

Supplementary Table 1. List of channel-specific image acquisition settings for six human-derived cell lines.

Cell Line	Organelle/Purpose	Integration Time (ms)	Laser Power (%)	Focal Height (μm) ^f
A549	DNA ^a	80	55	-4.4
	RNA (Nucleoli) ^b	60	50	-1.2
	ER (Endoplasmic reticulum) ^c	40	40	-2.4
	AGP (Actin cytoskeleton + Golgi + Plasma membrane) ^d	60	60	-4.4
	Mito ^e	20	15	-6.4
ARPE-19	DNA ^a	120	60	-4.8
	RNA (Nucleoli) ^b	20	45	-1.6
	ER (Endoplasmic reticulum) ^c	40	40	-4.0
	AGP (Actin cytoskeleton + Golgi + Plasma membrane) ^d	100	40	-4.8
	Mito ^e	120	80	-6.8
HepG2	DNA ^a	100	80	-2.0
	RNA (Nucleoli) ^b	40	30	-1.6
	ER (Endoplasmic reticulum) ^c	20	35	-2.4
	AGP (Actin cytoskeleton + Golgi + Plasma membrane) ^d	80	60	-2.4
	Mito ^e	80	60	-2.4
HTB-9	DNA ^a	100	60	-4.4
	RNA (Nucleoli) ^b	80	60	-2.8
	ER (Endoplasmic reticulum) ^c	120	70	-4.4
	AGP (Actin cytoskeleton + Golgi + Plasma membrane) ^d	80	60	-4.4
	Mito ^e	20	40	-6.8
MCF7	DNA ^a	80	40	-3.2
	RNA (Nucleoli) ^b	40	30	-1.6
	ER (Endoplasmic reticulum) ^c	80	35	-3.2
	AGP (Actin cytoskeleton + Golgi + Plasma membrane) ^d	60	40	-4.8
	Mito ^e	20	65	-6.4
U-2 OS	DNA ^a	80	50	-3.6
	RNA (Nucleoli) ^b	20	45	-0.4
	ER (Endoplasmic reticulum) ^c	20	50	-3.6
	AGP (Actin cytoskeleton + Golgi + Plasma membrane) ^d	120	50	-4.4
	Mito ^e	20	80	-6.8

^a Visualized with Hoechst-33342. Imaged using 405 nm laser with 435-480 nm emission filter. ^b Visualized with SYTO-14. Imaged using 488 nm laser with 500-550 nm emission filter. ^c Visualized with Alexa Fluor 488-conjugated concanavalin-A. Imaged using 488 nm laser with 500-550 nm emission filter. ^d Visualized with Alexa Fluor 568-conjugated phalloidin multiplexed with Alexa Fluor 555-conjugated wheat germ agglutinin. Imaged using 561 nm laser with 570-630 nm emission filter. ^e Visualized with Mitotracker Deep Red. Imaged with 640 nm laser with 650-760 nm emission filter. ^f focal height in reference to default values determined by the Opera Phenix HCS imaging system when using PerkinElmer CellCarrier-384 Ultra microplates.

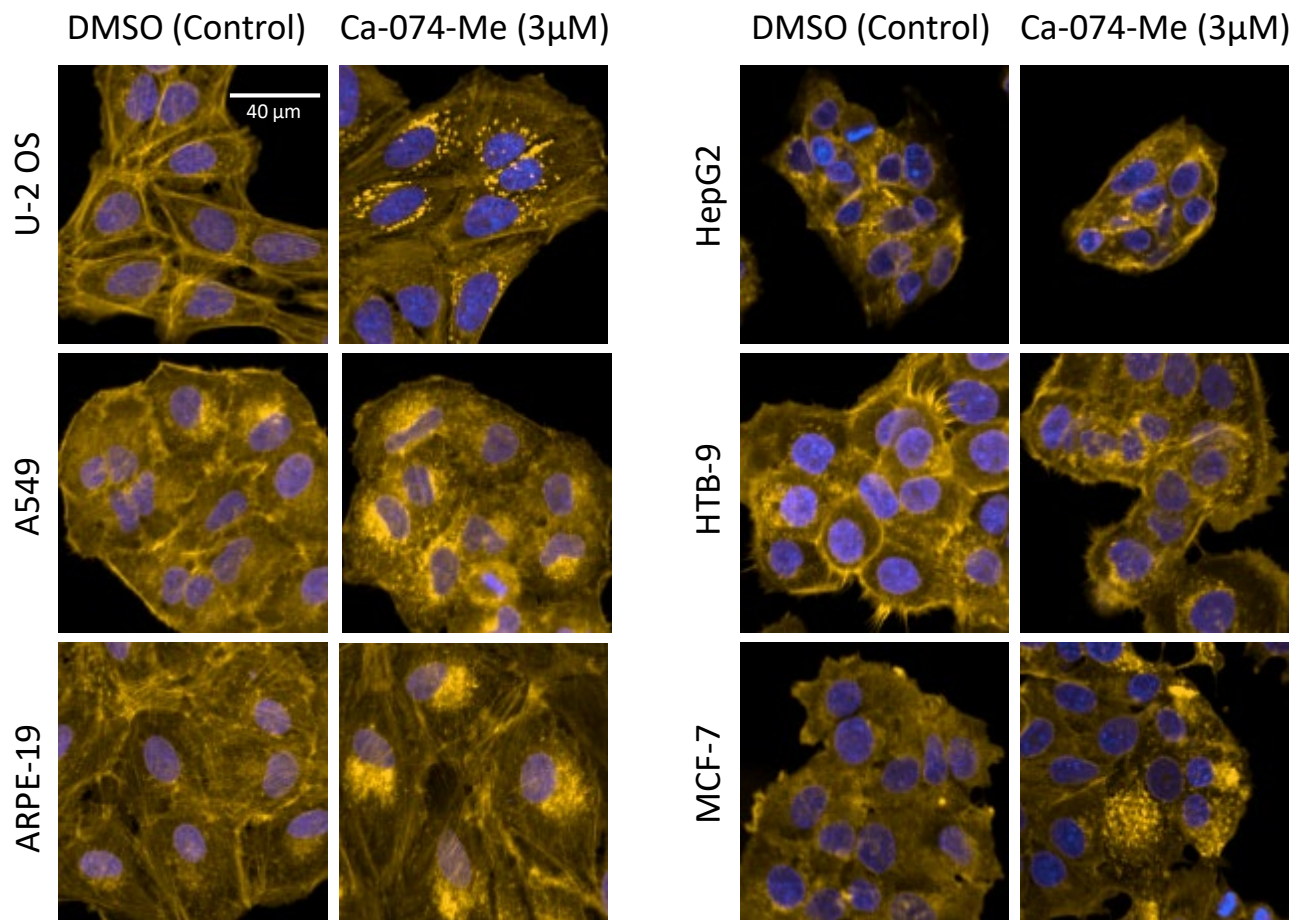
Supplementary Figure 1

Qualitative comparison of chemical-induced morphological phenotypes
across cell lines

- Supplementary Figure 1A. Ca-074-Me
- Supplementary Figure 1B. Etoposide

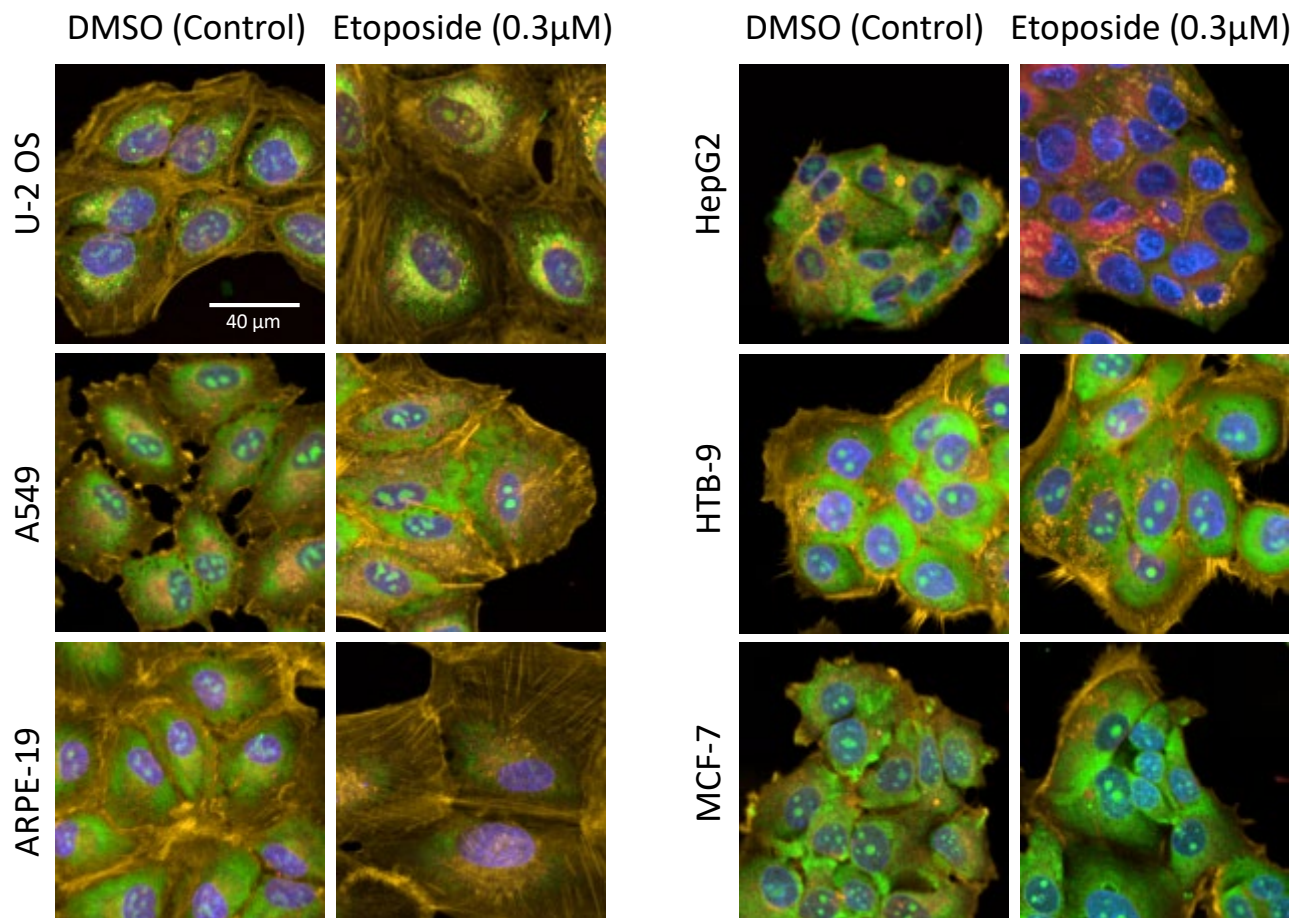
Supplementary Figure 1A.

Ca-074-Me



Supplementary Figure 1B.

Etoposide



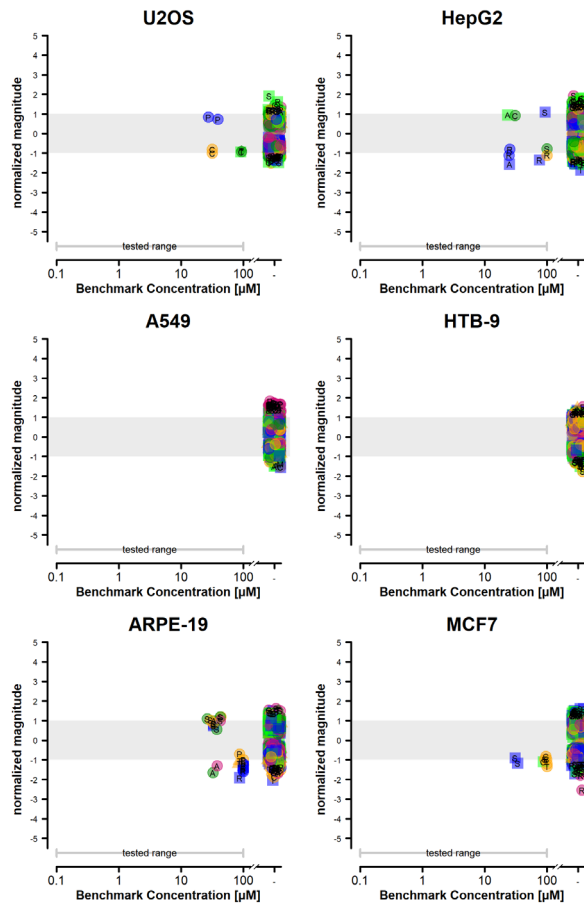
Supplementary Figure 2

Potency Magnitude Plots and Accumulation Plots for Visualizing Phenotypic Effects of Test Chemicals

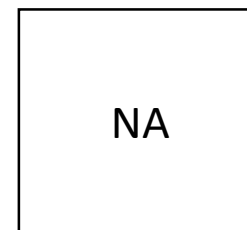
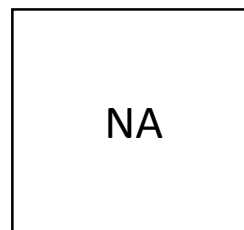
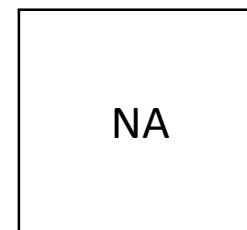
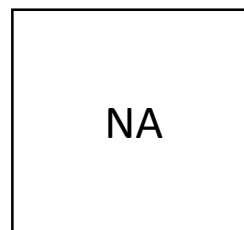
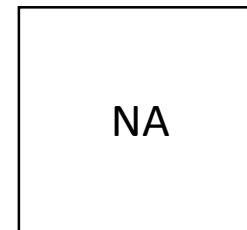
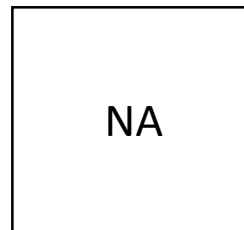
- Supplementary Figure 2A. Sorbitol
- Supplementary Figure 2B. Saccharin
- Supplementary Figure 2C. Amperozide
- Supplementary Figure 2D. Fluphenazine
- Supplementary Figure 2E. Tetrandrine
- Supplementary Figure 2F. Ca-074-Me
- Supplementary Figure 2G. Metoclopramide
- Supplementary Figure 2H. NPPD
- Supplementary Figure 2I. Fenbendazole
- Supplementary Figure 2J. Oxibendazole
- Supplementary Figure 2K. Taxol
- Supplementary Figure 2L. Rotenone
- Supplementary Figure 2M. Latrunculin B
- Supplementary Figure 2N. Etoposide
- Supplementary Figure 2O. Rapamycin

Supplementary Figure 2A.

