funakoshi
FRONTIERS IN LIFE SCIENCE

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Tokyo 113-0033, Japan

OH-Pen <Lipid Radical Inhibitor>

Catalog NO. FDV-0043

Research use only, not for human or animal therapeutic or diagnostic use.

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Product Background

Lipid **p**er**o**xidation (LPO) is one of the several degradation processes of lipids under oxidative stress (Figure 1). Primary products in LPO are lipid radicals and there are two major initiators to induce LPO process, pro-oxidants and lipid oxidative enzymes including lipoxygenase (LOX) and cytochrome P450 (CYP). 1) For pro-oxidant-induced LPO, lipids containing unsaturated fatty acid, especially polyunsaturated fatty acids (PUFAs), are attacked by pro-oxidants including reactive oxygen species (ROS) and form lipid-derived radicals. Lipid radical (L・) can be easily oxidized to lipid peroxyl radical (LOO・). Unstable LOO・ immediately extracts a hydrogen from another lipid molecule generating a lipid hydroperoxide (LOOH) and a new lipid radical (L・). 2) Another pathway enzyme-induced LPO, lipids containing PUFAs are oxidized to lipid hydroperoxides (LOOH), which decomposes to lipid peroxyl radicals LOO・ or alkoxyl radicals LO・ by metal ions (Fe^{2+} etc.). Once lipid radical is produced by the above two processes, lipid radicals expand the radical chain reaction (radical propagation step). In the termination reaction, antioxidants donate a hydrogen atom to the lipid peroxy radical (LOO・) species resulting in the formation of many different aldehydes including malondialdehyde (MDA), acrolein, propanal, hexanal, and 4-hydroxynonenal (4-HNE). These aldehydes are cytotoxic because reactive aldehydes attack biomolecules (proteins, DNA/RNA, etc.) to form secondary products. These reactive aldehydes are considered causative factors of organ injury, ferroptosis and ER-stress. To understand the molecular mechanism and physiological relevance of LPO, lipid radical-specific inhibitors are very powerful tools. OH-Pen is a unique lipid radical-specific inhibitor and will not react with reactive oxygen species. Funakoshi also has lipid radical-specific detector, **LipiRADICAL™ Green** (#FDV-0042).

