Table S1. Primers used in this study.

Gene	Primer	Sequence (5'-3')	Method
AT4G05320	*UBQ10* F	ACCCTAACGGGAAAGACGA	Real-time qPCR
	UBQ10 R	GGAGCCTGAGAACAAGATGAA	
At5g60390	*EF1α*F	TGGTGACGCTGGTATGGTTA	Real-time qPCR
	*EF1α*R	TCCTTCTTGTCCACGCTCTT	
AT1G12110	*NRT1.1* F	TTCTCGTGACAATCGTCG	Real-time qPCR
	NRT1.1 R	TGGAATACTCGGCTCATCAT	
AT1G69850	*NRT1.2* F	GGATTCGGTGTTTCTACCAT	Real-time qPCR
	NRT1.2 R	CGCAATGATTTGAGGGAC	
AT1G08090	*NRT2.1* F	AACAAGGGCTAACGTGGATG	Real-time qPCR
	NRT2.1 R	CTGCTTCTCCTGCTCATTCC	
AT1G08100	NRT*2.2* F	CAGGTGGAAACAGAGCTGCCATGG	Real-time qPCR
	NRT*2.2* R	GACCATAGATACAACGGCAGTGACGAG	
AT5G60770	*NRT2.4* F	CCGTCTTCT CCA TGTCTTTC	Real-time qPCR
	NRT2.4 R	CTGACCATTGAACATTGTG	
AT1G12110	Salk_097431 LP	ATATTGGAATCCCTTTCTCGG	Genotyping
	Salk_097431 RP	ATATTGGAATCCCTTTCTCGG	
AT5G60770	cs27332 LP	AAACTTCTTTGCCCGTCC	Genotyping
	cs27332 RP	ATACCCTTTCGCTTCTCGG	
AT1G69850	cs859605 LP	CCACGTCAAGAAGAAGCTTTG	Genotyping
	cs859605 RP	AAAATATTTGGGCCTCGTGAC	
AT1G08090	Salk_141712 LP	CTCACGAAGCTCATGGAGAAC	Genotyping
	Salk_141712 P	CTAATGTGCAGCTAAGGCCAC	
AT1G08100	salk_043543 LP	CTAGCGTGAGCACCAAGATTC	Genotyping
	salk_043543 RP	AATGAGTTCACGATGTGGTGC	
AT4G24020	cs868891 LP	TCTTGTCACAGTTTGCCCG	Genotyping
	cs868891 RP	TTCTGAGCCTGATGGTTCG	
AT1G12940	GK 213H10 LP	GATGAGCTCCATGTTCTCTGG	Genotyping
	GK 213H10 RP	ATCAACTGTGTTAAGACCGCG	
AT1G08090 and AT1G08100	cs859604 LP	GCAAGCGACTATCATCACTCC	Genotyping
	cs859604 RP	GTTCTCCATGAGCTTCGTGAG	
GABI-KAT-LB	8474	ATAATAACGCTGCGGACATCTACATTTT	Genotyping
pBIN-pROK2 T-DNA	Lab1.3	ATTTTGCCGATTTCGGAAC	Genotyping

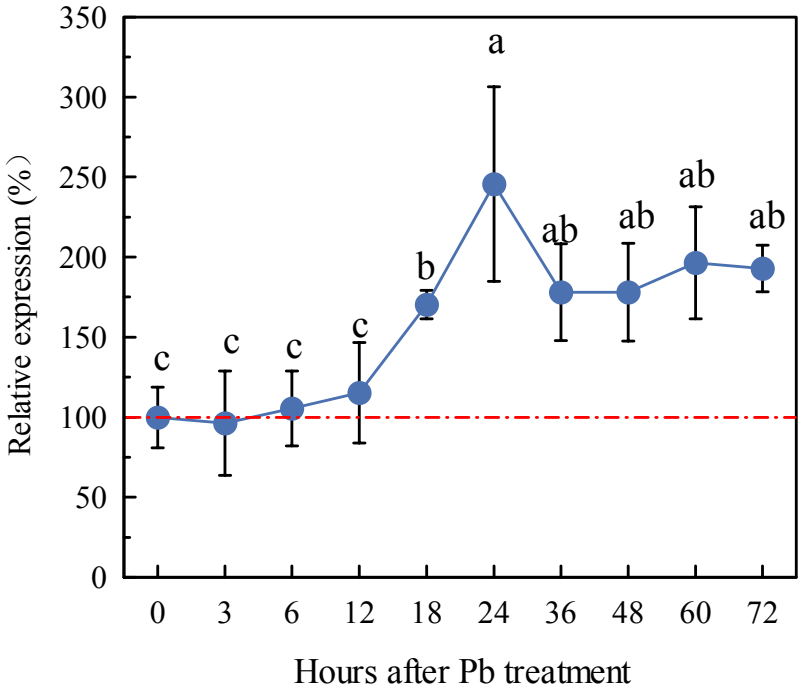

Figure S1. Time course of the *NRT1.1* induction by Pb^{2+} exposure. The 4 d-old *Arabidopsis thaliana* Col-0 seedlings were transferred to basal agar media with or without 300 μM $(CH_3COO)_2Pb$, as described in the Materials and Methods section. The NRT1.1 expression in roots was analyzed at various times, as indicated in figures. The relative expression was calculated as *NRT1.1* expression with Pb treatment relative to mean *NRT1.1* expression without Pb in the same treatment time. Bars in the graph show mean ± SE calculated from 4 biological replicates. Different letters indicate statistically significantly different means ($P < 0.05$, Tukey's multiple comparisons test).