Sorbititol



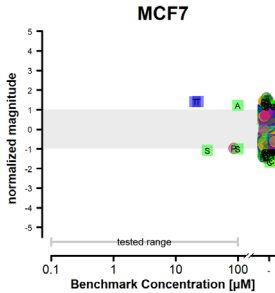
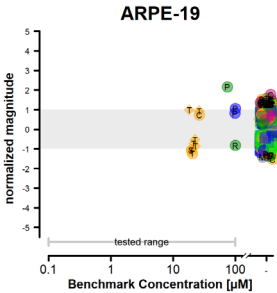
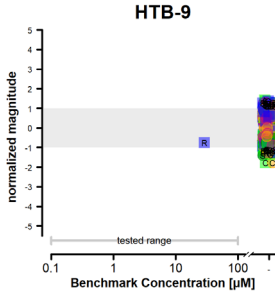
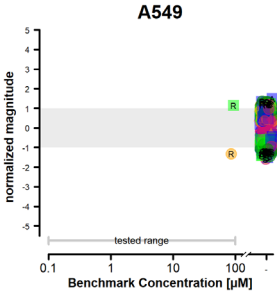
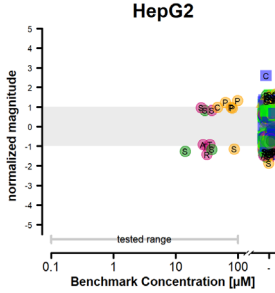
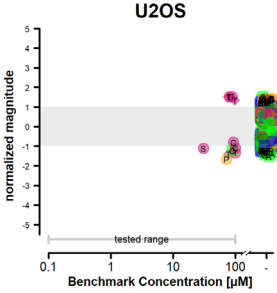
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- RNA
- ER
- AGP
- Mito
- I Intensity
- T Texture
- M Morphology
- S Symmetry
- C Compactness
- A Axial
- R Radial
- P Profile
- Cell / Cytoplasm
- Nuclei
- ◆ Ring
- ▲ Membrane



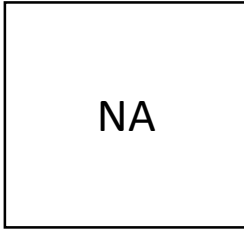
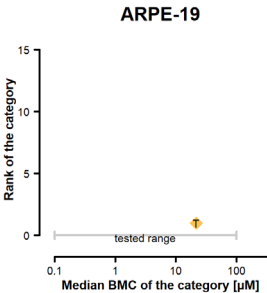
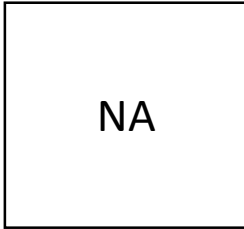
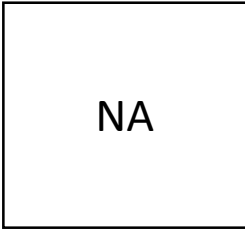
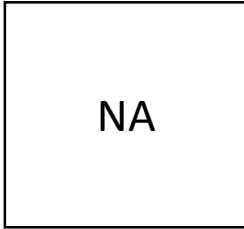
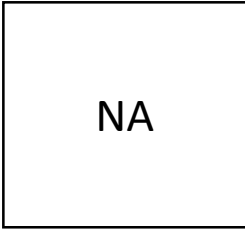
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- R Radial
- P Profile
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- Nuclei
- ◆ Ring
- ▲ Membrane

Supplementary Figure 2B.

Saccharin



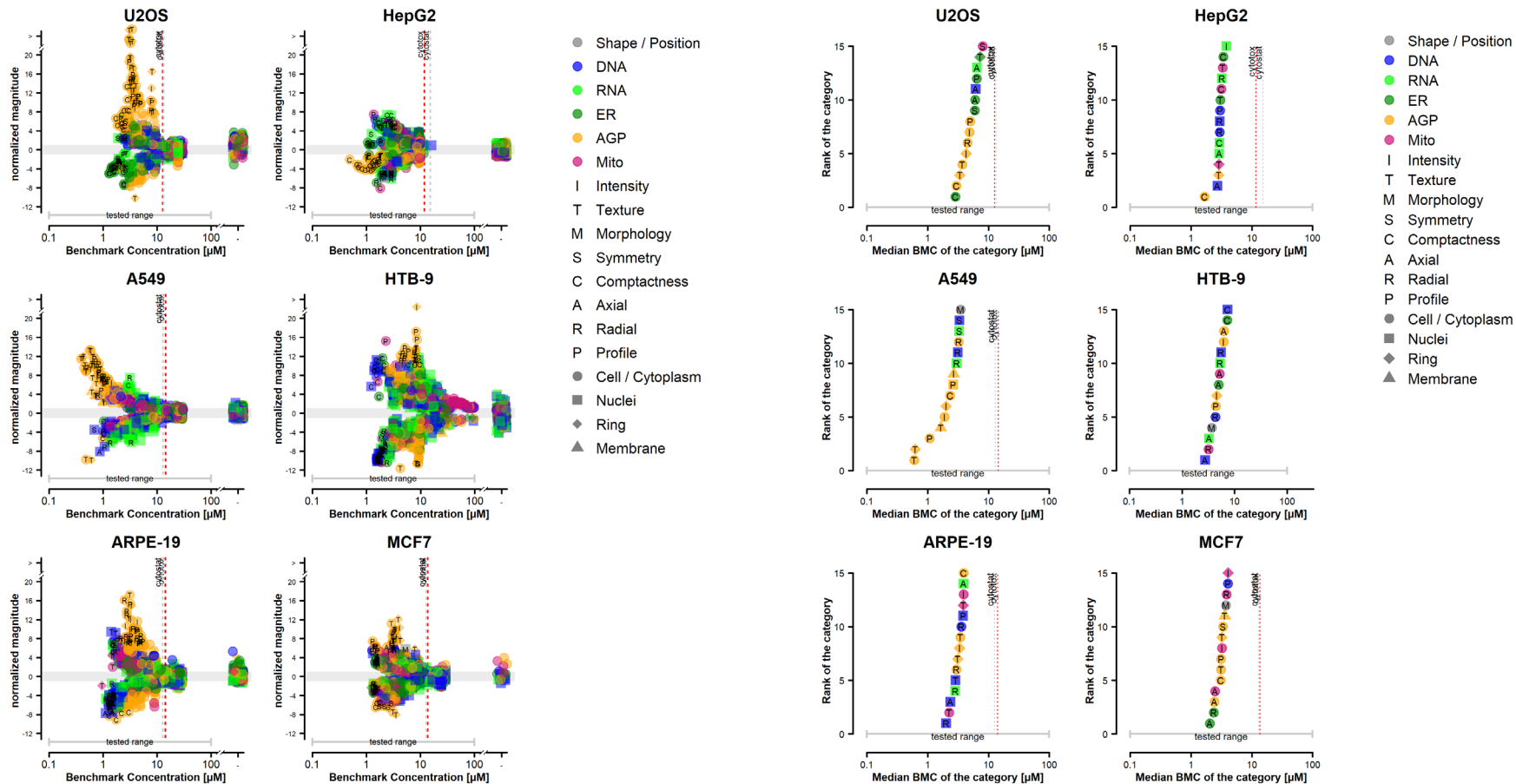
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- Shape / Position
- DNA
- RNA
- ER
- AGP
- Mito
- I Intensity
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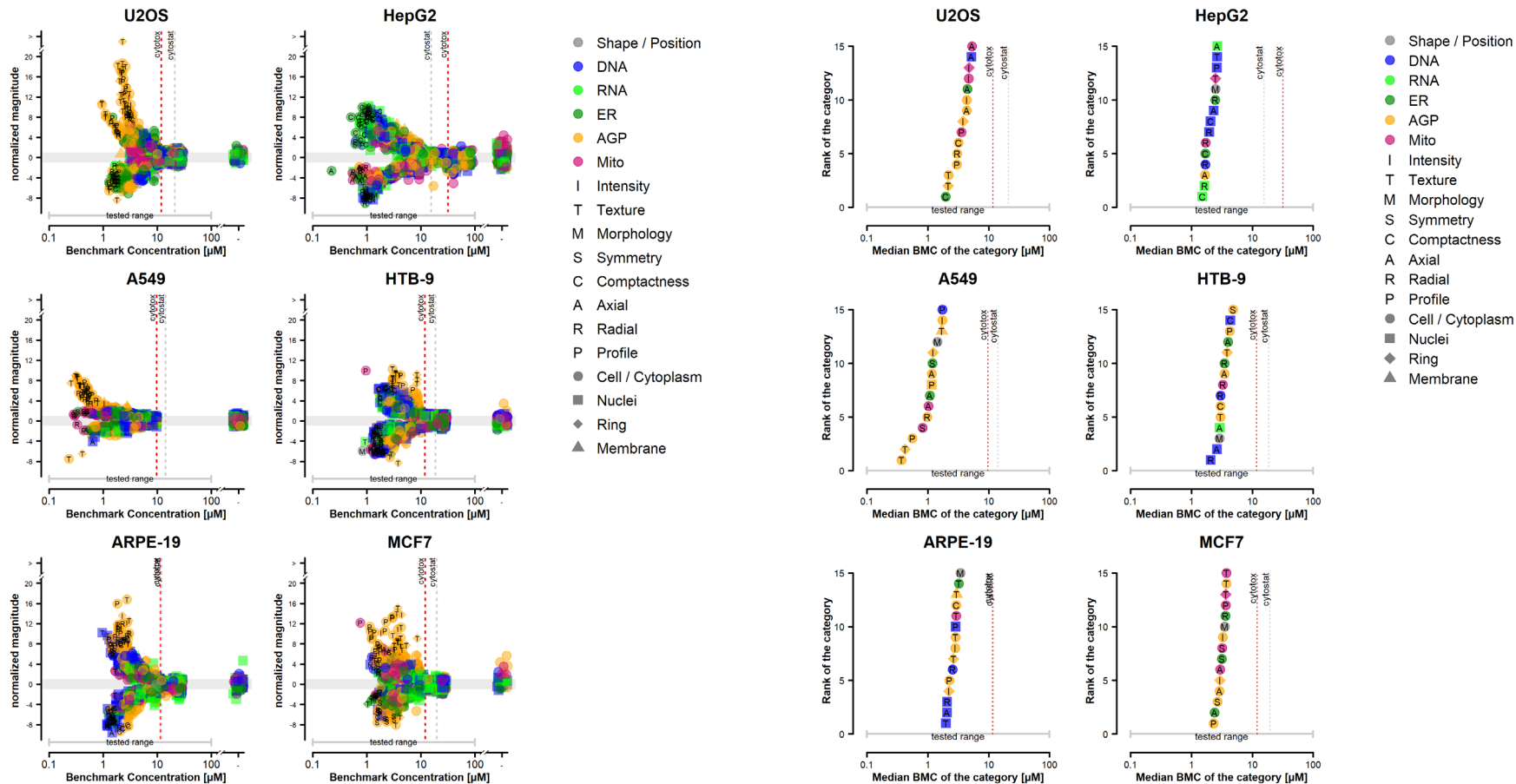
Supplementary Figure 2C.

Amperozide



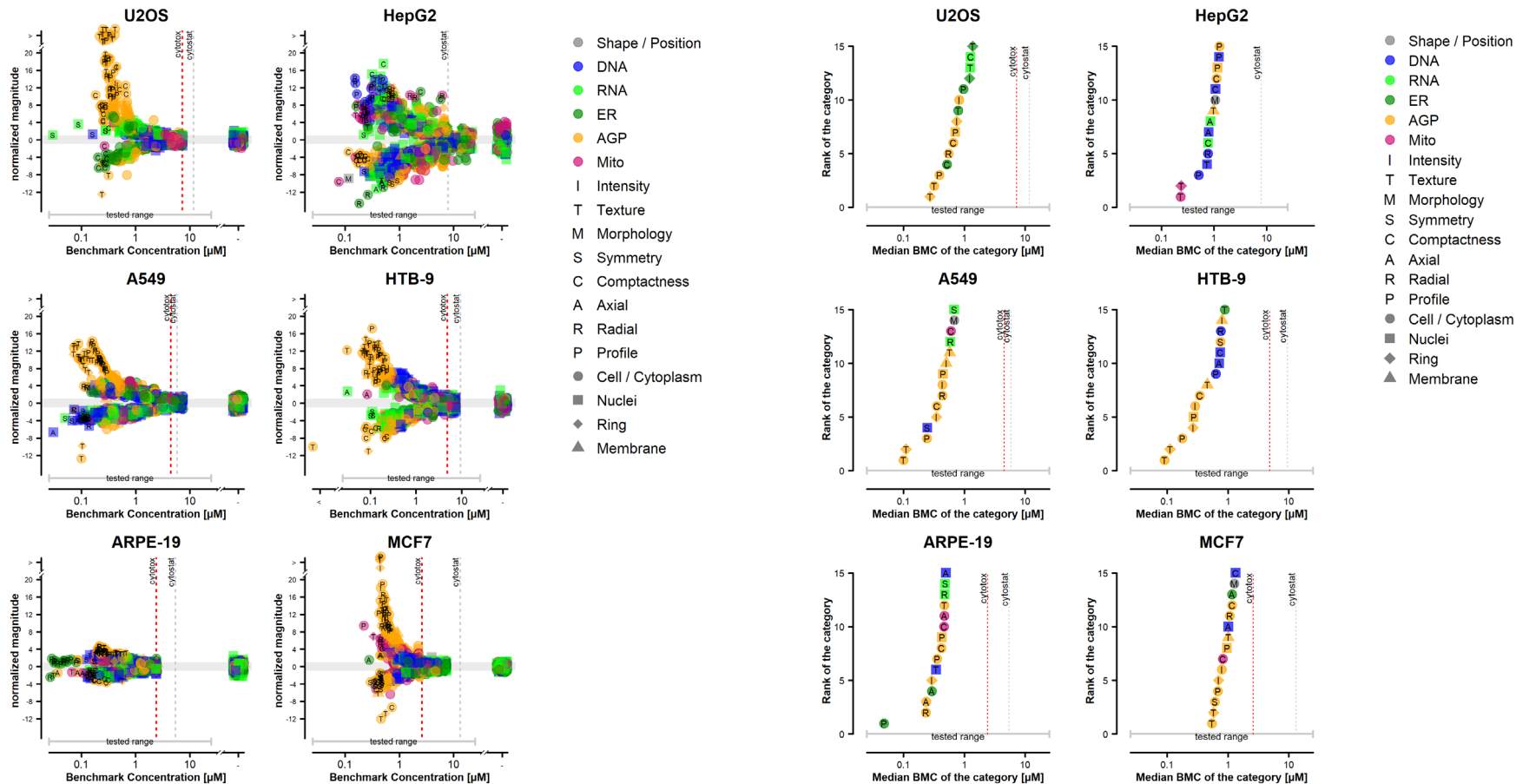
Supplementary Figure 2D.

Fluphenazine



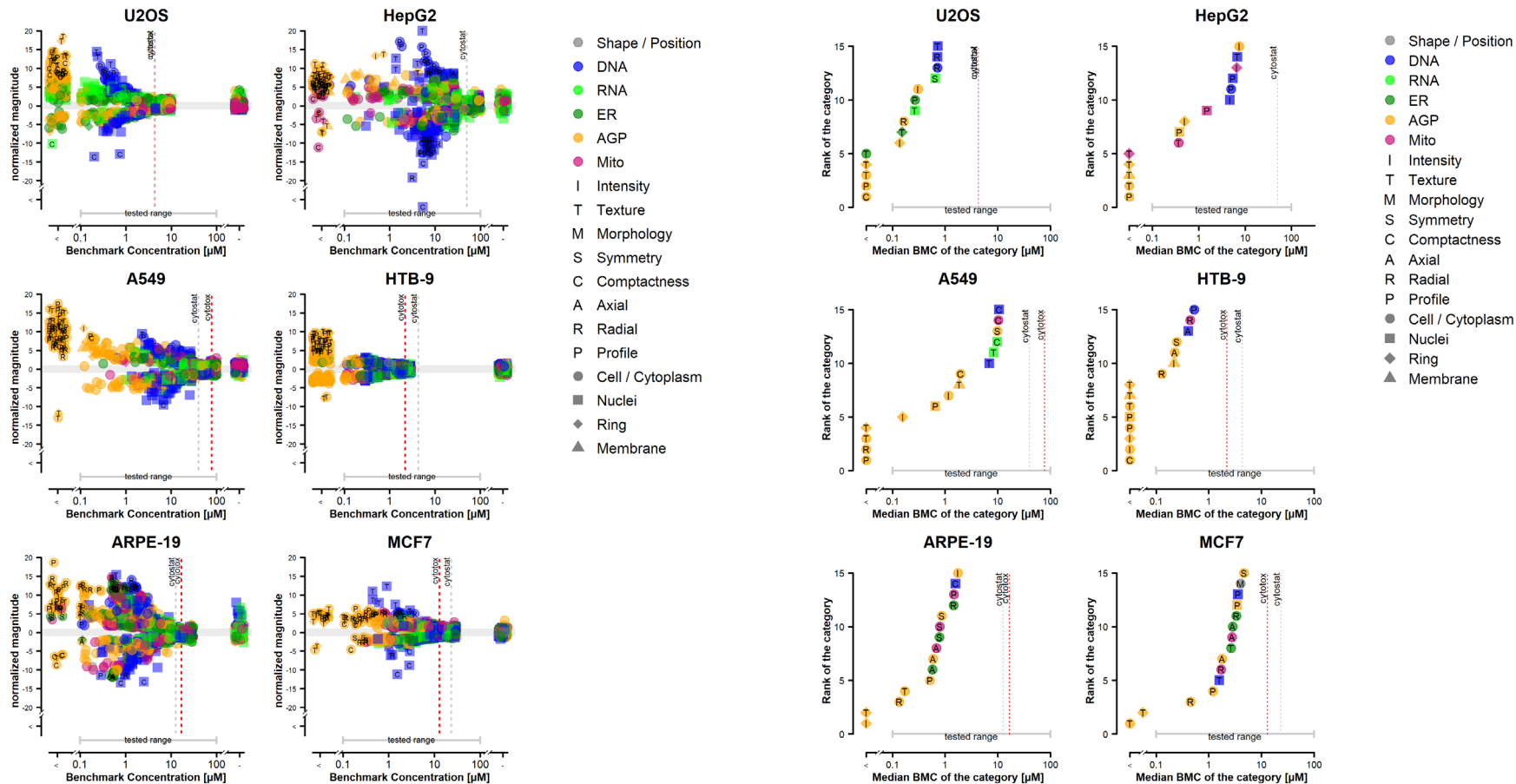
Supplementary Figure 2E.

