

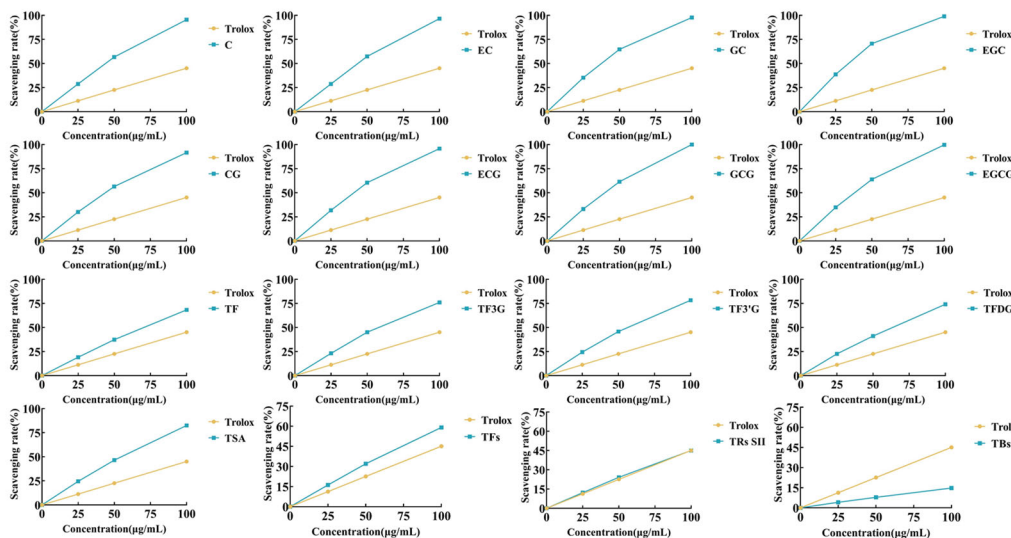
## Supplementary Materials

Table S1. Catechins and TFs used in structure-activity relationship assay

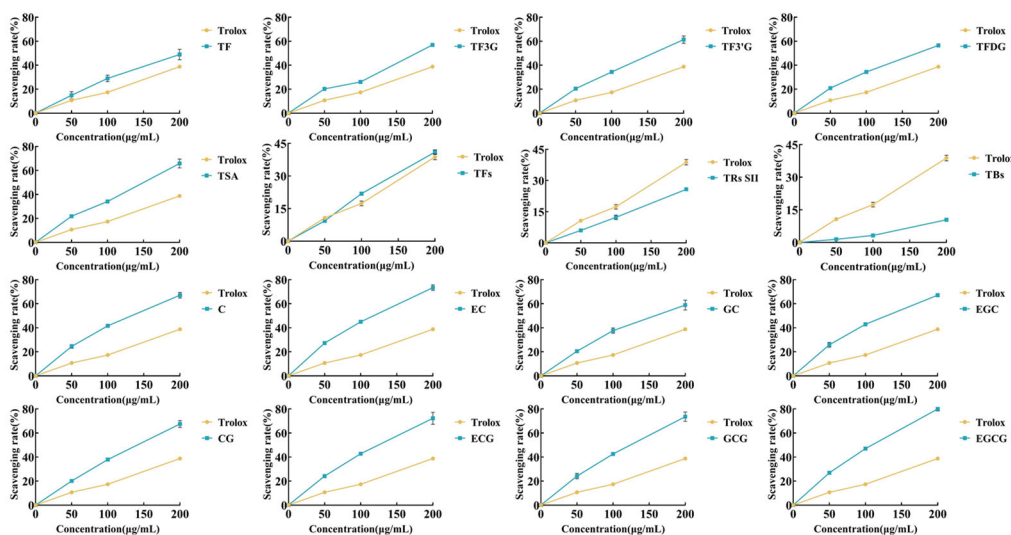
Compounds		Geometrical isomerism	B ring structure	Number of galloyl groups	Position of galloyl groups
Catechins	EGCG	cis-	pyrogallol	1	-
	ECG	cis-	catechol	1	-
	EGC	cis-	pyrogallol	0	-
	EC	cis-	catechol	0	-
	GCG	trans-	pyrogallol	1	-
	CG	trans-	catechol	1	-
	GC	trans-	pyrogallol	0	-
	C	trans-	catechol	0	-
TFs	TF	-	-	0	-
	TF-3-G	-	-	1	3
	TF-3'-G	-	-	1	3'
	TFDG	-	-	2	3 + 3'