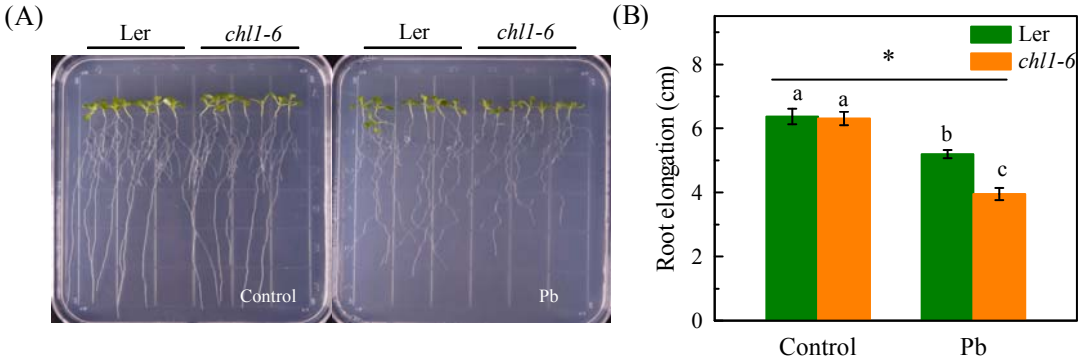

Figure S2. The root growth responses of *Arabidopsis thaliana* Ler and *chl1-6* plants to Pb^{2+} toxicity. Two lines of seedlings were cultured with and without 300 μM Pb^{2+}, respectively, as described in Figure 4. The results were analyzed 7 d after seedling transfer. (A) Photographs of plants; (B) root elongation. Data were analyzed by two-way ANOVA followed by Tukey's multiple comparisons test. Bars in the graph show mean ± SE calculated from 7 biological replicates. Different letters below the bars indicate statistically significantly different means ($P < 0.05$); an asterisk indicates there was a significant interaction between Pb treatment and genotype ($P < 0.05$).

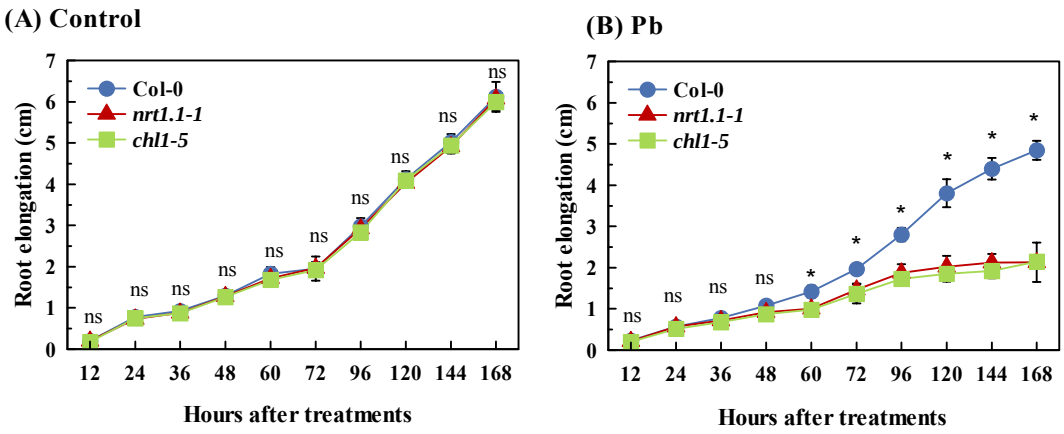

Figure S3. Time course of root growth response of *Arabidopsis thaliana* Col-0, *nrt1.1-1*, and *chl1-5* plants to Pb^{2+} toxicity. The 4 d-old seedlings were transferred to basal agar media with or without 300 μM $(CH_3COO)_2Pb$. Root elongation was analyzed at various times as indicated in figures. Bars in the graph show mean ± SE calculated from 4 – 6 biological replicates. An asterisk indicates there was a significant difference between Col-0 and *nrt1.1* mutants; ns, nonsignificant ($P < 0.05$; Tukey's test).

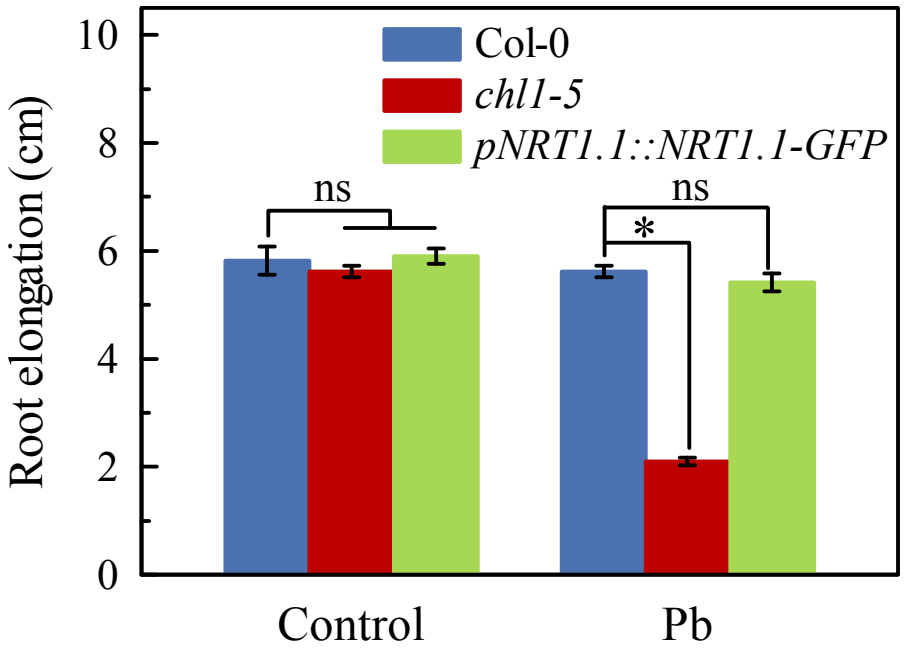

Figure S4. The root growth responses of *Arabidopsis thaliana* Col-0, *chl1-5*, and *pNRT1.1::NRT1.1-GFP* transgenic plants to Pb^{2+} toxicity. Three lines of seedlings were cultured with and without 300 μM Pb^{2+}, respectively, as described in Figure 4. Root elongation was analyzed 7 d after seedling transfer. Bars in the graph show mean ± SE calculated from 5 biological replicates. Asterisks indicate significant differences compared with Col-0 plants; ns, nonsignificant ($P < 0.05$; two-tailed Student's *t*-test).