Tetrandrine



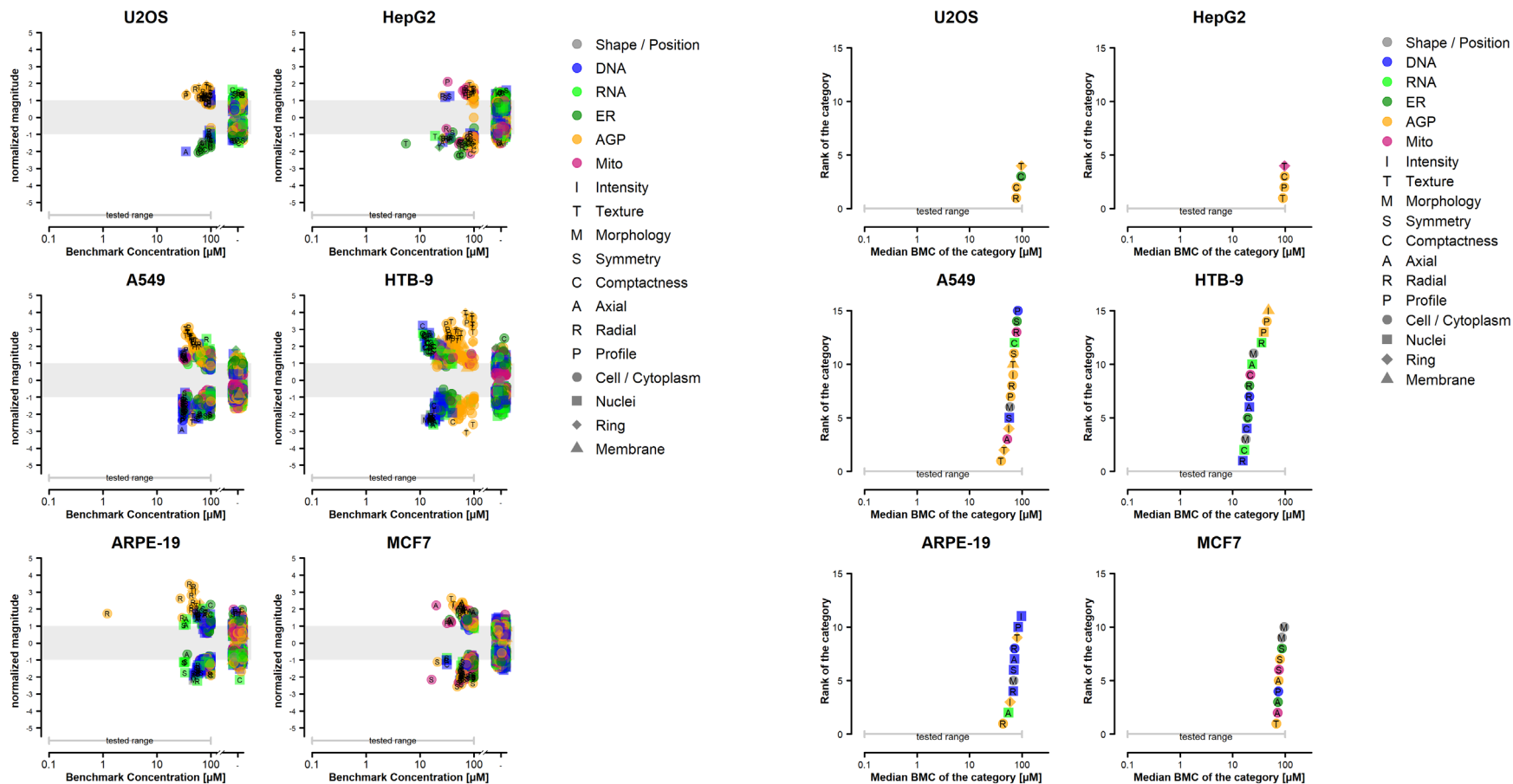
Supplementary Figure 2F.

Ca-074-Me



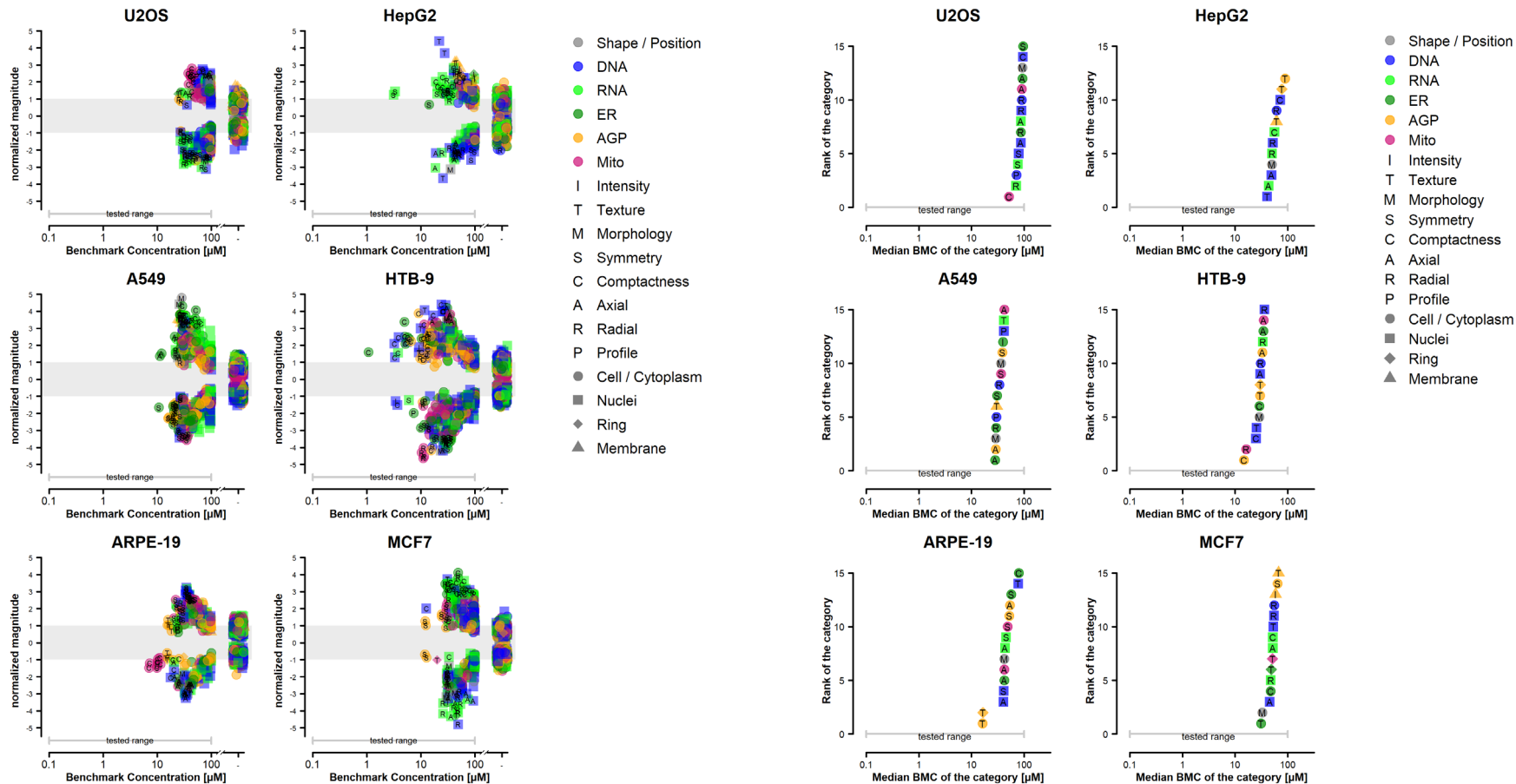
Supplementary Figure 2G.

Metoclopramide

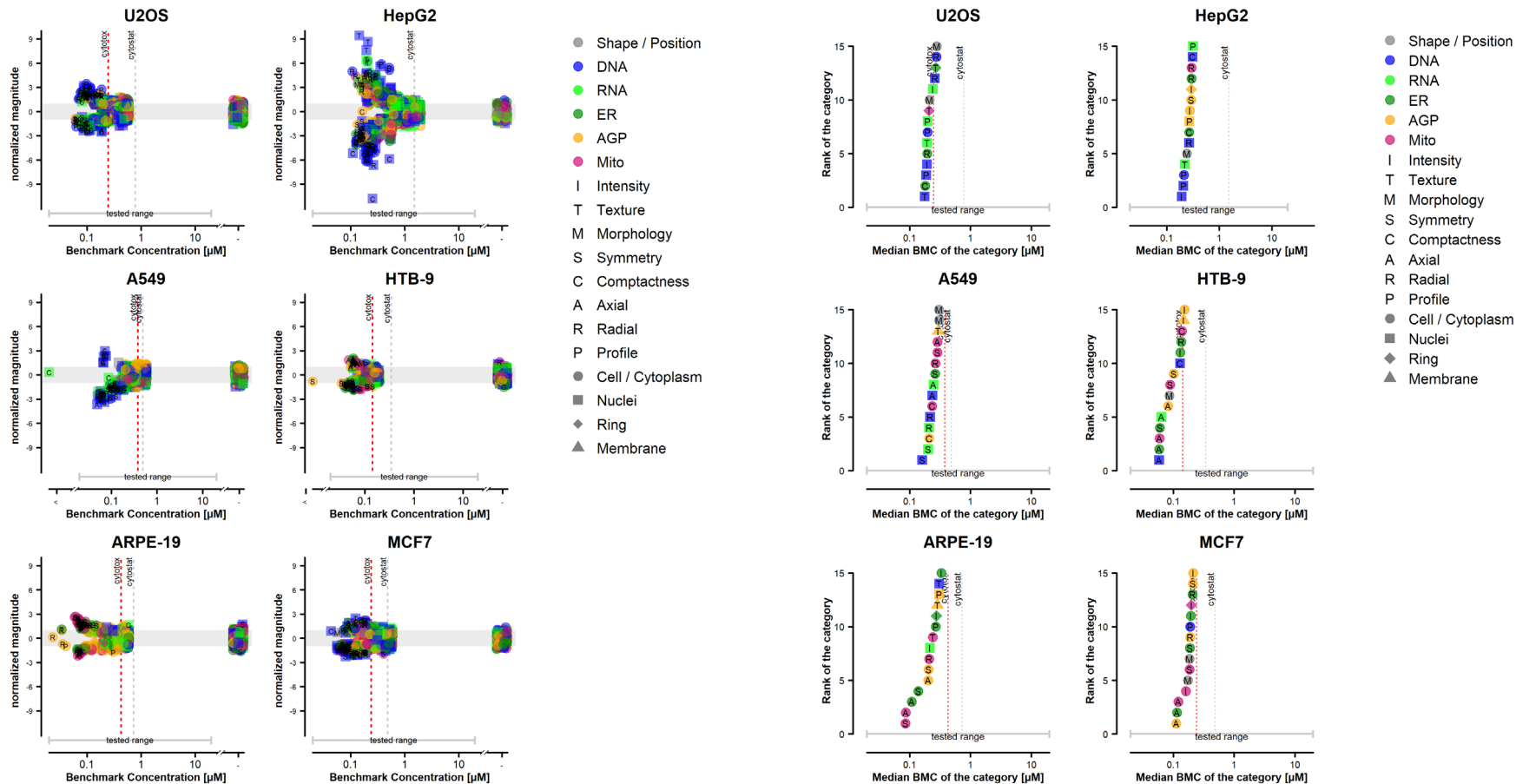


Supplementary Figure 2H.

