 0.47	12.9 ± 0.68
Intact + Amlodipine (n=10)						
	82 ± 11	107 ± 15	74 ± 9	42 ± 6	16 ± 2	7 ± 1
BP change (mmHg)	12.3 ± 0.18	12.7 ± 0.16	12.8 ± 0.16	13.1 ± 0.28	13.0 ± 0.42	12.4 ± 0.42
RK-NX (n=15)						
# segments	1242 ± 369	1165 ± 296	809 ± 186	330 ± 68	73 ± 16	29 ± 8
BP change (mmHg)	13.3 ± 0.30	13.4 ± 0.30	13.8 ± 0.30	13.5 ± 0.19	12.9 ± 0.21	13.0 ± 0.42
RK-NX + Amlodipine (n=15)						
	364 ± 107	253 ± 58	124 ± 31	57 ± 18	24 ± 9	13 ± 5
BP change (mmHg)	13.1 ± 0.24	13.1 ± 0.22	12.7 ± 0.13	12.4 ± 0.22	11.9 ± 0.25	12.1 ± 0.34

Fig. S2

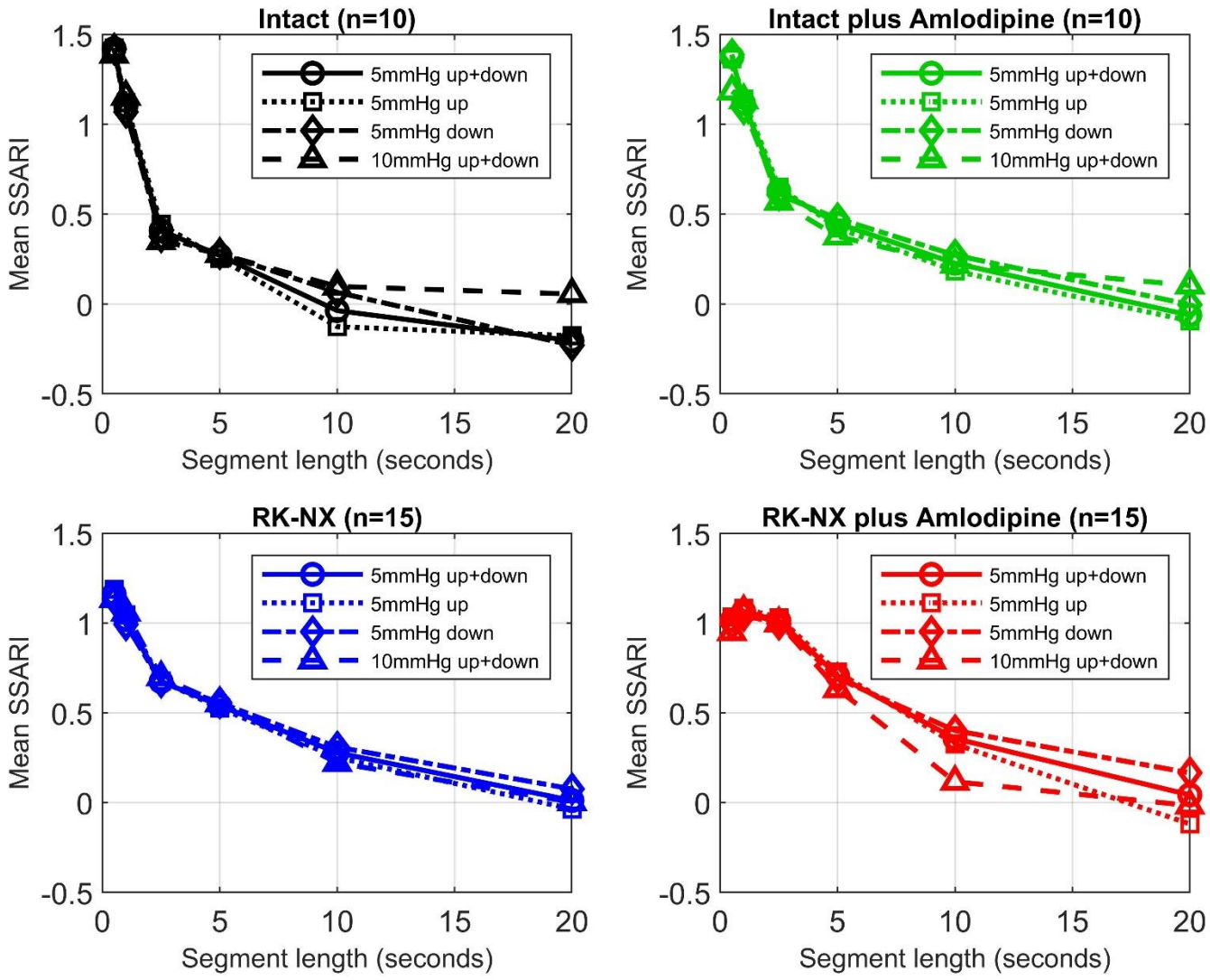

Figure S2: The impact on calculated SSARI of increases vs decreases in average mean arterial pressure (MAP) of at least 5 mmHg between adjacent segments of different segment lengths are shown for intact control and RK-NX rats before and after amlodipine. The impact of increasing the threshold of BP change between adjacent segments to > 10 mmHg from 5 mmHg is also depicted. No significant differences in SSARI were observed for BP increases vs. decreases or from an increase in the BP change between adjacent segments.