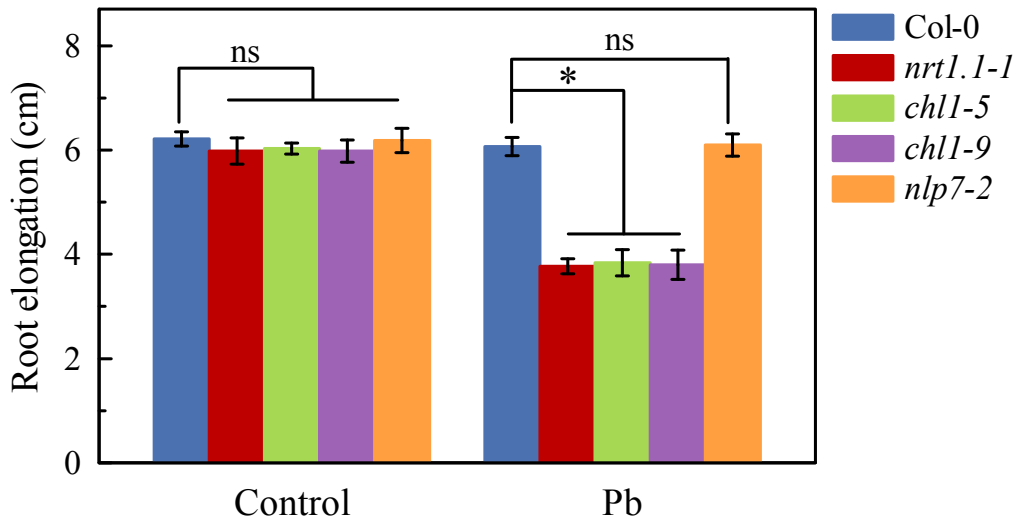

Figure S5. The root growth responses of *Arabidopsis thaliana* Col-0, *nrt1.1-1*, *chl1-5*, *chl1-9*, and *nrt7-2* plants to Pb^{2+} toxicity. The seedlings were cultured with and without 300 μM Pb^{2} as described in Figure 4. Root elongation was analyzed 7 d after seedling transfer. Bars represent means ± SE (n = 5). Asterisks indicate significant differences compared to that of Col-0 plants; ns, nonsignificant differences ($P < 0.05$; two-tailed Student's *t*-test).

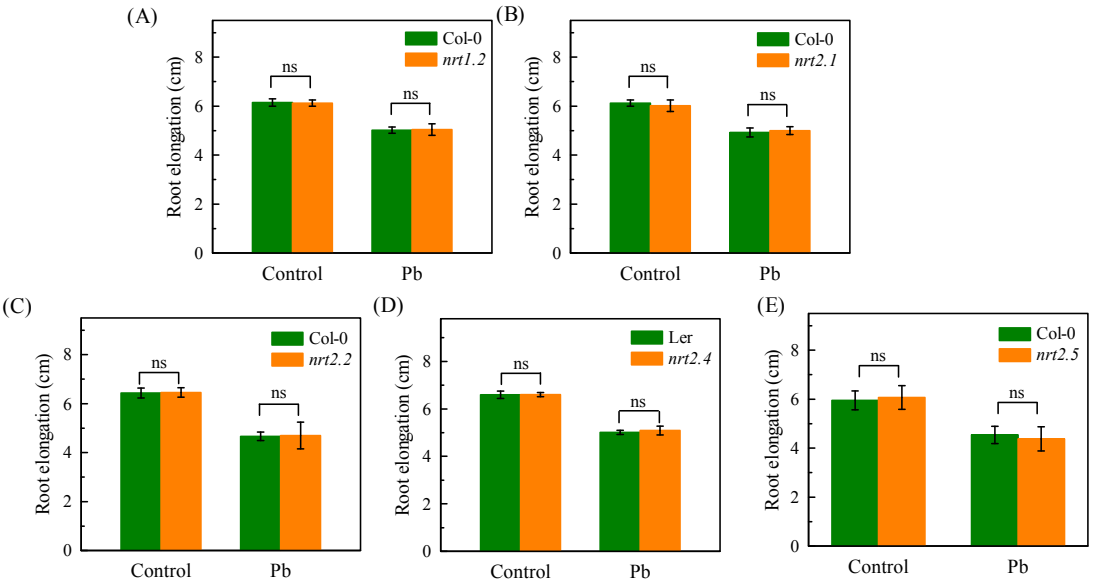

Figure S6. The root growth responses of *Arabidopsis thaliana* Col-0, *nrt1.2*, *nrt2.1*, *nrt2.2*, *Ler*, *nrt2.4*, and *nrt2.5* plants to Pb^{2+} toxicity in basal agar medium. The seedlings were cultured with and without 300 μM Pb^{2+}, respectively, as described in Figure 4. Root elongation was analyzed 7 d after seedling transfer. Bars in the graph show mean ± SE calculated from 7 biological replicates. ns, indicates nonsignificant differences compared to that of the corresponding wild-type plants ($P < 0.05$; two-tailed Student's *t*-test).