Note: “-” means this column is not the object of study for this compound. EC, (-)-epicatechin; ECG, (-)-epicatechin gallate; EGC, (-)-epigallocatechin; EGCG, (-)-epigallocatechin gallate; C, (±)-catechin; CG, (-)-catechin gallate; GC, (-)-gallocatechin; GCG, (-)-gallocatechin gallate; TFs, theaflavins; TF, theaflavin; TF3G, theaflavin-3-gallate; TF3'G, theaflavin-3'-gallate; TFDG, Theaflavin-3,3'-digallate.

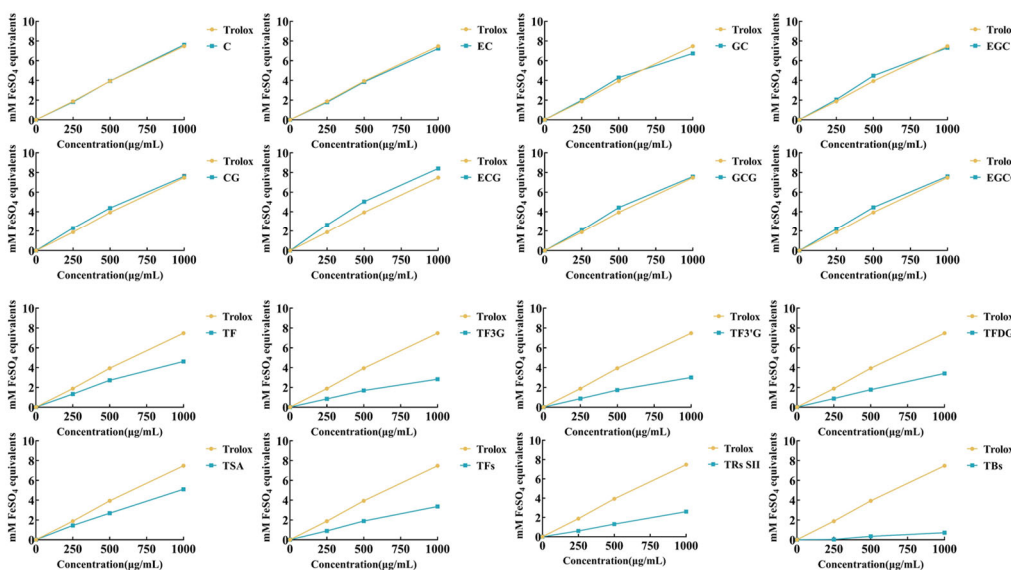
A



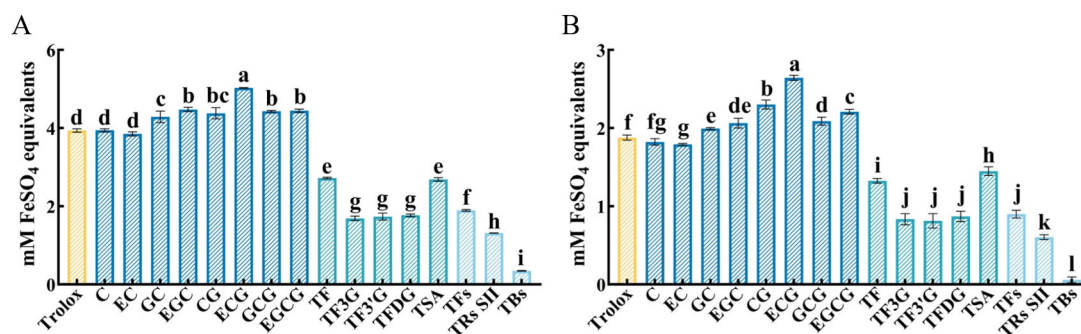
B



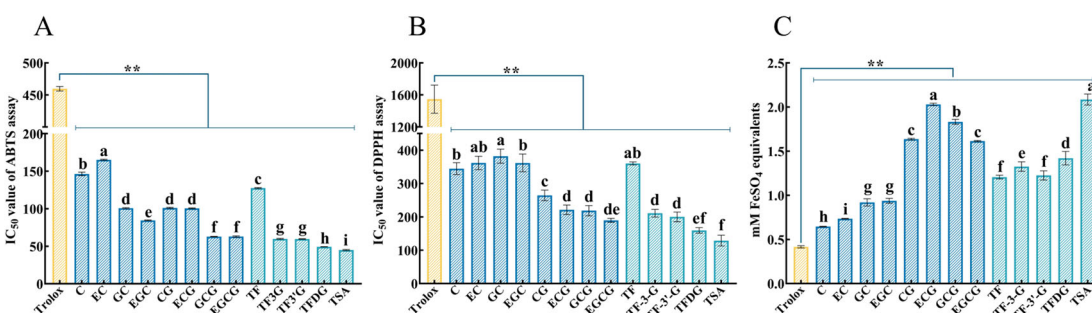
C



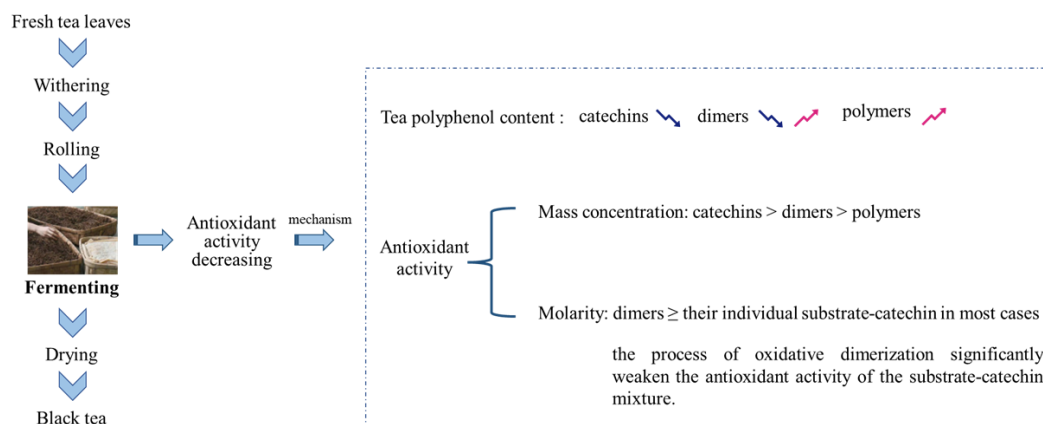
**Figure S1.** Dose-effect relationship of antioxidant activity of catechins and their oxidized polymers (CTOPs). (A) Dose-effect relationship of ABTS<sup>+</sup> free radical scavenging activity; (B) Dose-effect relationship of DPPH free radical scavenging activity; (C) Dose-effect relationship of total antioxidant capacity. Trolox was used as positive control. Theaflavins (TFs), thearubigins S II (TRs S II), and theabrownins (TBs) were components isolated from a tea sample by solvent extraction. TSA, theasinensin A.



**Figure S2.** Total antioxidant capacity assay with FRAP method at 0.5 mg/mL (A) and 0.25 mg/mL (B).



**Figure S3.** Comparison of antioxidant activities of catechins and their dimers at molarity. (A) ABTS<sup>+</sup> free radical scavenging activity of catechins and their dimers; (B) DPPH free radical scavenging activity of catechins and their dimers; (C) Total antioxidant capacity of catechins and their dimers. The molarity used in total antioxidant capacity assay was 250 μM. a,b,c,d Different letters above the column indicate significant differences (p < 0.05).



**Figure S4.** Declining mechanism of antioxidant activity during black tea fermentation.