Fig. S3

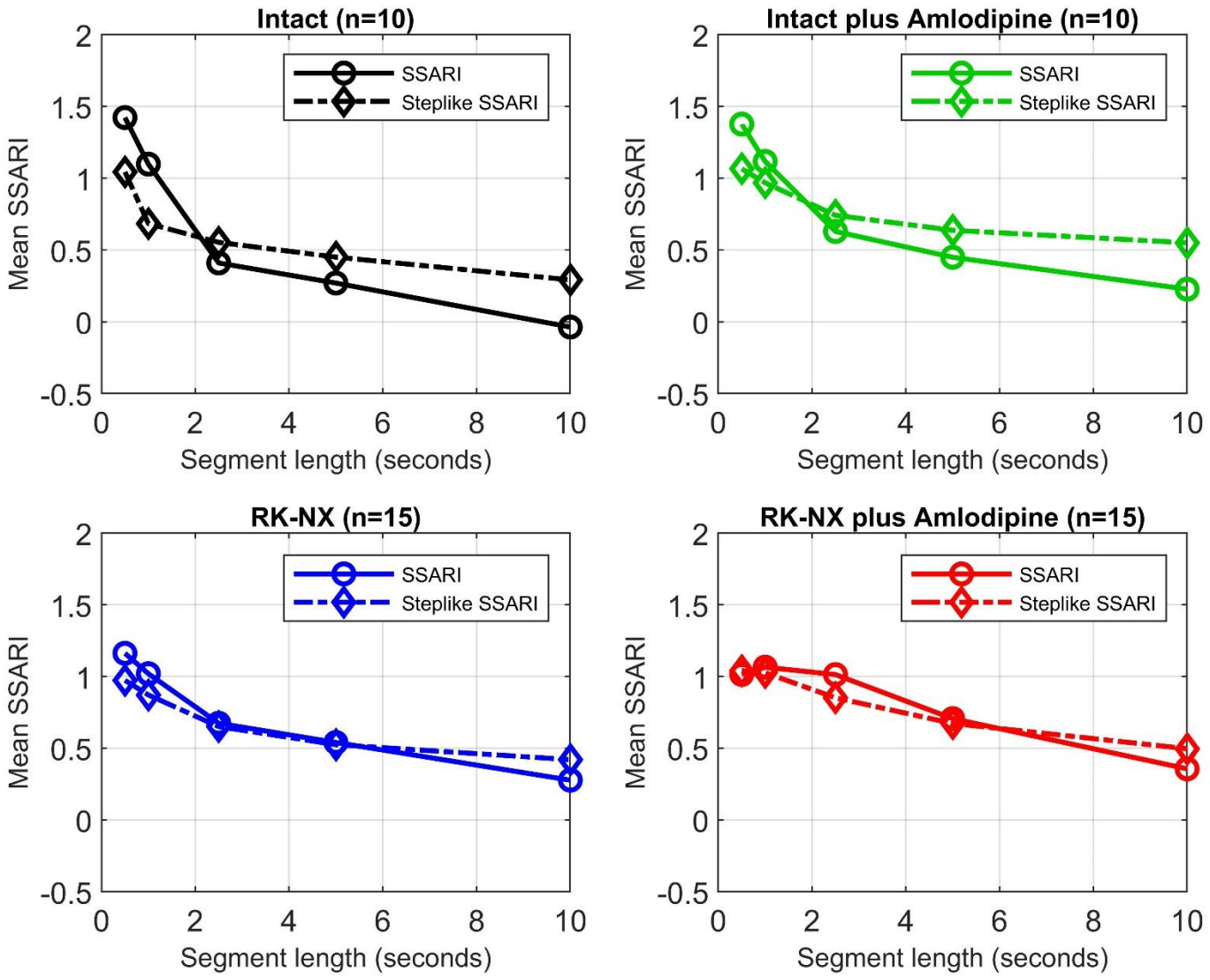

Figure S3: A comparison of SSARI calculated in the standard fashion as described in the Methods Section (Fig. 2 and S1) vs when SSARI was restricted to 10 second segments with minimal BP variations within the segment following a BP change of at least 5 mmHg from a baseline segment of at least 5 second duration with stable BP in intact control rats and RK-NX rats before and after amlodipine. No significant differences were observed.

Table S2. Transfer function parameters of relevance to the operational characteristics of the myogenic mechanism of renal autoregulation.

Group	Myogenic Frequency (Hz)	FGA Myogenic	Phase at Myogenic Peak (degrees)	Peak Phase (degrees)	Slope of Gain Reduction db/decade	FGA Nadir
Intact (n=10)	0.23 (0.22 – 0.25)	2.3 (1.96 – 2.9)	47.4 (28.92 – 57.5)	89.2 (66.6 – 101.0)	25.5 (22.23 – 26.5)	0.6 (0.48 – 0.6)
Intact + Amlodipine (n=10)	0.18 (0.16 – 0.22)	1.8† (1.7 – 2.4)	14.9† (9.0 – 25.5)	52.4† (19.4 – 69.1)	15.7 (7.6 – 17.8)	0.9† (0.7 – 1.1)
RK-NX (n=14)	0.25 (0.21 – 0.36)	1.7 (1.3 – 2.2)	24.7 (20.4 – 30.1)	54.3* (45.2 – 65.4)	10.9* (7.7 – 13.6)	0.9* (0.8 – 1.0)
RK-NX + Amlodipine (n=14)	0.13† (0.12 – 0.16)	1.5† (1.2 – 1.7)	15.4† (9.8 – 24.9)	24.9† (16.2 – 30.0)	1.9† (0.9 – 4.4)	1.2 (0.9 – 1.5)

Results are Median (IQR). FGA Myo, fractional gain in admittance at the myogenic resonance peak; FGA nadir, the reduction in fractional gain in admittance at the nadir following the myogenic resonance peak. * $p < 0.007$ maximum vs. intact; † $p < 0.007$ maximum vs respective intact or RK-NX at baseline before amlodipine. p values > 0.009 were considered non-significant (see statistical analysis methods for explanation).