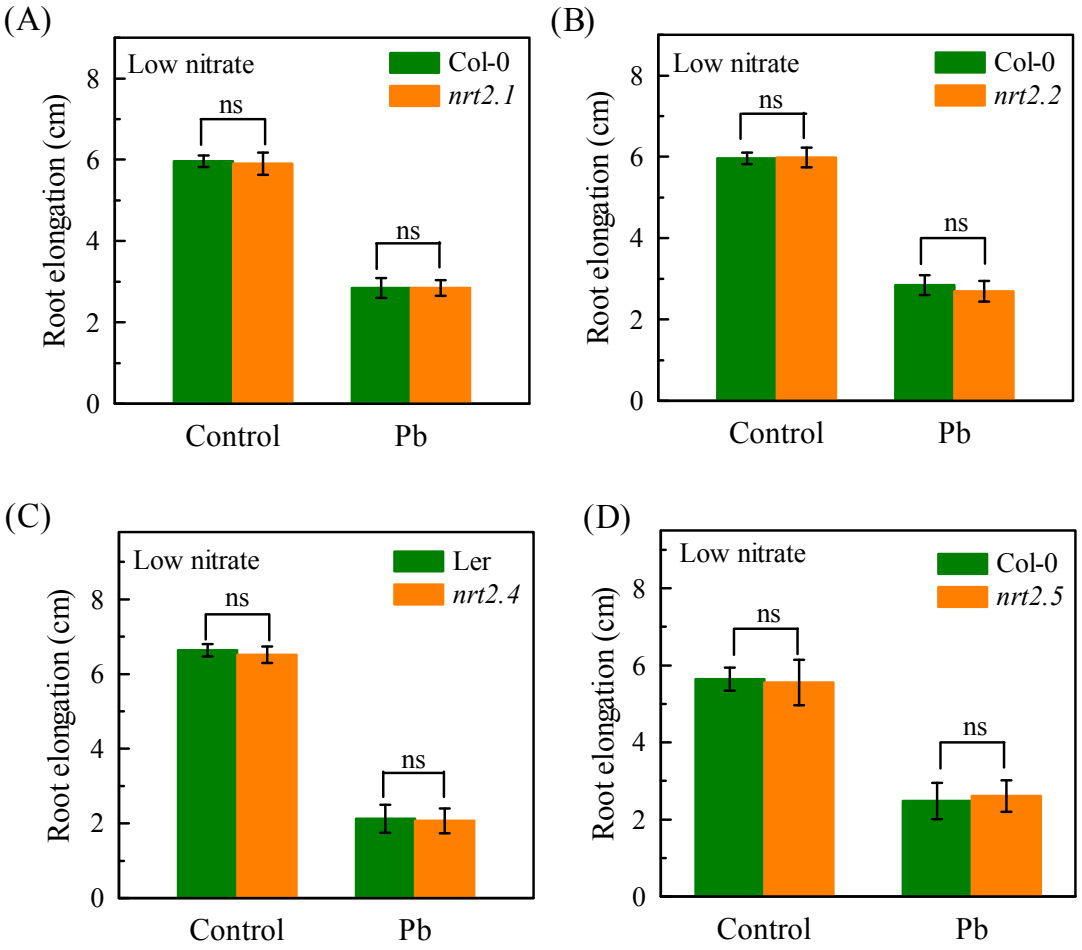

Figure S7. The root growth responses of *Arabidopsis thaliana* Col-0, *nrt2.1*, *nrt2.2*, Ler, *nrt2.4,* and *nrt2.5* plants to Pb^{2+} toxicity in low-nitrate medium. The 4 d-old seedlings were transferred to a low-nitrate (0.2 mM) nutrient agar media with or without 300 μM Pb^{2+}, and the pH of growth medium is 6.5. Root elongation was analyzed 7 d after seedling transfer. Bars in the graph show mean ± SE calculated from 5 biological replicates. ns, indicates nonsignificant differences compared to that of the corresponding wild-type plants ($P < 0.05$; two-tailed Student's *t*-test).

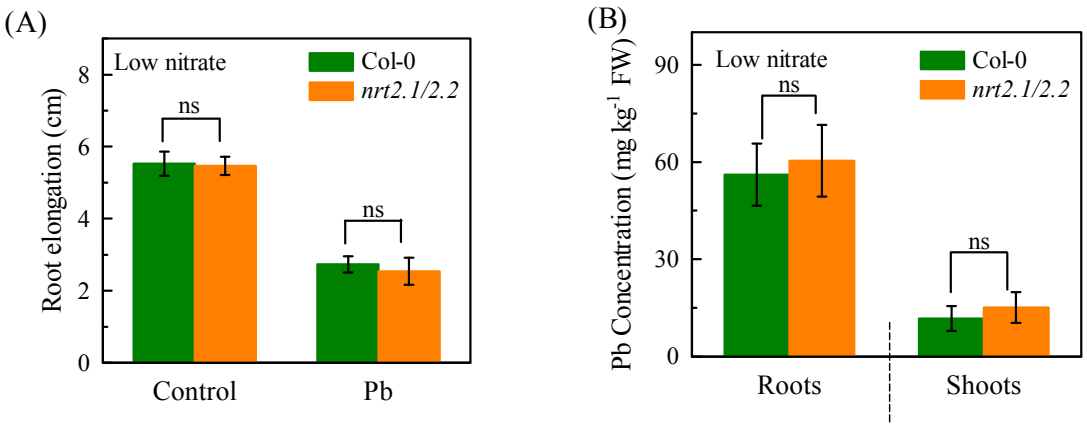

Figure S8. The root elongation and Pb concentration in *Arabidopsis thaliana* Col-0 and *nrt2.1/2.2* plants in low-nitrate growth conditions. The 4 d-old seedlings were transferred to a low-nitrate (0.2 mM) nutrient agar media with 300 μM Pb^{2+}. The root elongation and Pb concentrations in the roots and shoots were measured 7 d after Pb^{2+} treatment of seedlings. Bars in the graph show mean ± SE calculated from 4–7 biological replicates. ns indicates nonsignificant differences compared to that of their corresponding wild-type plants ($P < 0.05$; two-tailed Student's *t*-test).

