

Supplemental Figure legends

Supplementary Figure 1. Blocking of primary hepatocyte uptake of PKH26 labeled GDN
Primary hepatocytes were incubated for 3 h with the indicated chemical reagents or PBS as a control in the presence of PKH26 labeled GDN (a) or GDEN2 (b) (100 $\mu\text{g/ml}$). The treated cells were then washed, fixed, and cells were stained with anti-mouse albumin. PKH26+Albumin+ cells were detected using confocal microscopy and photographed. Results represent one of five independent experiments.

Supplementary Figure 2 Temperature depends uptake of GDN

24-h cultured mouse primary hepatocytes were incubated with PKH26 labeled GDN (100 $\mu\text{g/ml}$) or PBS as a control at 37°C, 20°C or 4°C for 6 h. The treated cells were then washed and fixed. PKH26+Albumin+ cells were detected using confocal microscopy and photographed. Results represent one of three independent experiments.

Supplementary Figure 3. Size distribution (left) and surface Zeta-potential (right) of the LN from GDEN1 lipids with Shogaol knock out and knock in were measured using a Zetasizer. Results represent one of five independent experiments.

Supplementary Figure 1

a

GDN

No Nanoparticle

PBS

Amiloride

Bafilomycin A1

Chlorpromazine

Cytochalasin D

Indomethacin

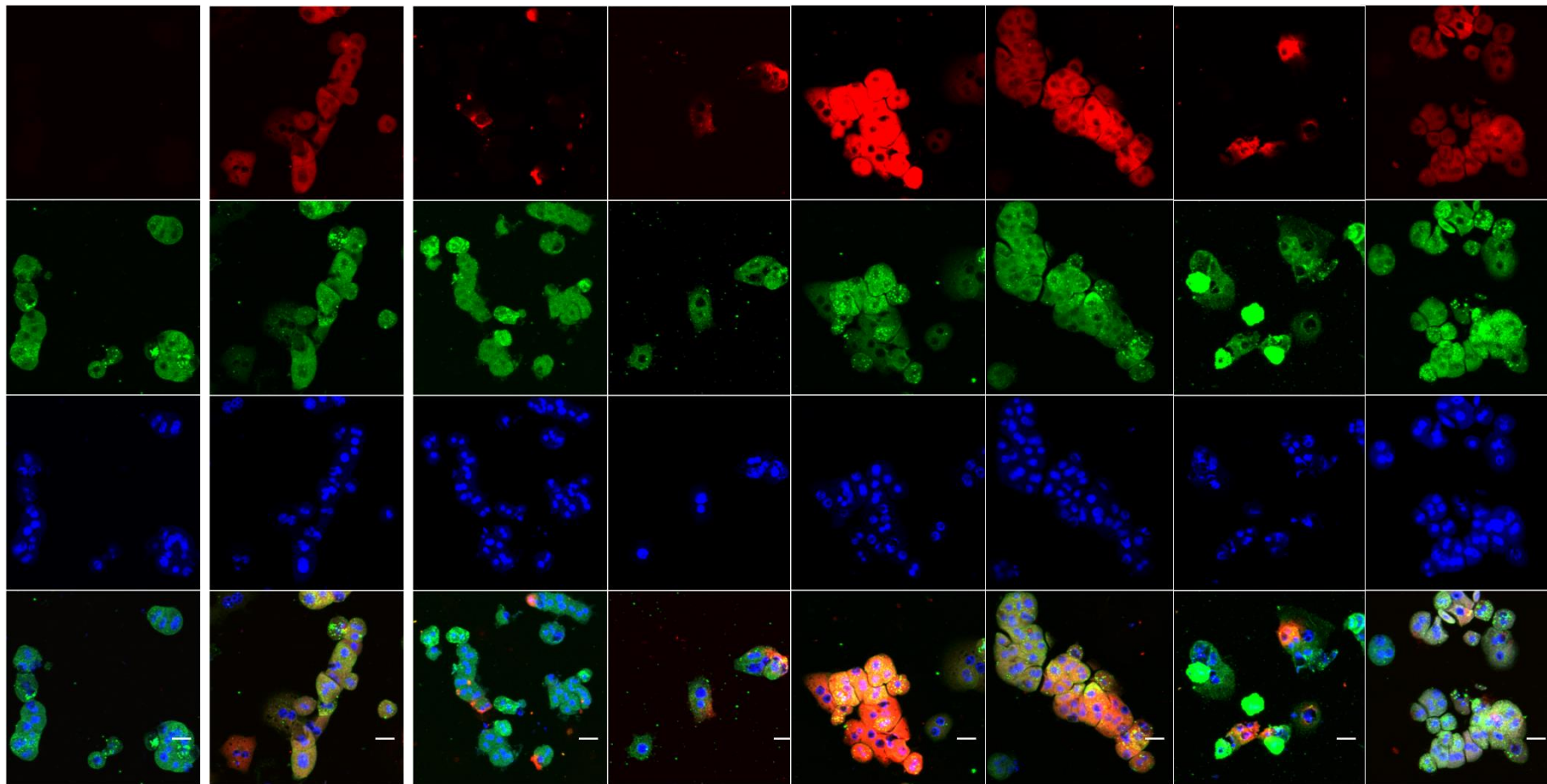
Nocodazole