NPPD

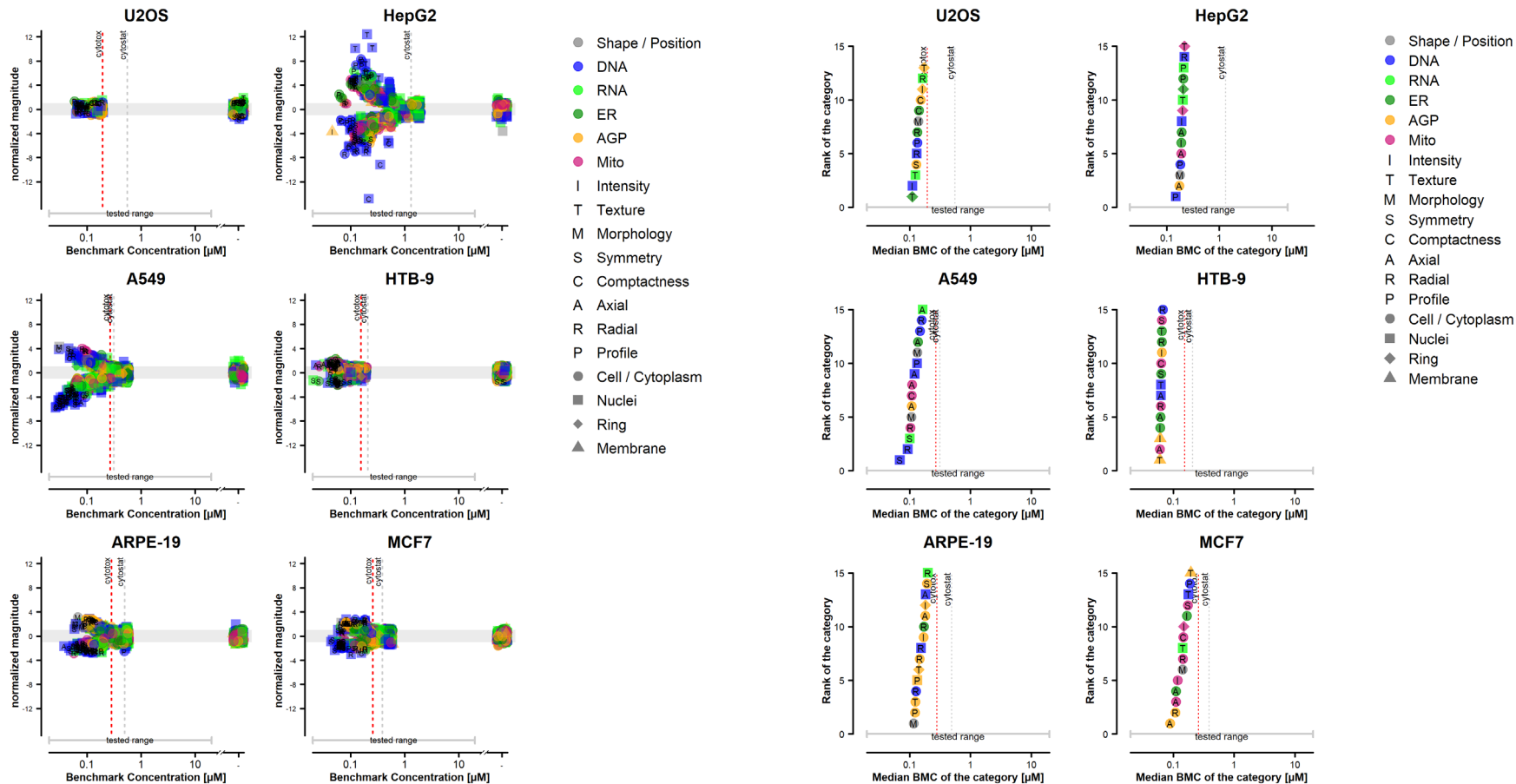


Supplementary Figure 21. Fenbendazole



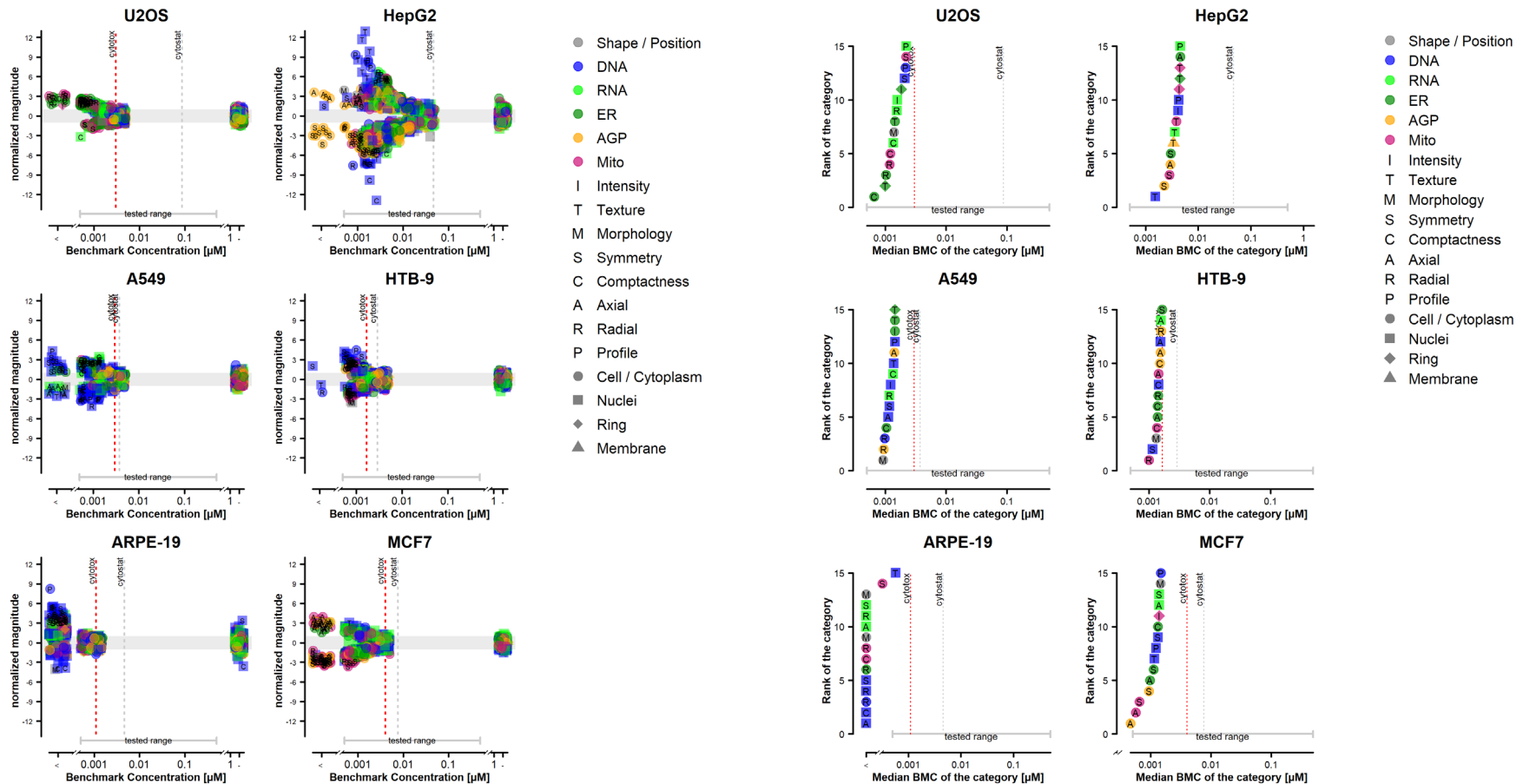
Supplementary Figure 2J.

Oxibendazole



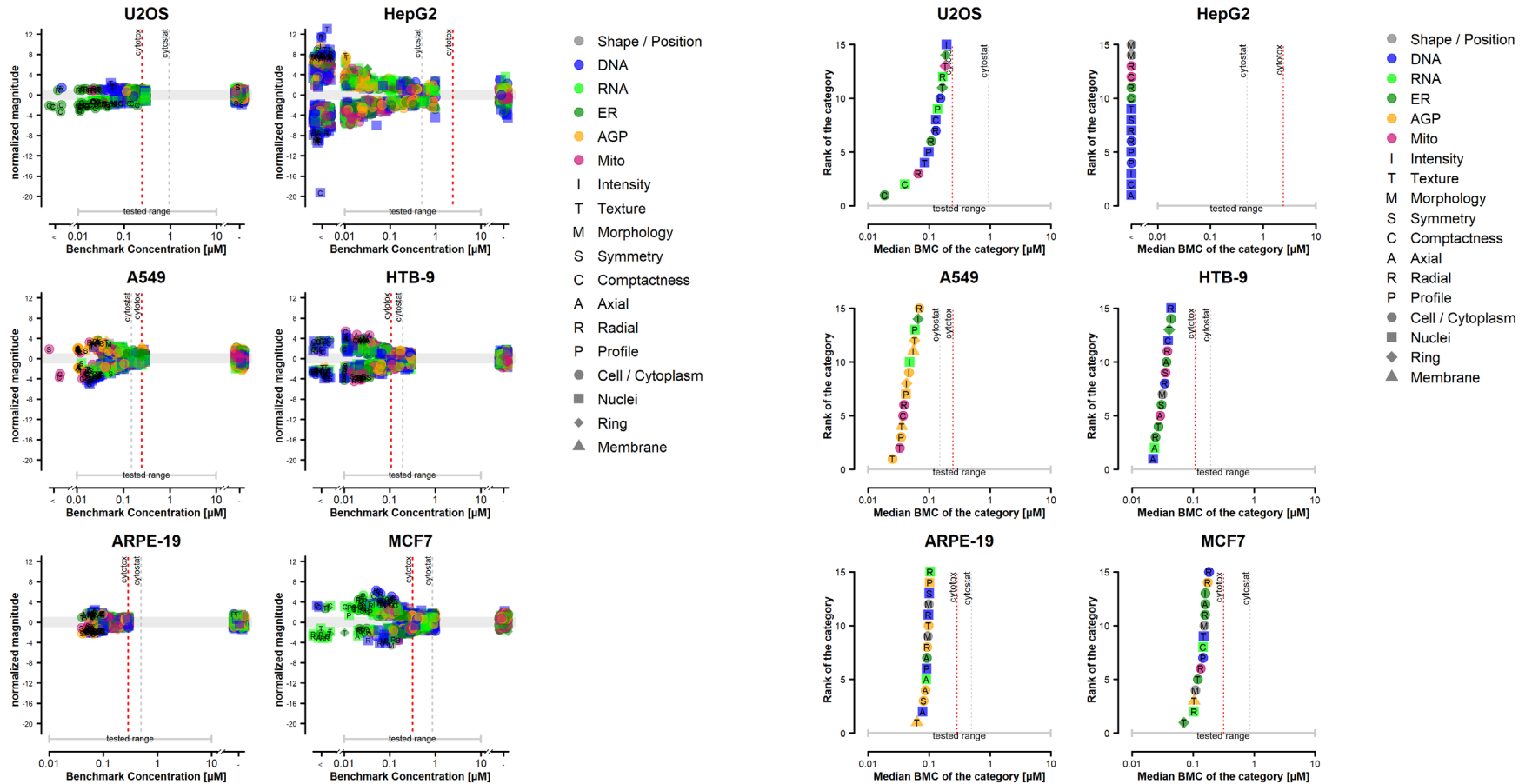
Supplementary Figure 2K.

Taxol



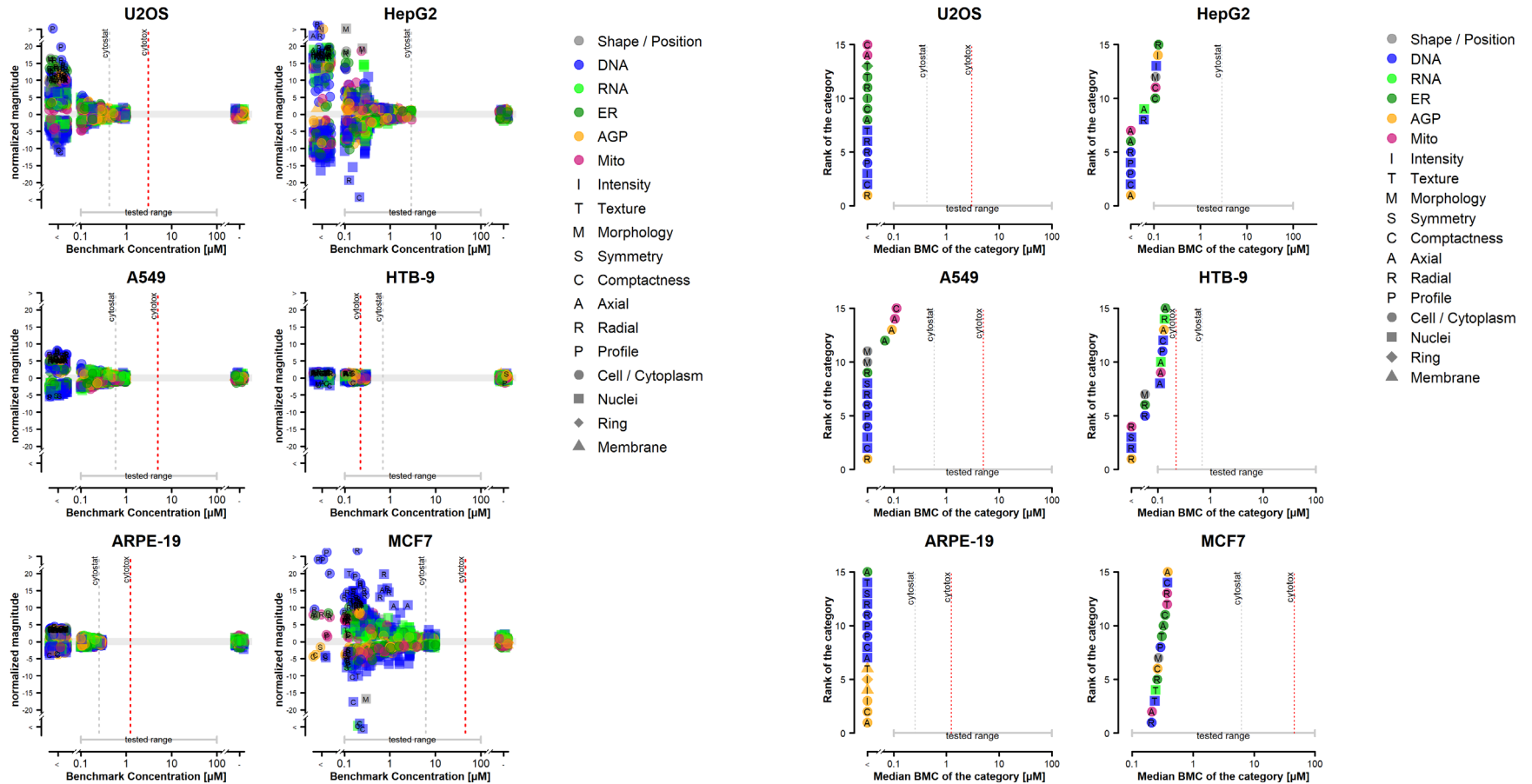
Supplementary Figure 2L.

Rotenone



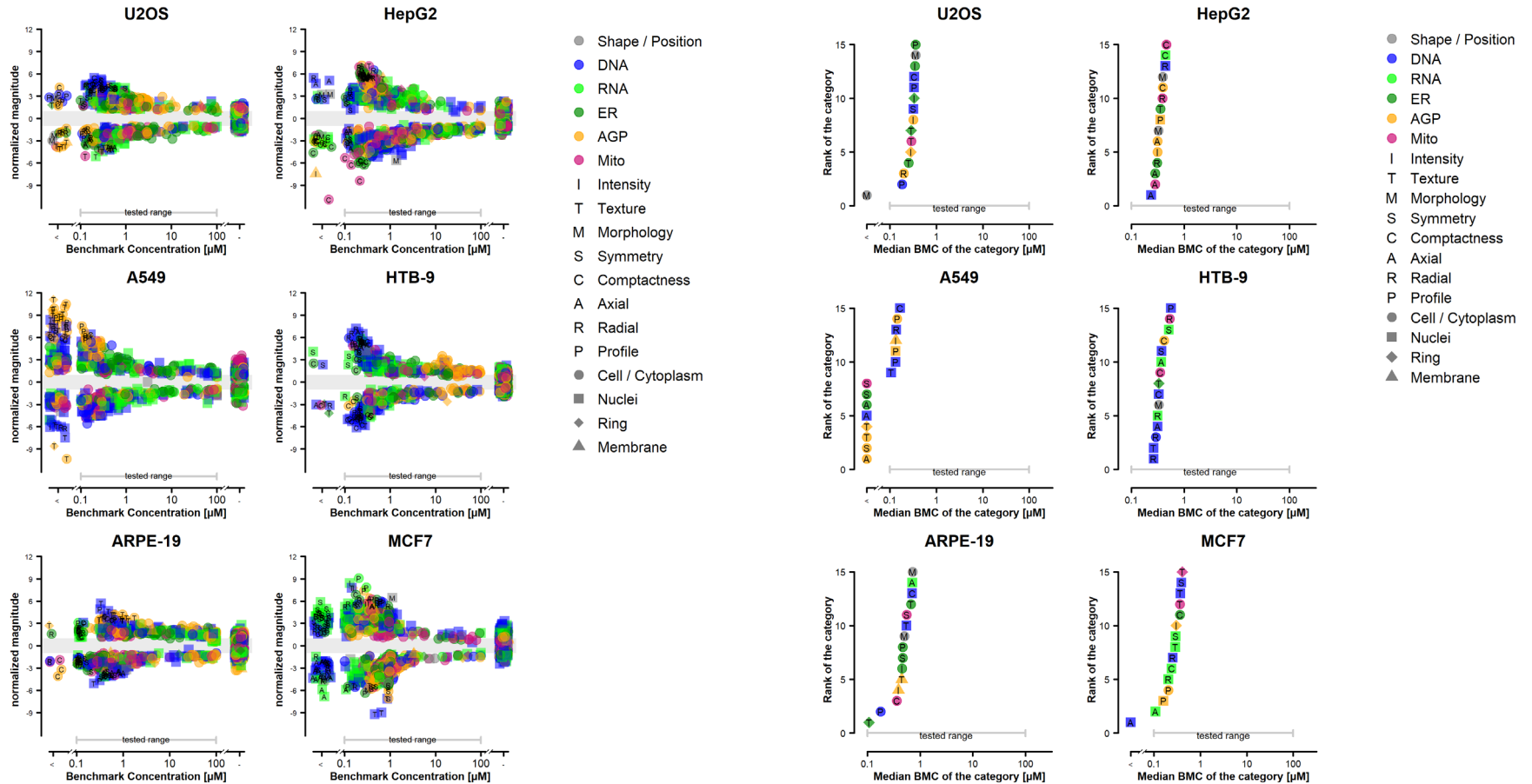
Supplementary Figure 2N.