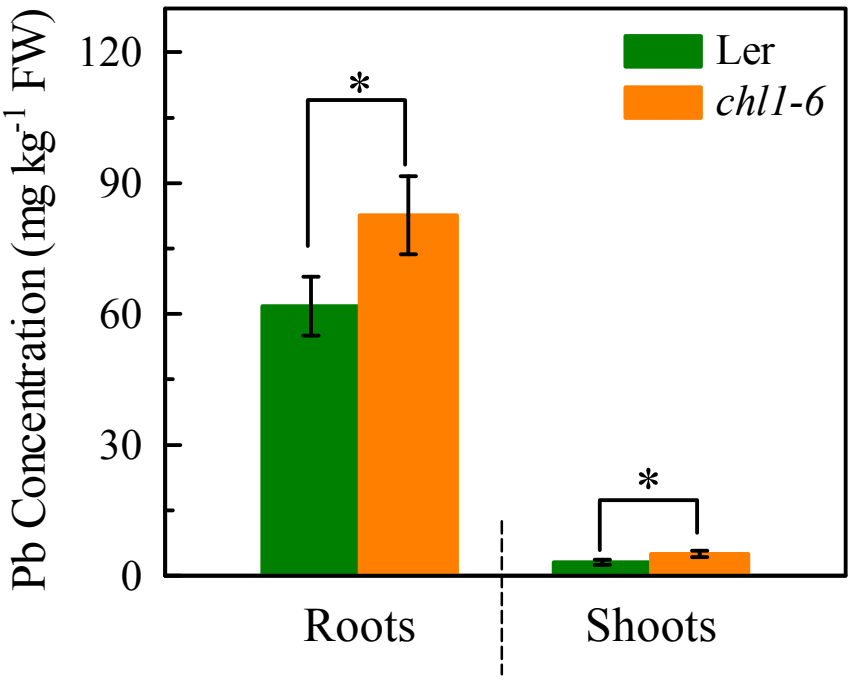

Figure S9. Pb concentration in *Arabidopsis thaliana* Ler and *chl1-6* plants. Two lines of seedlings were cultured with 300 μM Pb^{2+} as described in Figure 4. The Pb concentrations in the roots and shoots were measured 7 d after Pb^{2+} treatment of seedlings, as described in the Materials and Methods section. Bars in the graph show mean ± SE calculated from 4 biological replicates. Asterisks indicate significant differences compared to Ler plants ($P < 0.05$; two-tailed Student's *t*-test).

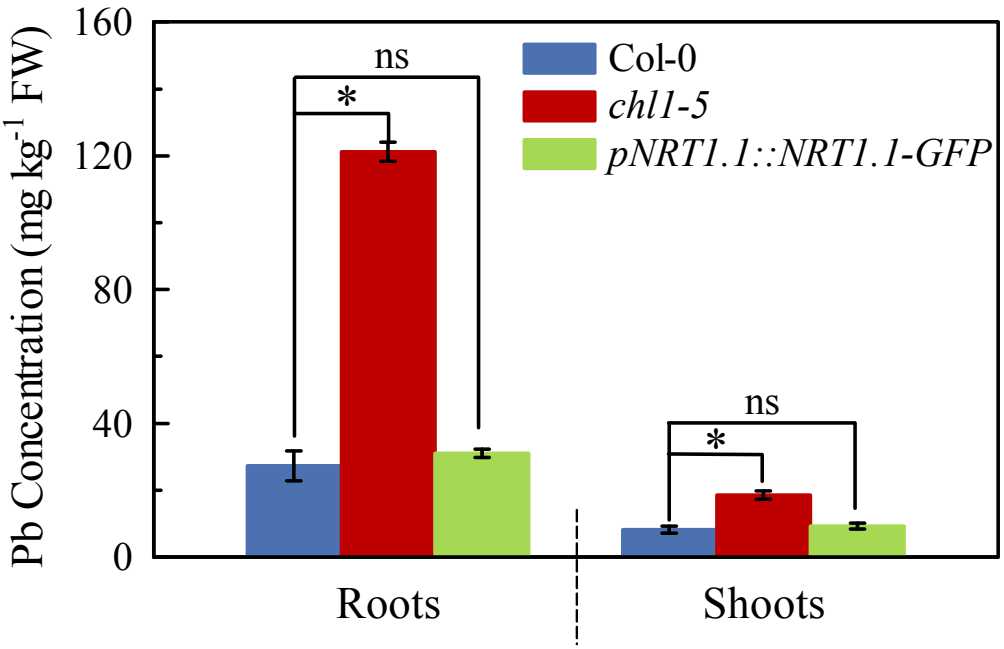

Figure S10. Pb concentration in *Arabidopsis thaliana* Col-0, *chl1-5*, and *pNRT1.1::NRT1.1-GFP* transgenic plants. Three lines of seedlings were cultured with 300 μM Pb^{2+} as described in Figure 4. The Pb concentrations in the roots and shoots were measured 7 d after Pb^{2+} treatment of seedlings, as described in the Materials and Methods section. Bars in the graph show mean ± SE calculated from 4 biological replicates. Asterisks indicate significant differences compared to that of Col-0 plants; ns, nonsignificant differences ($P < 0.05$; two-tailed Student's *t*-test).