PKH26

Albumin

DAPI

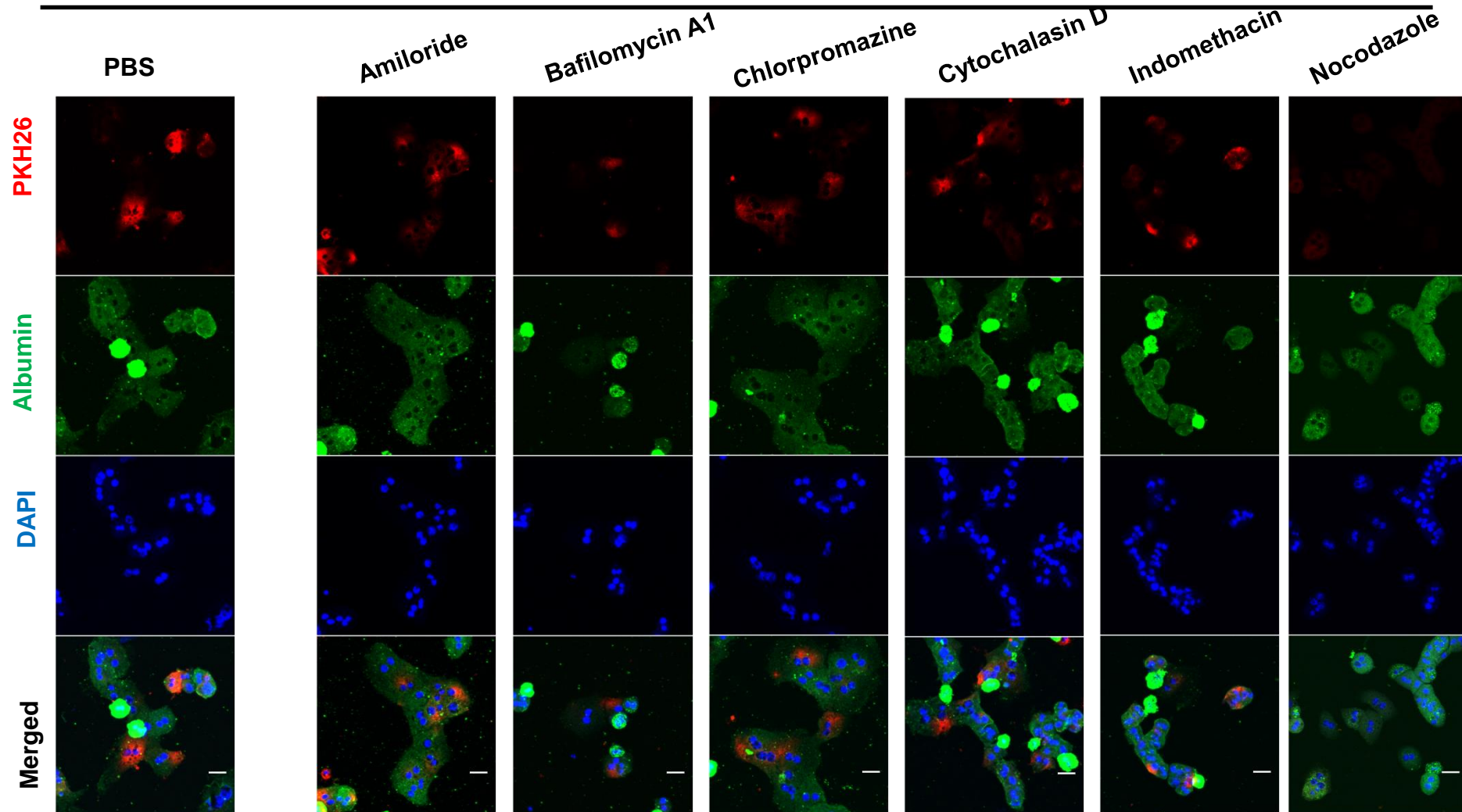
Merged



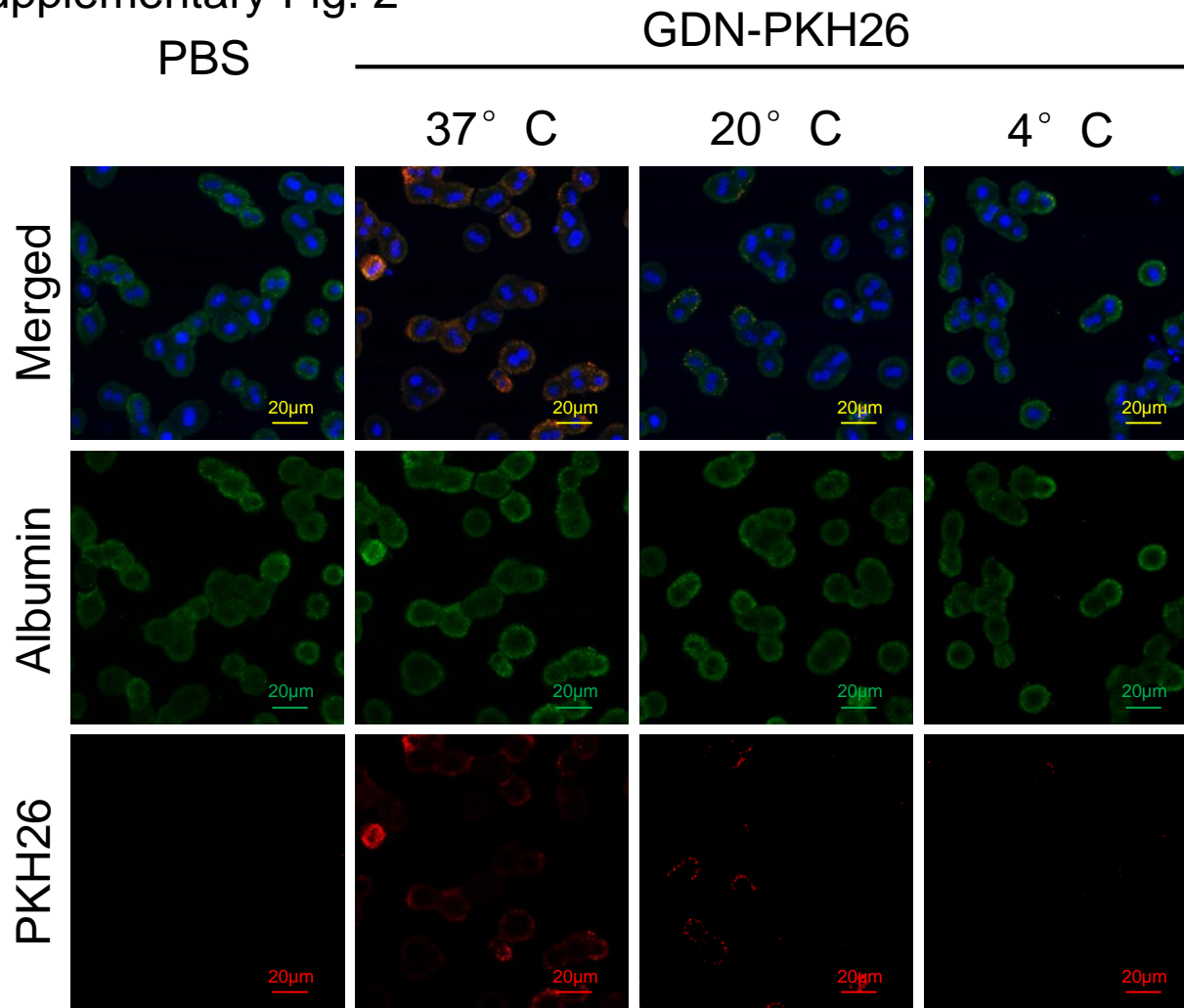
Supplementary Figure 1

b

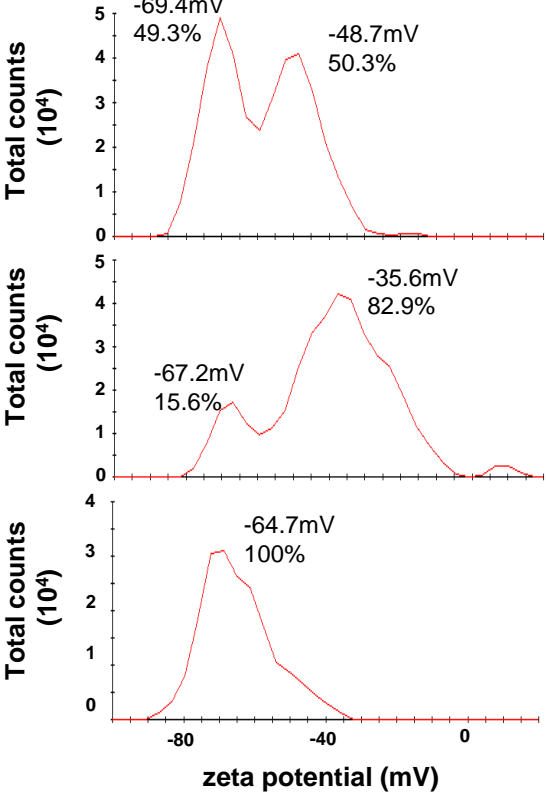
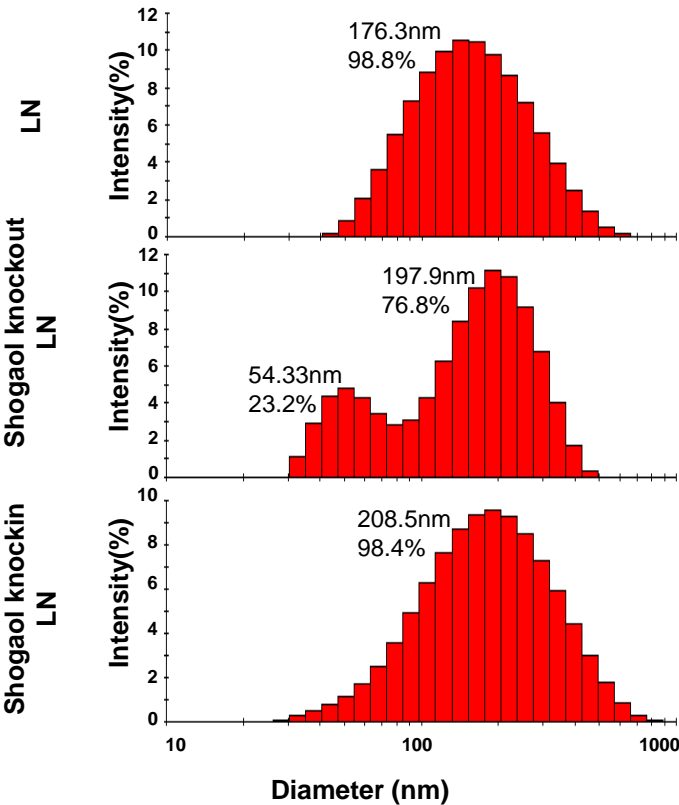
GDEN2



Supplementary Fig. 2



Supplementary Figure 3



Supplementary Table 1 lipids in GDENs (ng/mg of dry GDENs)

Lipid	GDN	GDEN2
DGDG	0.353	0.084
MGMG	0.149	0.050
PG	0.003	0.001
PC	0.023	0.004
PI	0.010	0.005
PS	0.009	0.005
PA	0.327	0.103
PE	0.006	0.002
LysoPG	0.001	0.001
LysoPC	0.000	0.000
LysoPE	0.002	0.001
Total polar lipid	0.883	0.256

DGDG: **Digalactosyldiacylglycerol**
 MGMG: **Monogalactosyl Monoacylglycerol**
 PG: **Phosphatidylglycerol**
 PC: **Phosphatidylcholine**
 PI: **Phosphatidylinositol**
 PS: **Phosphatidylserine**
 PA: **Phosphatidic acids**
 PE: **Phosphatidylethanolamine**
 LysoPG: **Lysophosphatidylglycerol**
 LysoPC: **Lysophosphatidylcholine**
 LysoPE: **Lysophosphatidylethanolamine**

Supplementary table 2: Primers used for Real-time PCR

Gene	Primers	
GCLC	forward	5'-ACATCTACCACGCAGTCAAGGACC-3'
	reverse	5'-CTCAAGAACATCGCCTCCATTTCAG-3'
GCLM	forward	5'-GCCCGCTCGCCATCTCTC-3'
	reverse	5'-GTTGAGCAGGTTCCCGGTCT-3'
NQO1	forward	5'-AGCGTTCGGTATTACGATCC-3'
	reverse	5'-AGTACAATCAGGGCTCTTCTCG-3'
HO-1	forward	5'-ACGCATATACCCGCTACCTG-3'
	reverse	5'-CCAGAGTGTTTCATTTCGAGCA-3'