Etoposide



Supplementary Figure 20.

Rapamycin



Supplementary Figure 3

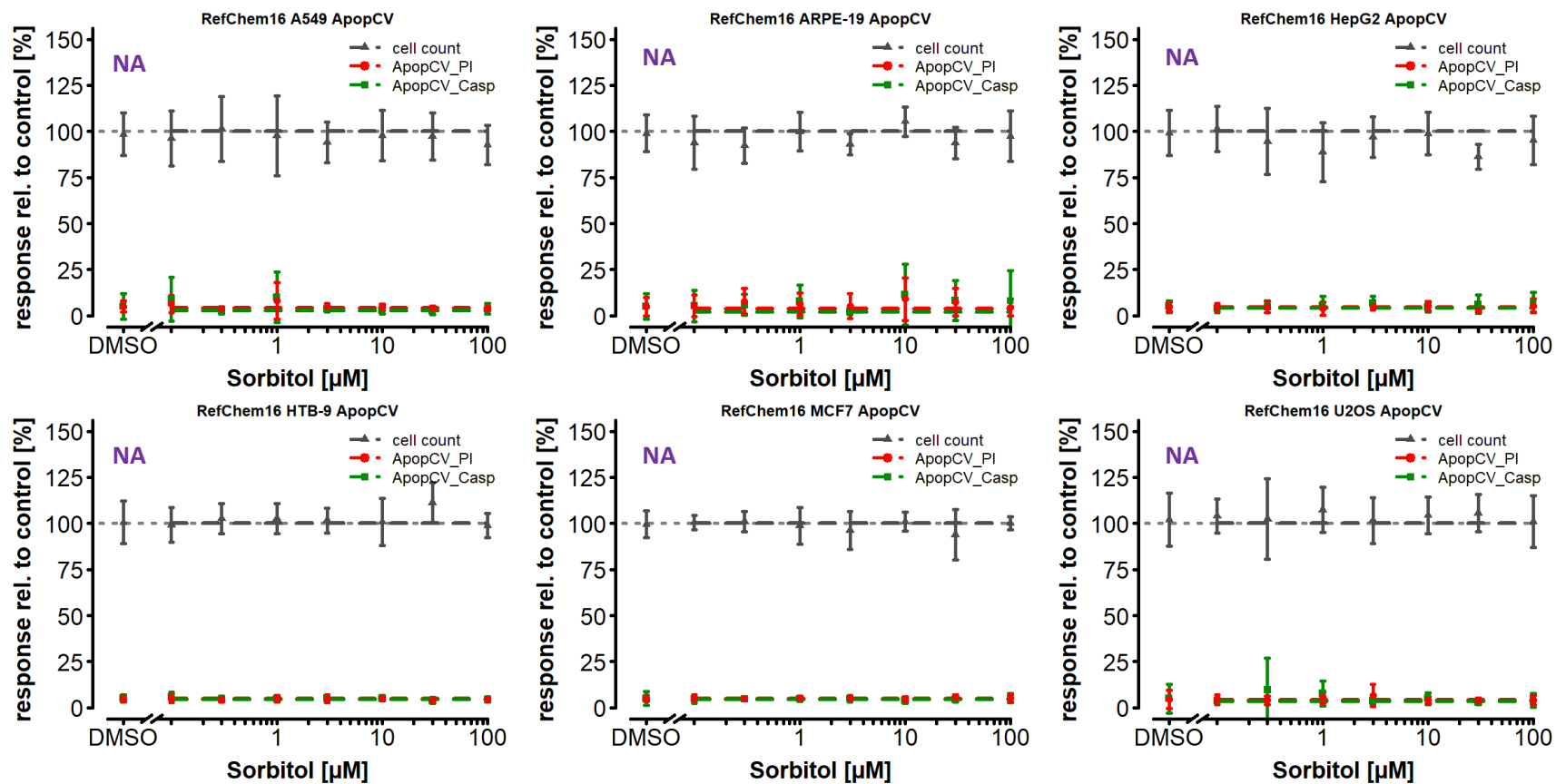
Plots of Cell Count and Cell Viability
(Well level values normalized to DMSO Control)

- Supplementary Figure 3A. Sorbitol
- Supplementary Figure 3B. Saccharin
- Supplementary Figure 3C. Amperozide
- Supplementary Figure 3D. Fluphenazine
- Supplementary Figure 3E. Tetrandrine
- Supplementary Figure 3F. Ca-074-Me
- Supplementary Figure 3G. Metoclopramide
- Supplementary Figure 3H. NPPD
- Supplementary Figure 3I. Fenbendazole
- Supplementary Figure 3J. Oxibendazole
- Supplementary Figure 3K. Taxol
- Supplementary Figure 3L. Rotenone
- Supplementary Figure 3M. Latrunculin B
- Supplementary Figure 3N. Etoposide
- Supplementary Figure 3O. Rapamycin
- Supplementary Figure 3P. Berberine Chloride

**Purple values in each panel are the CP POD in μM . NA = CP POD not determined. < TR = CP POD below tested concentration range.

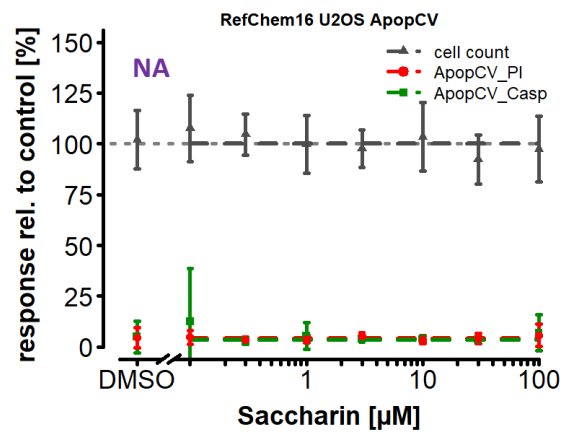
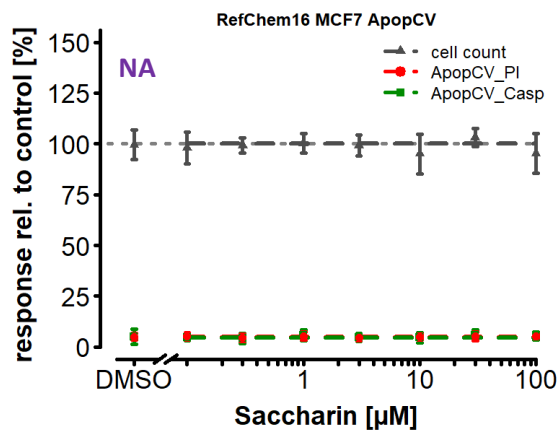
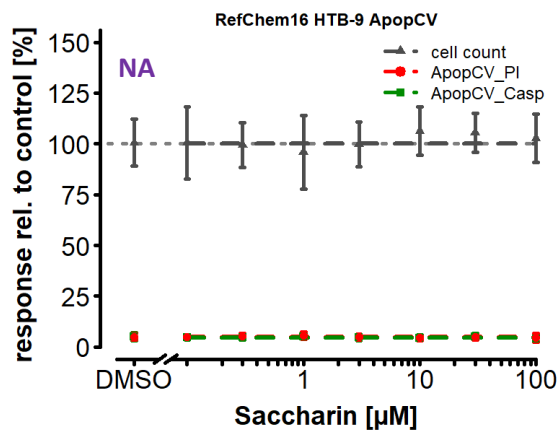
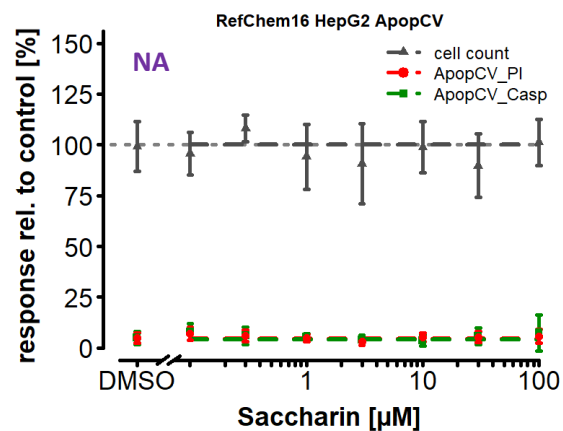
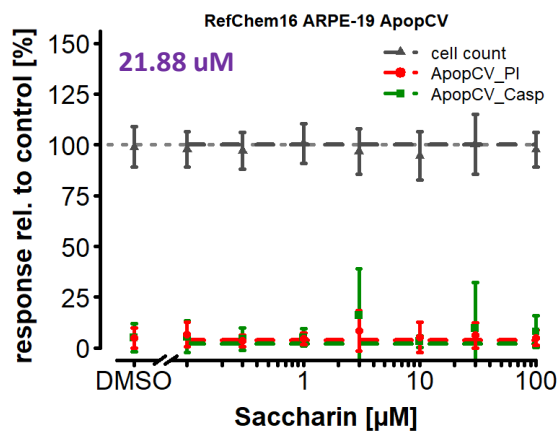
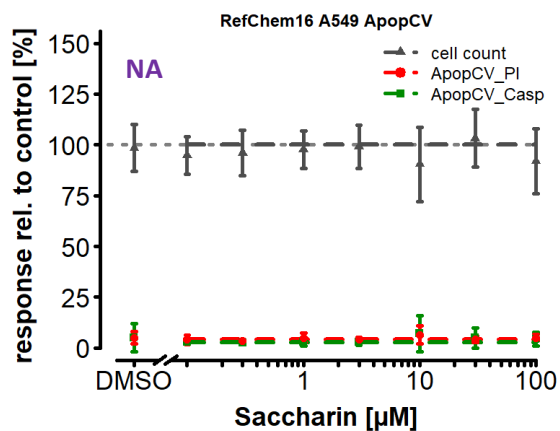
Supplementary Figure 3A.

Sorbitol



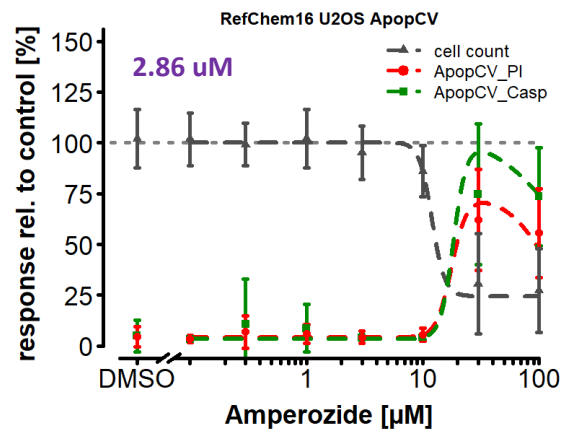
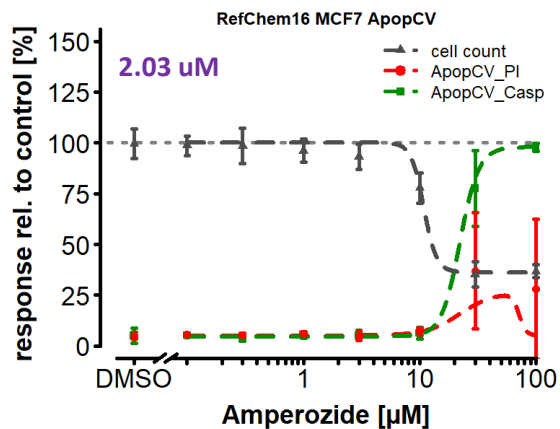
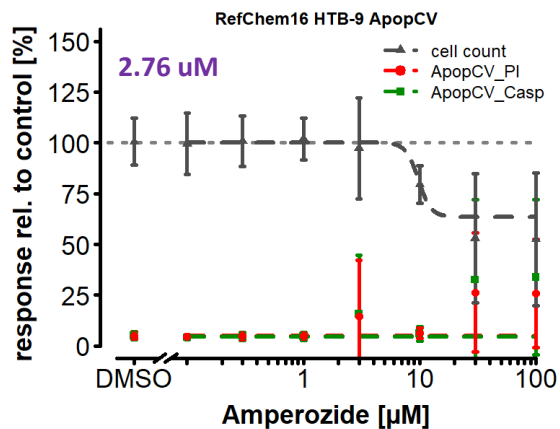
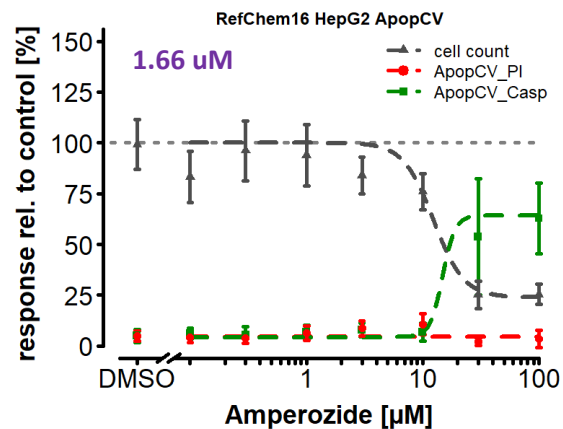
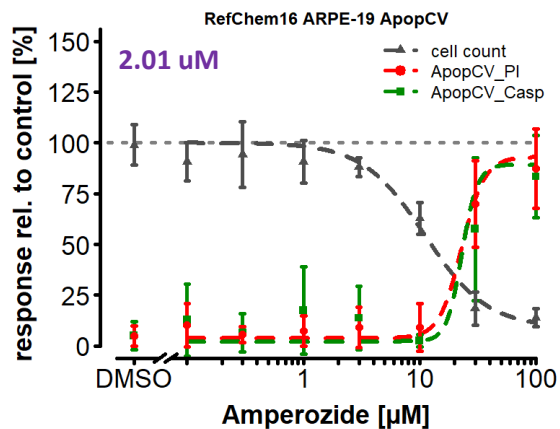
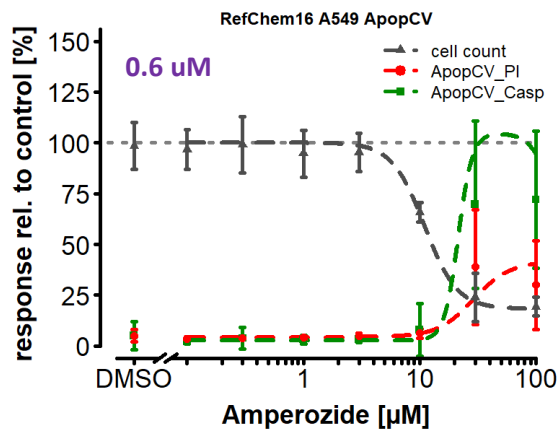
Supplementary Figure 3B.