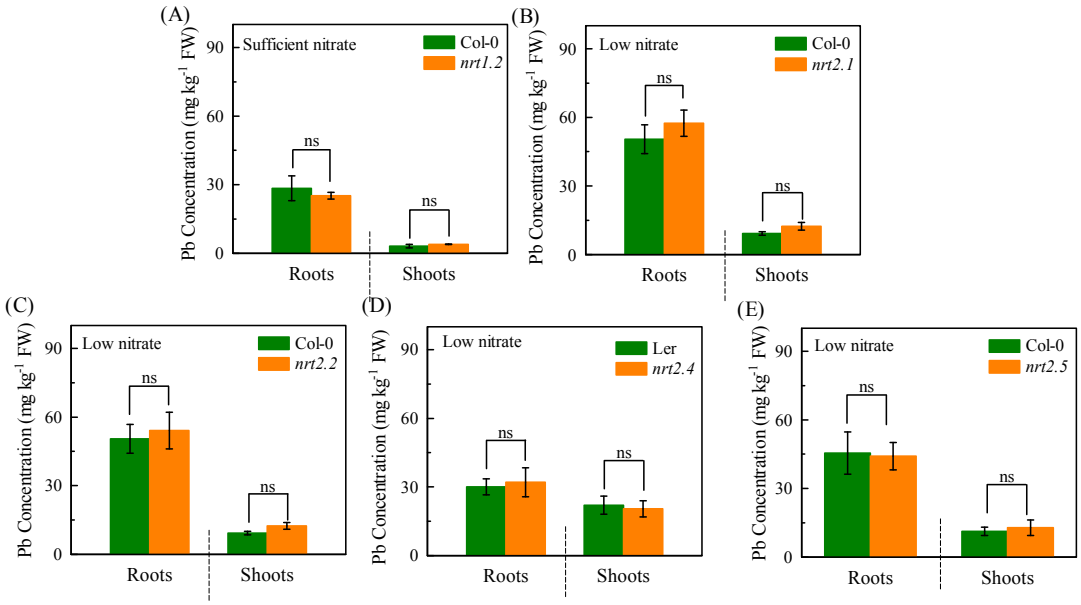

Figure S11. Pb concentration in *Arabidopsis thaliana* Col-0, *nrt1.2*, *nrt2.1*, *nrt2.2*, *Ler*, *nrt2.4*, and *nrt2.5* plants in sufficient-nitrate (2.25 mM) or low-nitrate (0.2 mM) growth conditions. In figure (A), the 4 d-old Col-0 and *nrt1.2* seedlings were transferred to a sufficient-nitrate (2.25 mM) nutrient agar media with 300 µM Pb^{2+}; in figure (B-E), 4 d-old Col-0, *nrt2.1*, *nrt2.2*, *Ler*, *nrt2.4,* and *nrt2.5* seedlings were transferred to a low-nitrate (0.2 mM) nutrient agar media with 300 µM Pb^{2+}. The Pb concentrations in the roots and shoots were measured 7 d after Pb^{2+} treatment of seedlings. Bars in the graph show mean ± SE calculated from 4 biological replicates. ns, indicates nonsignificant differences compared to that of the corresponding wild-type plants ($P < 0.05$; two-tailed Student's *t*-test).

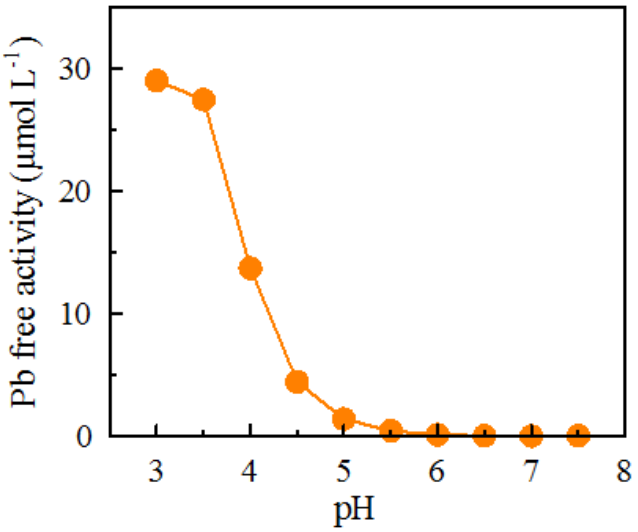

Figure S12. Pb-free activity in different pH growth media calculated using GEOCHEM-PC.

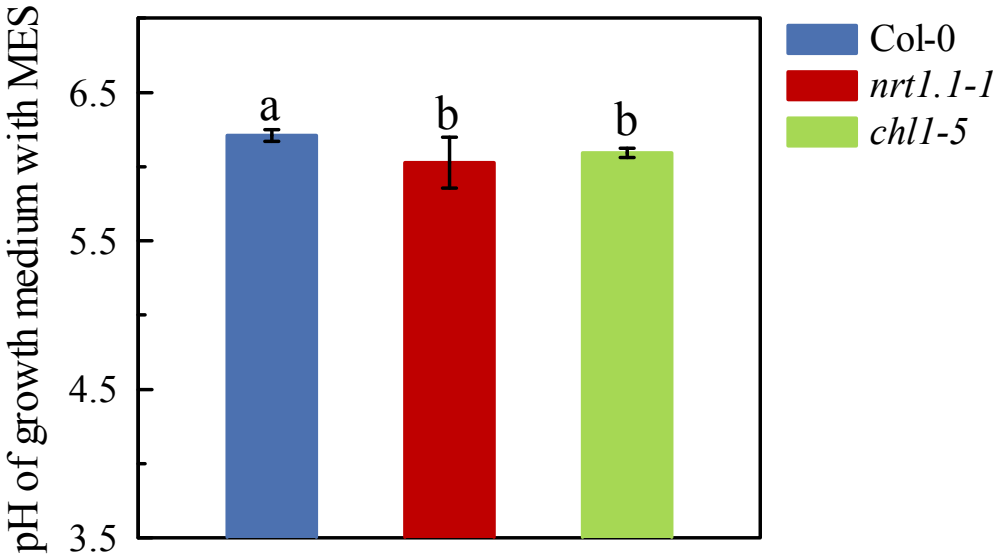

Figure S13. pH alterations in rooting media for *Arabidopsis thaliana* Col-0, *nrt1.1-1*, and *chl1-5* plant growth medium with pH buffer. Three lines of seedlings were cultured with 300 μM Pb^{2+} as described in Figure 4. The initial pH of growth medium is 6.5 and the pH of the nutrient media was buffered using 0.05% (w/v) MES. The rooting media pH alterations in the 300 μM Pb^{2+} growth medium with pH buffer were analyzed 7 d after seedling transfer. The rooting media pH was measured as described in the Materials and Methods section. Bars represent mean ± SE (n = 4). Different letters indicate significant differences between genotypes in the treatments, ($P < 0.05$; two-tailed Student's *t*-test).