Fig. S4

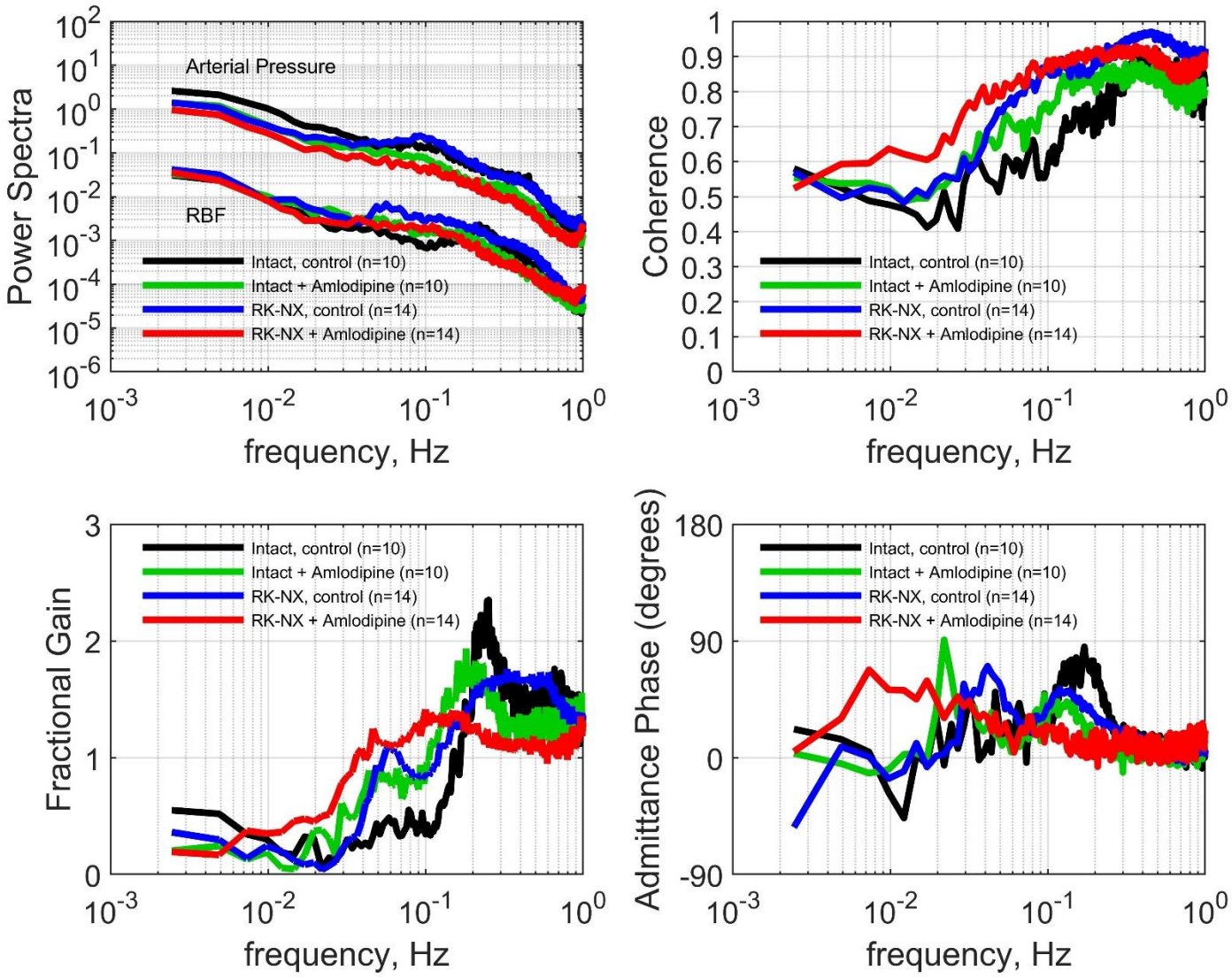

Figure S4: Transfer function analysis of the relationship between BP (input) and RBF (output) computed over 30 minutes in conscious intact vs. RK-NX rats. Data is also included from some of the rats that underwent step-AR studies under anesthesia after completion of the conscious recordings. The effects of superimposed amlodipine administration in both groups are additionally illustrated on arterial pressure and renal blood flow power spectra for intact and RK-NX rats before and after Amlodipine; coherence between arterial pressure (input) and RBF

(output); fractional gain in admittance and admittance phase. Features considered to be indicative of a weaker/impaired myogenic response are observed in RK-NX rats and after amlodipine. These include an attenuation of the resonance peak associated with the myogenic mechanism, a reduced slope and magnitude of gain reduction, and a reduced admittance peak phase at the myogenic frequency. Additionally, amlodipine shifted the myogenic response to a significantly slower frequency in RK-NX but not intact rats. See Table S2 for statistical analyses of quantitative transfer function parameters related to the operational characteristics of the myogenic mechanism.