Saccharin



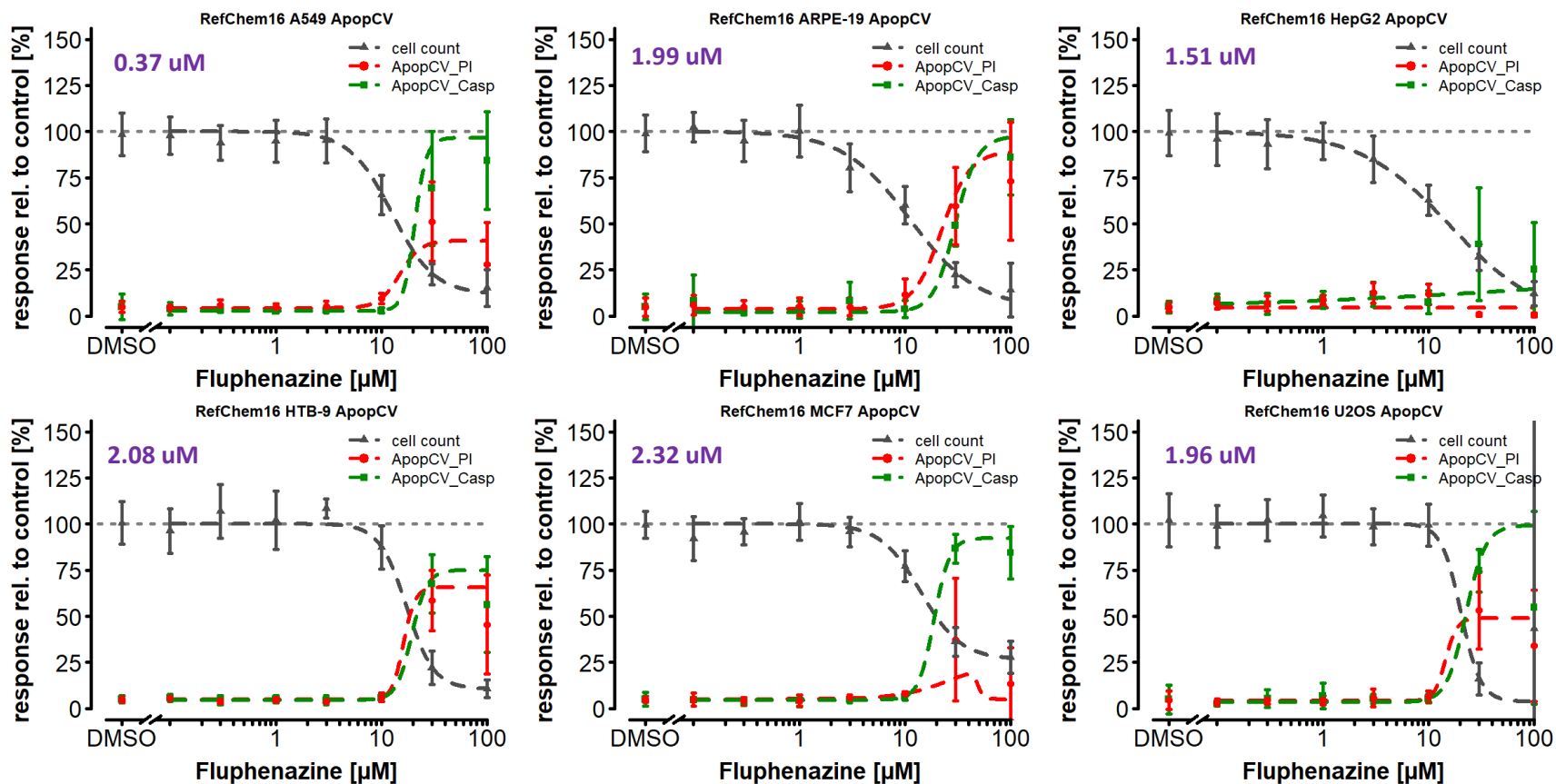
Supplementary Figure 3C.

Amperozide



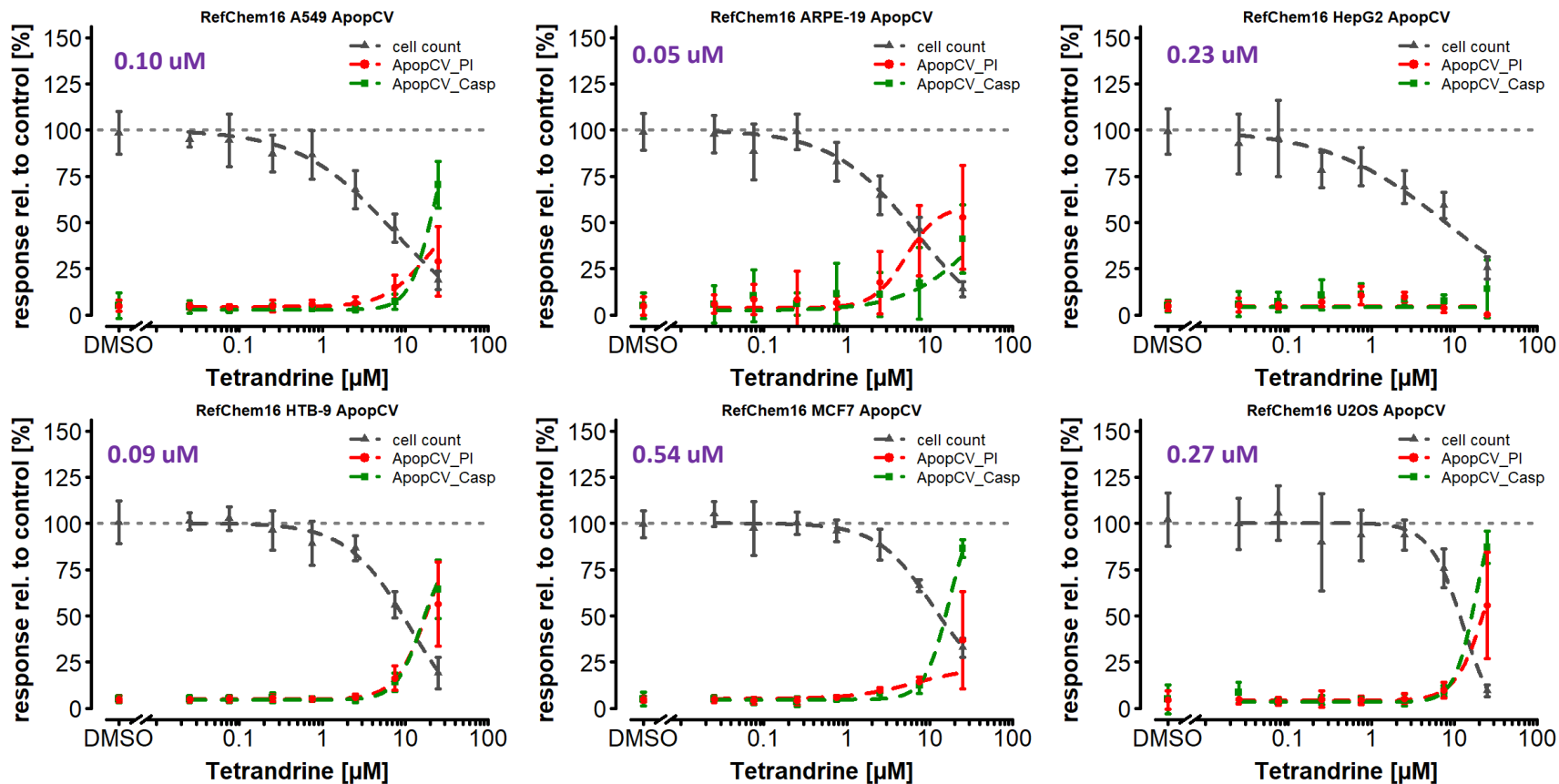
Supplementary Figure 3D.

Fluphenazine



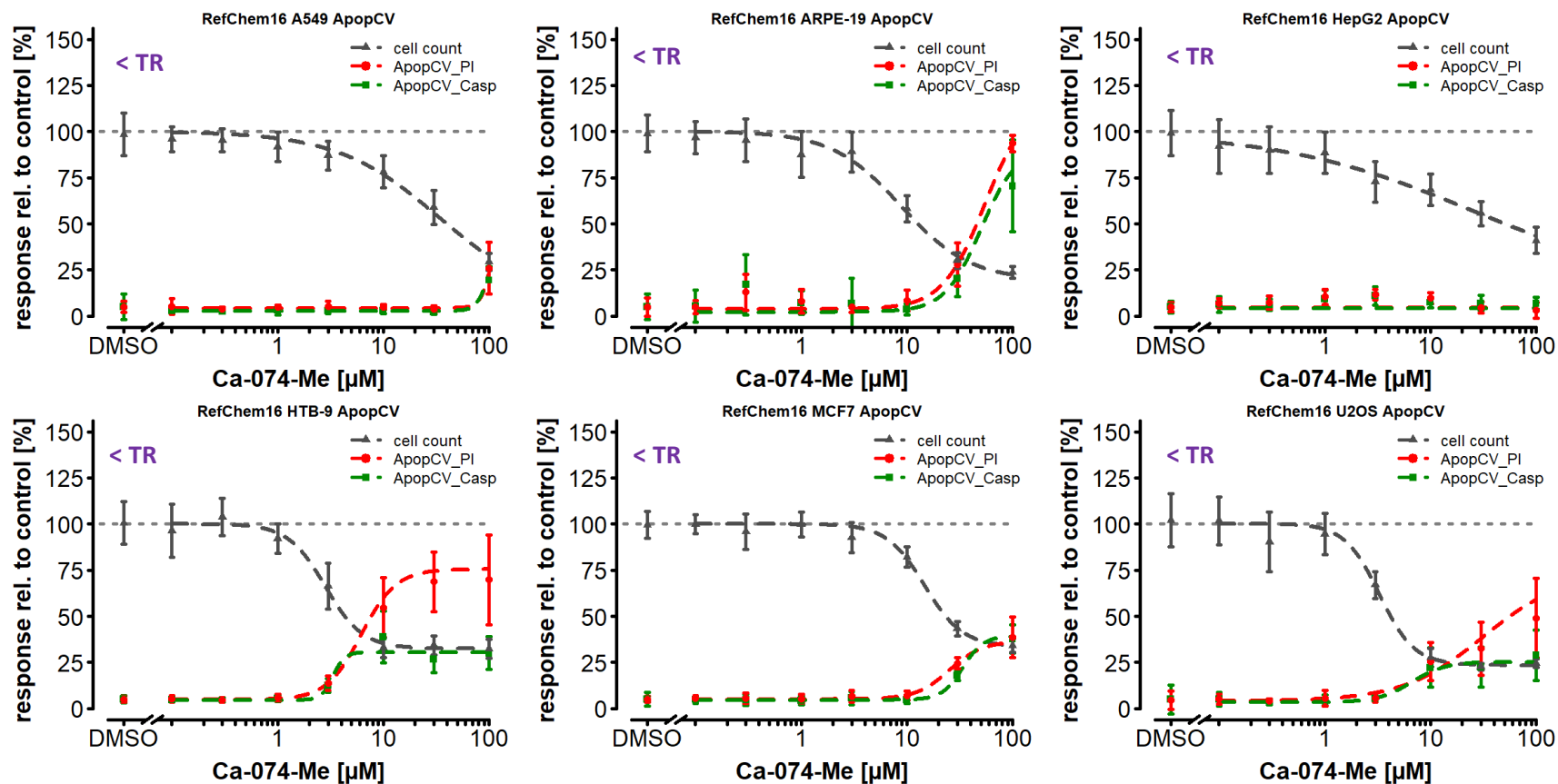
Supplementary Figure 3E.

Tetrandrine



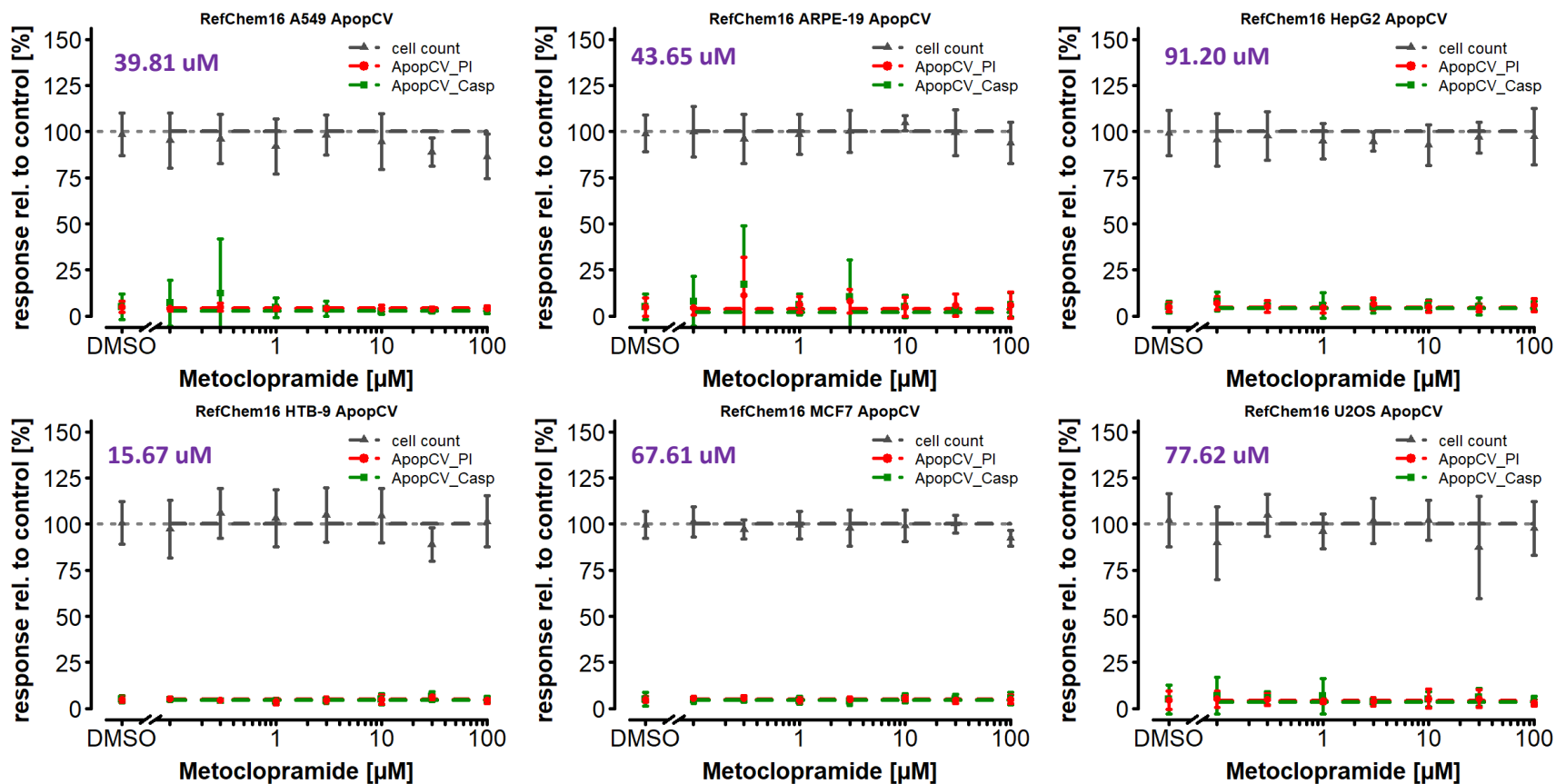
Supplementary Figure 3F.