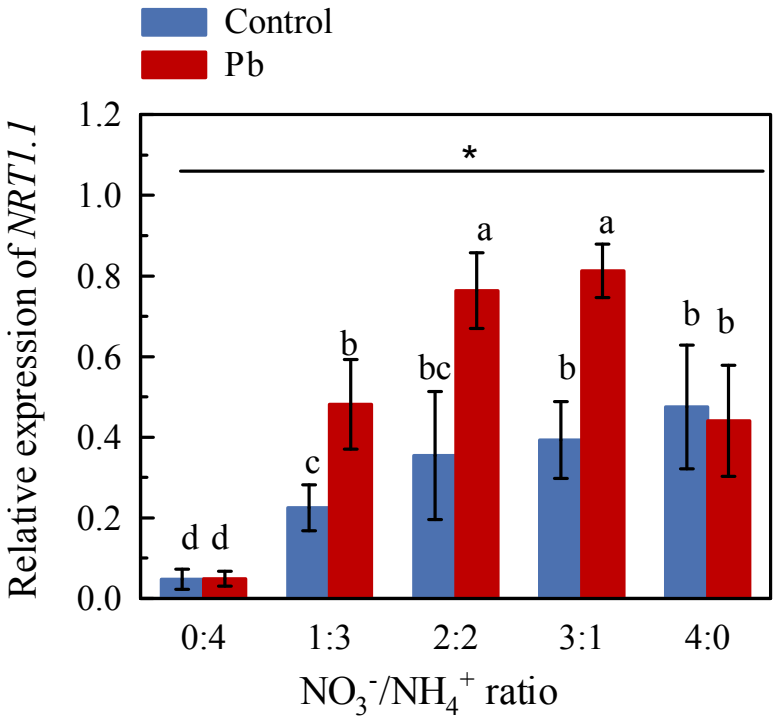

Figure S14. Effects of Pb^{2+} stress on *NRT1.1* expression in roots of *Arabidopsis thaliana* Col-0 plants fed with different ratios of NO_3^- to NH_4^+. The 4 d-old seedlings were transferred to nutrient media containing different NO_3^-/NH_4^+ ratios with or without 300 μM $(CH_3COO)_2Pb$, as described in Figure 7.The results were analyzed 3 d after seedling transfer. Data were analyzed by two-way ANOVA followed by Tukey's multiple comparisons test. Bars in the graph show mean ± SE calculated from 4 biological replicates. Different letters above the bars indicate statistically significantly different means ($P < 0.05$); an asterisk indicates there was a significant interaction between NO_3^-/NH_4^+ ratio and Pb treatment ($P < 0.05$).

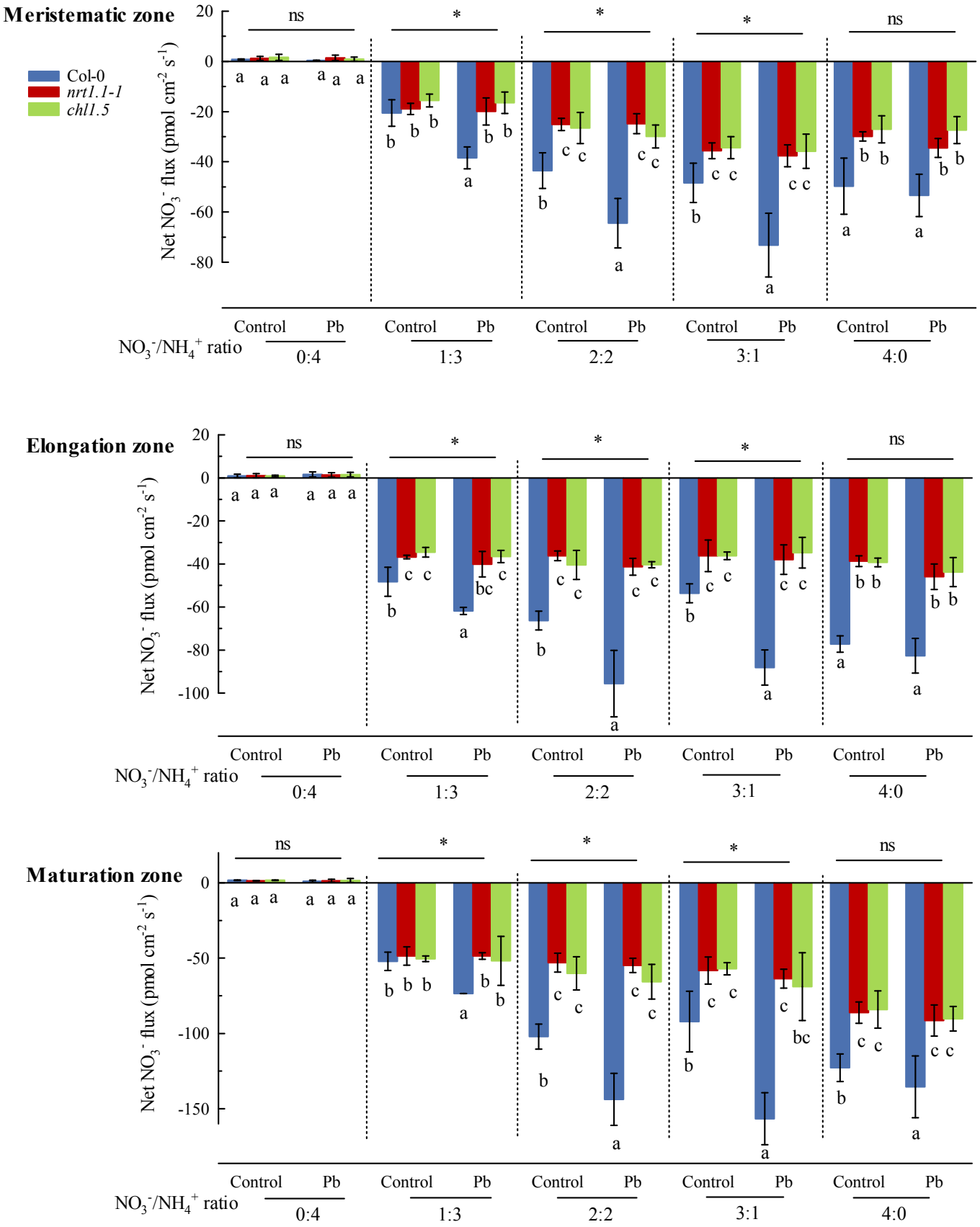
Meristematic zone
Elongation zone
Maturation zone
Col-0
nrt1.1-1
chl1.5
Net NO3- flux (pmol cm-2 s-1)
ns
*
Control
Pb
NO3-/NH4+ ratio
0:4
1:3
2:2
3:1
4:0

Figure S15. Effects of Pb^{2+} stress on net NO_3^- flux in roots of Col-0, *nrt1.1-1*, and *chl1.5* plants fed with different ratios of NO_3^- to NH_4^+. The 4 d-old seedlings were transferred to nutrient media containing different NO_3^-/NH_4^+ ratios with or without 300 μM $(CH_3COO)_2Pb$, as described in Figure 7. The results were analyzed 3 d after seedling transfer. The net NO_3^- flux in the meristematic, elongation, and maturation zones of roots were measured with a microelectrode; negative flux indicates net influx. Data were analyzed by two-way ANOVA followed by Tukey's multiple comparisons test. Bars in the graph show mean ± SE calculated from 5 biological replicates. Different letters above the bars indicate statistically significantly different means ($P < 0.05$); an asterisk indicates there was a significant interaction between Pb^{2+} exposure and genotype in a same NO_3^-/NH_4^+ ratio ($P < 0.05$).