Fig. S5

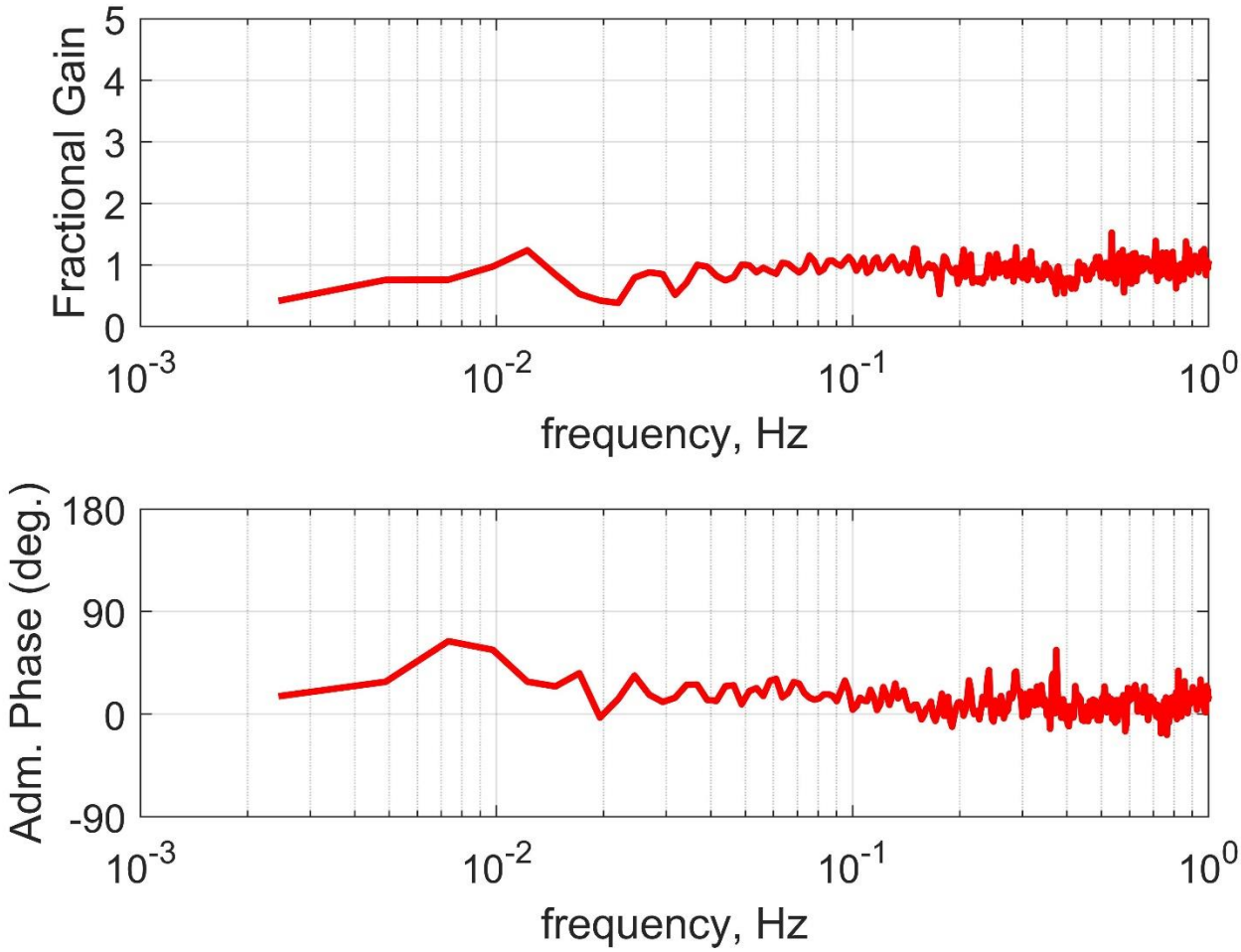

Figure S5: Illustration of the flat transfer functions in an RK-NX rat after amlodipine that precluded calculation of quantitative transfer function parameters leading to the exclusion of results of 3/17 RK-NX rats from the analysis presented in Table S2.