Ca-074-Me



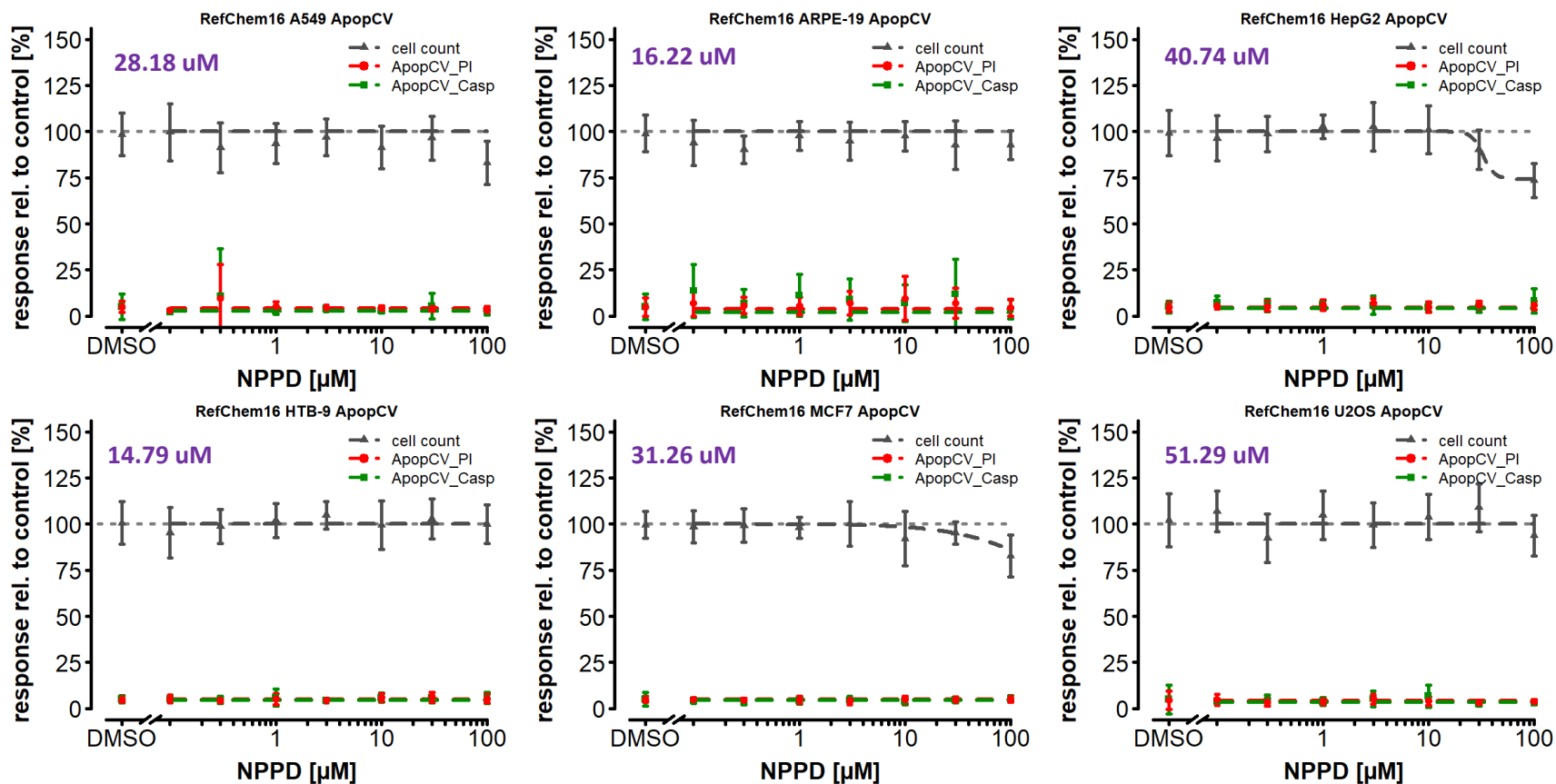
Supplementary Figure 3G.

Metoclopramide



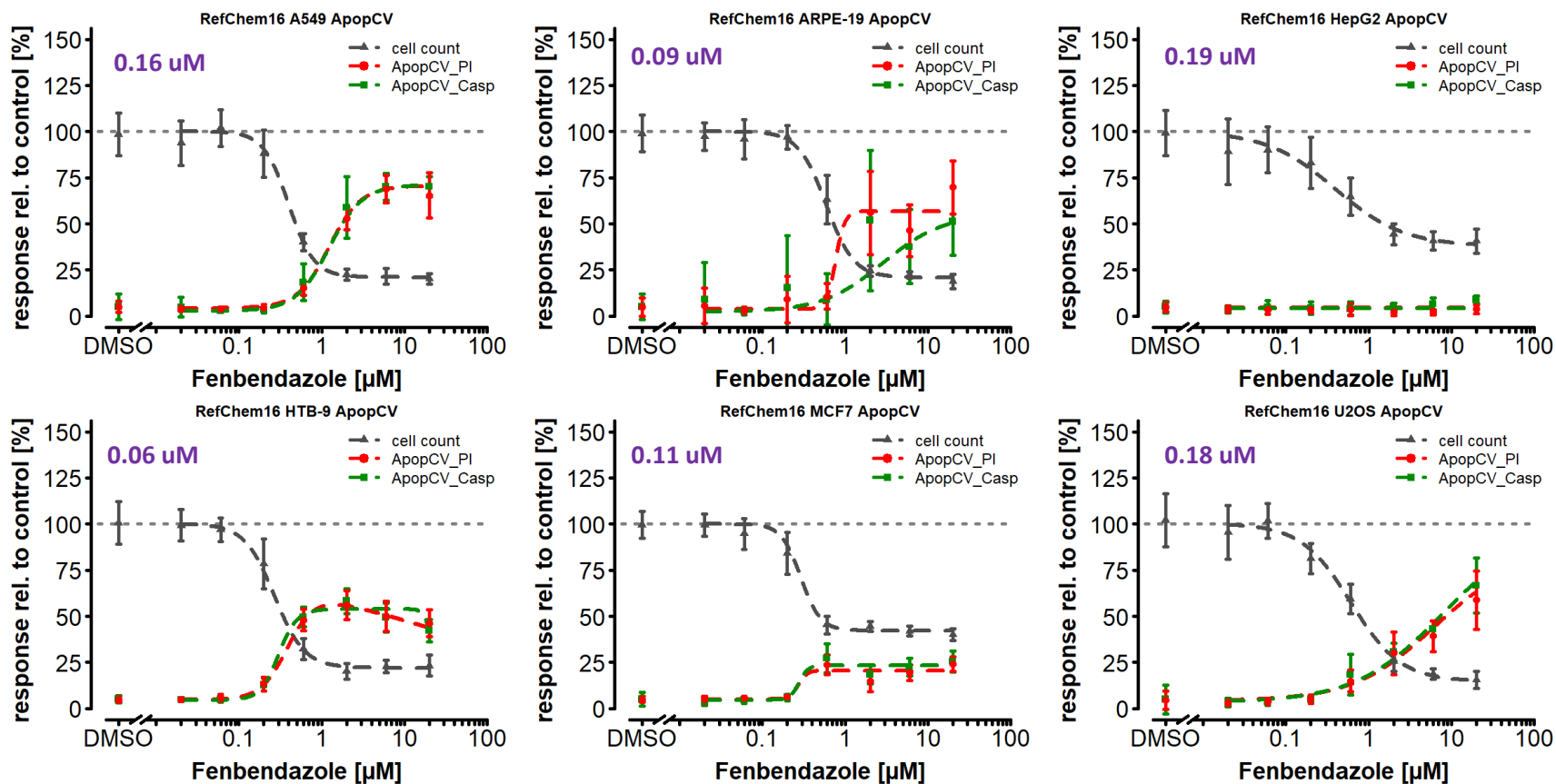
Supplementary Figure 3H.

NPPD



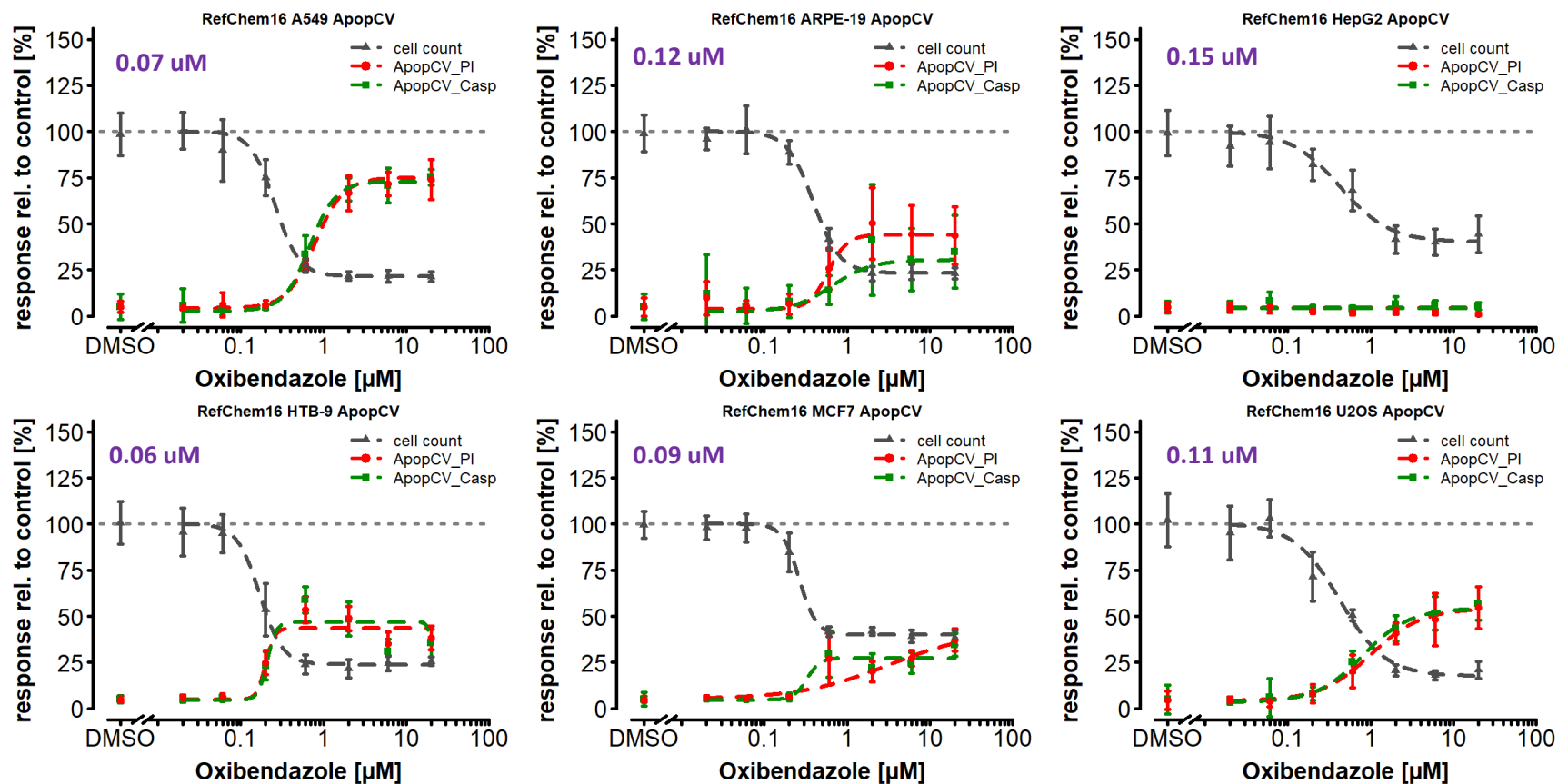
Supplementary Figure 3I.

Fenbendazole



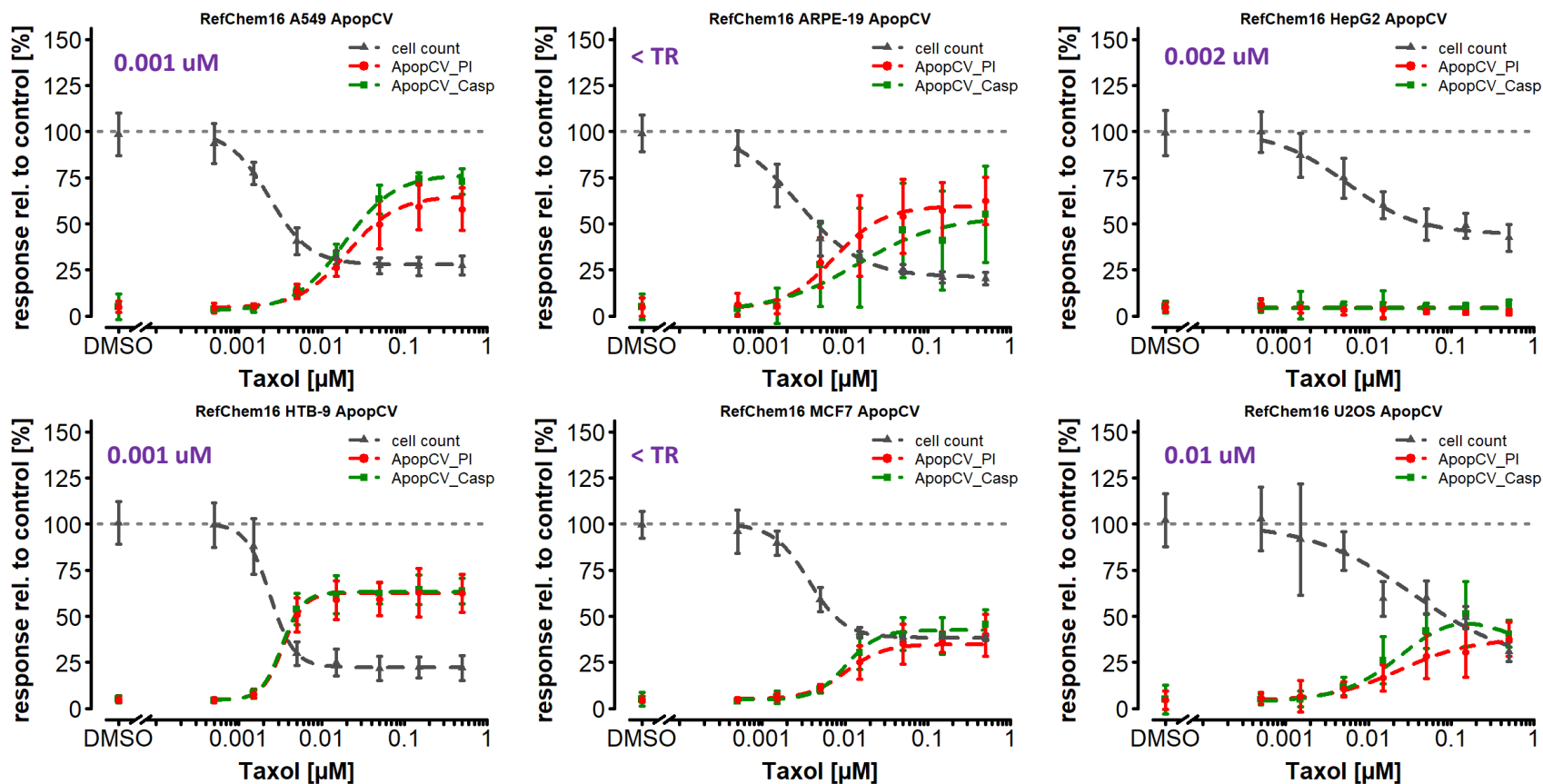
Supplementary Figure 3J.