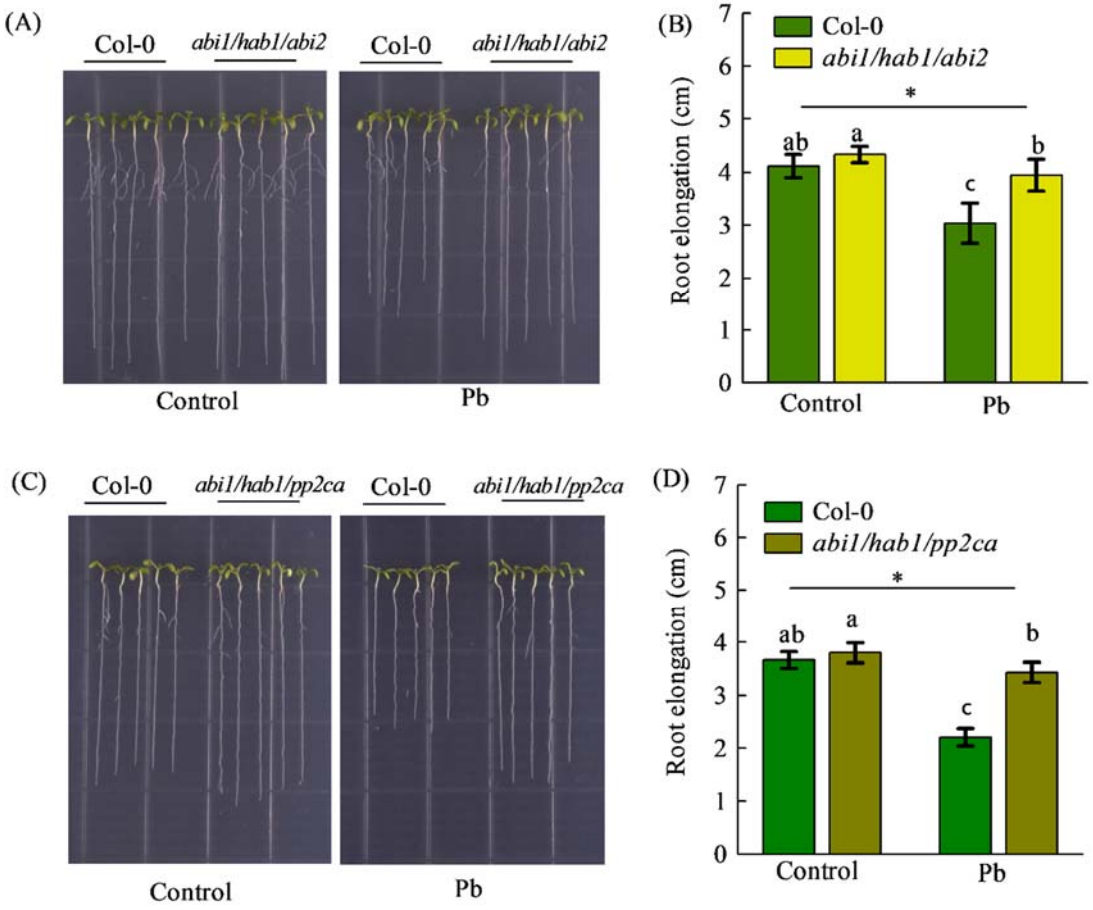

Figure S16. The root growth responses of *Arabidopsis thaliana* Col-0, *abi1/hab1/abi2* and *abi1/hab1/pp2ca* plants to Pb^{2+} toxicity. Three lines of seedlings were cultured with and without 300 μM Pb^{2+}, respectively, as described in Figure 4. Root elongation was analyzed 6 d after seedling transfer. (A and C) Photographs of plants; (B and D) root elongation. Data were analyzed by two-way ANOVA followed by Tukey's multiple comparisons test. Bars in the graph show mean ± SE calculated from 4 biological replicates. Different letters below the bars indicate statistically significantly different means ($P < 0.05$); an asterisk indicates there was a significant interaction between Pb treatment and genotype ($P < 0.05$).

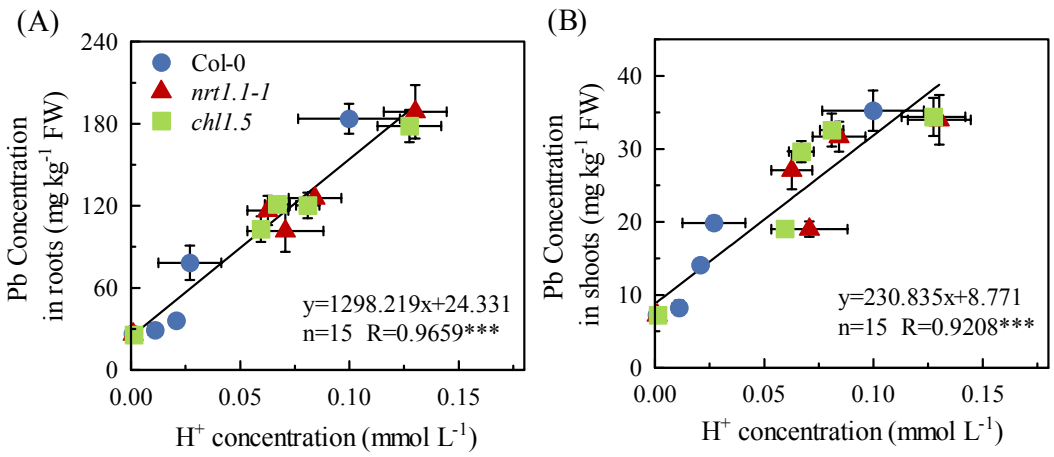

Figure S17. The relationship between H^+ concentrations in growth media and Pb concentration in *Arabidopsis thaliana* Col-0, *nrt1.1-1*, and *chl1-5* plants roots (A), and shoots (B). These correlation relationships were calculated from the data of Figure 7. The H^+ concentration in growth media was calculated from rooting media pH. *** P <0.001.