Oxibendazole



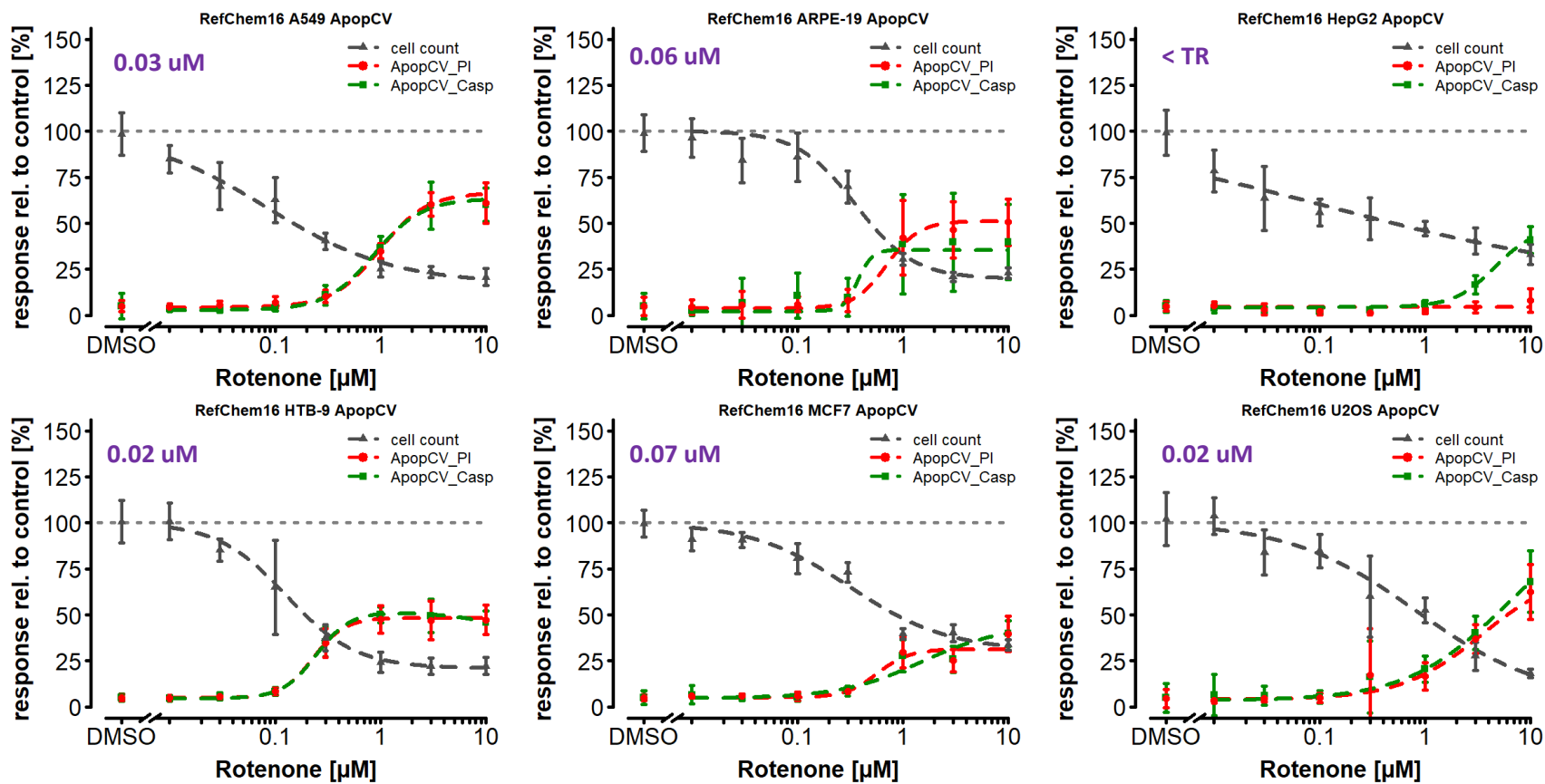
Supplementary Figure 3K.

Taxol



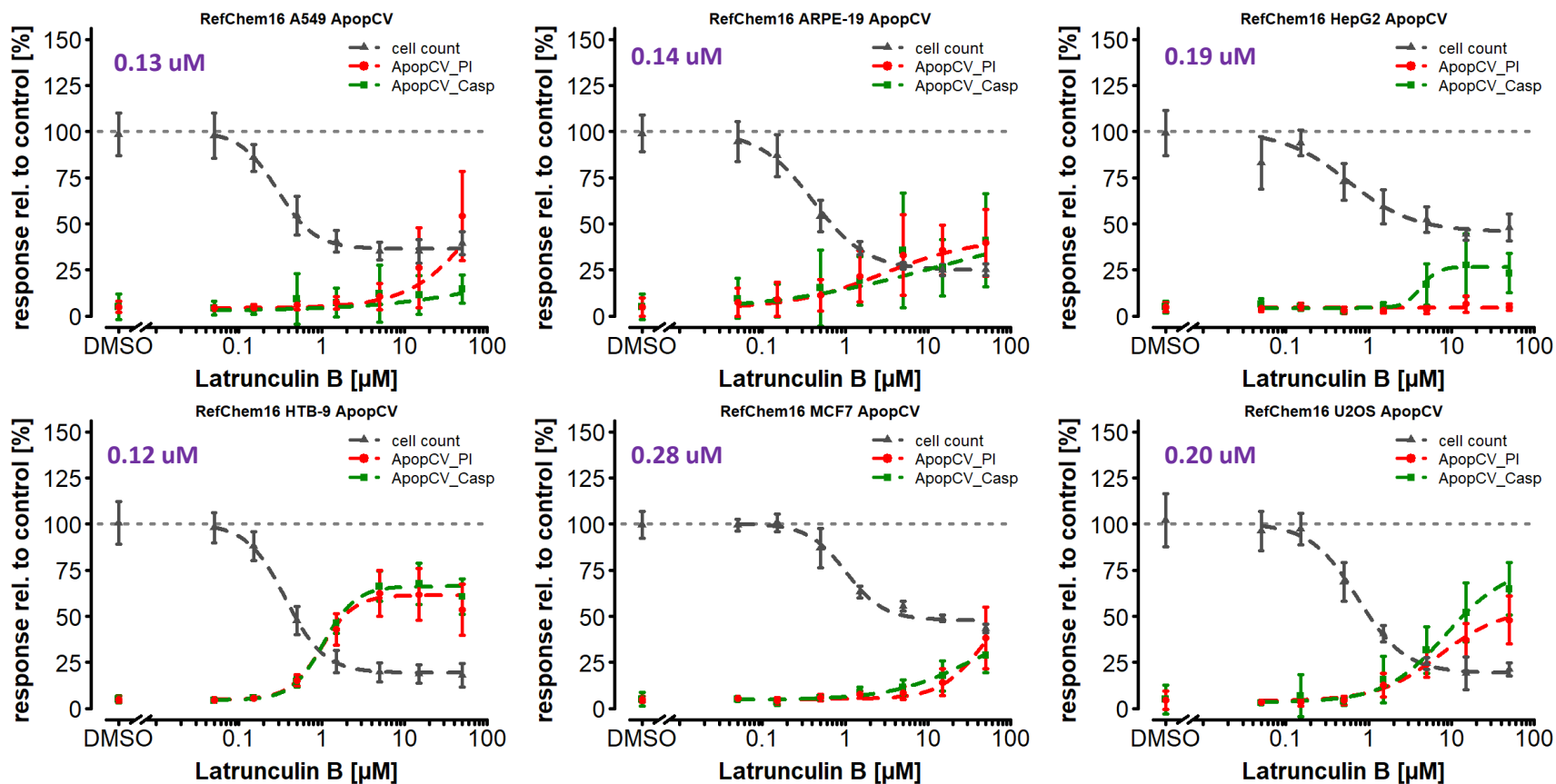
Supplementary Figure 3L

Rotenone



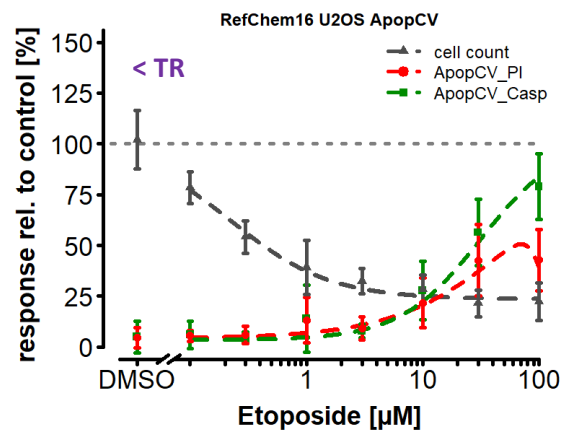
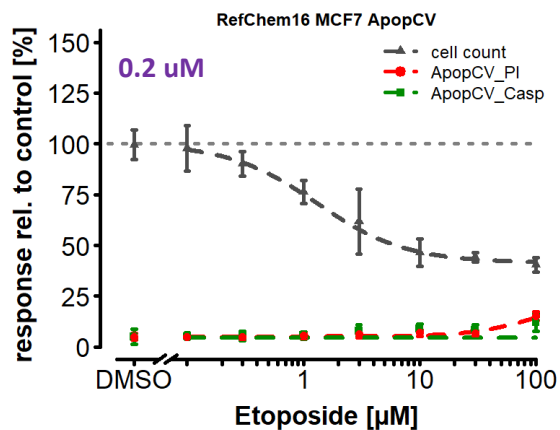
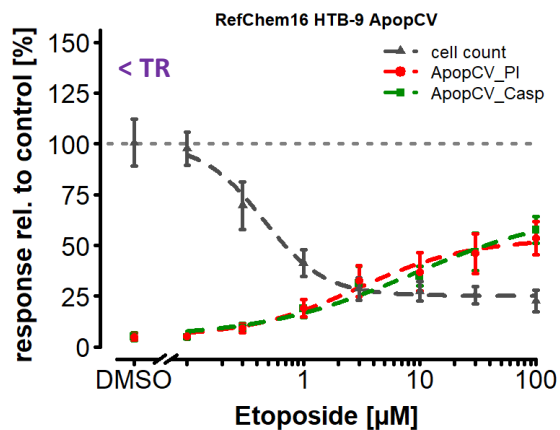
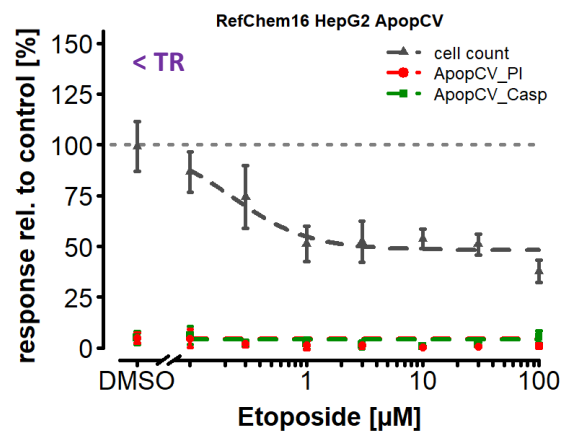
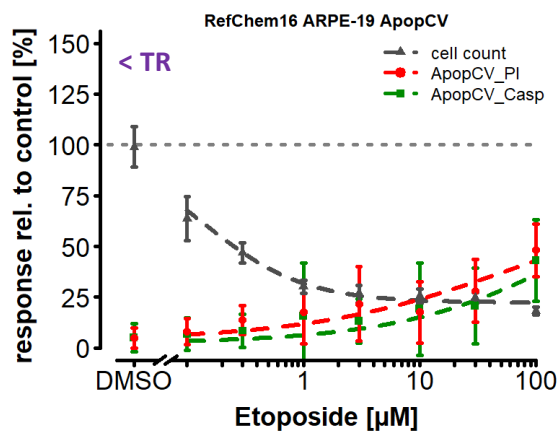
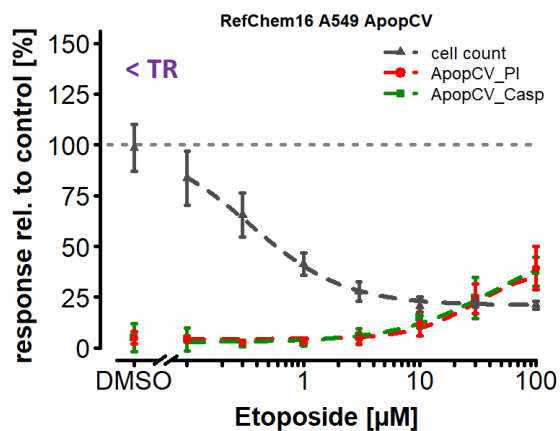
Supplementary Figure 3M.

Latrunculin B



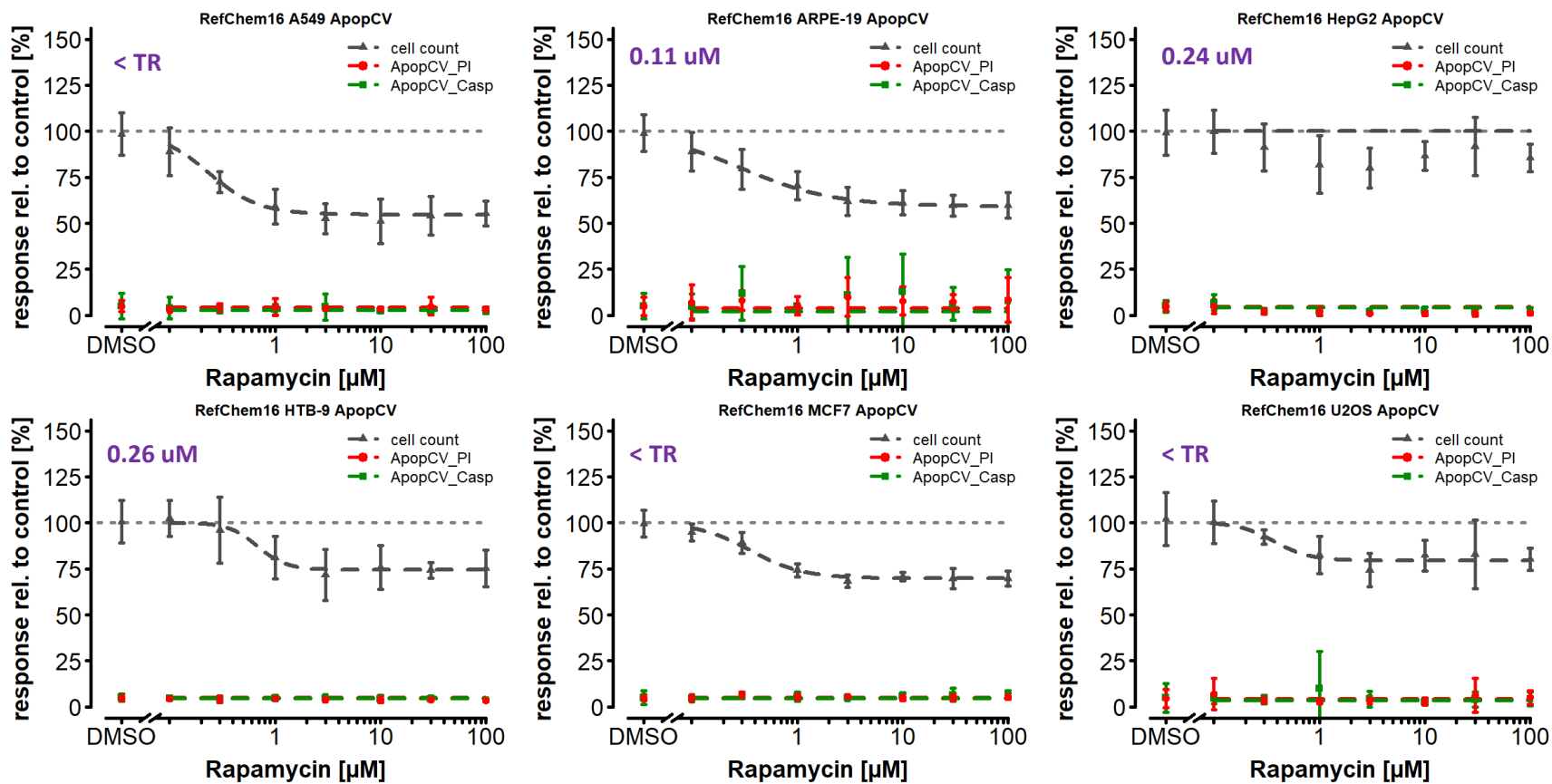
Supplementary Figure 3N.

Etoposide



Supplementary Figure 30.

Rapamycin



Supplementary Figure 3P.

Berberine Chloride