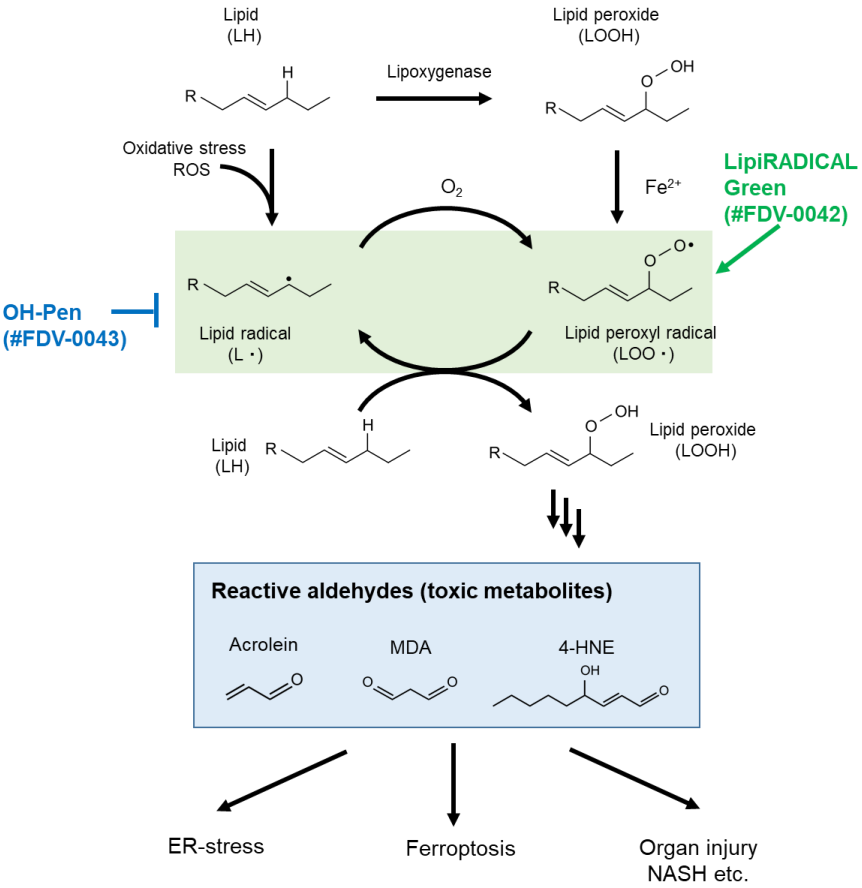

Figure 1. Overview of lipid radicals in LPO pathway

Description

Catalog Number: FDV-0043
Size: 0.1 mg
Formulation: $C_{13}H_{26}NO_2$・
Chemical structure: See Fig. 2
Molecular weight: 228.19g/mol
Solubility: Soluble in DMSO
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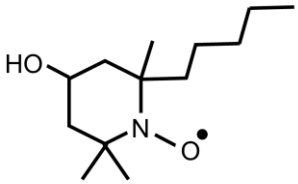

Figure 2. Chemical structure

Reconstitution and Storage

Reconstitution: stock solution recommended concentration 1-10 mM in 100% DMSO.
Storage :
Store powder at -20ºC.
After reconstitution in DMSO, aliquot and store at -20 °C, avoid repeated freeze-thaw cycles.

Application data

Inhibition of nitrosamine-induced carcinogenesis by OH-Pen

Rats received diethylnitrosamine (DEN, 100 mg/kg body weight), which is a well-known hepatic procarcinogen. Subsequently, rats received OH-Pen (2.5 µmol/kg body weight) by intraperitoneal injection after 1 hour DEN administration. For the acute model and chronic model, livers were dissected after 24 hours and 12 weeks DEN administration, respectively.

(Upper panel) Livers from chronic hepatocelluar carcinoma model and total foci number
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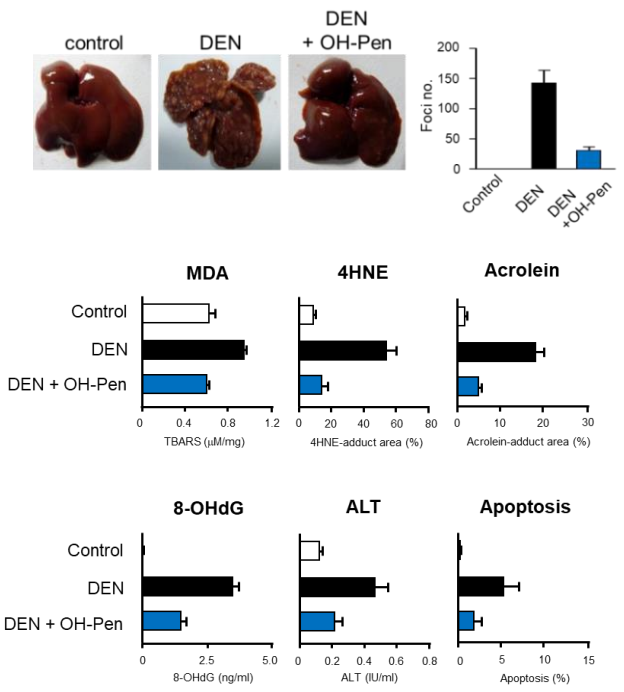
(Middle panel) Quantification of LPO-derived aldehydes in acute model livers.

(Lower panel) Quantification of tissue damage markers. In all panels, OH-Pen clearly suppressed DEN-induced hepatocellular carcinoma.



Reference

1. Yamada *et al., Nat. Chem. Biol.*, **12**, 608-613 (2016) Fluorescence probes to detect lipid-derived radicals.
2. Matsuoka *et al., Anal. Chem.*, **92**, 6993-7002, (2020) Method for structural determination of lipid-derived radicals

Related products

LipiRADICAL™ Green <Lipid Radical Detection Reagent>

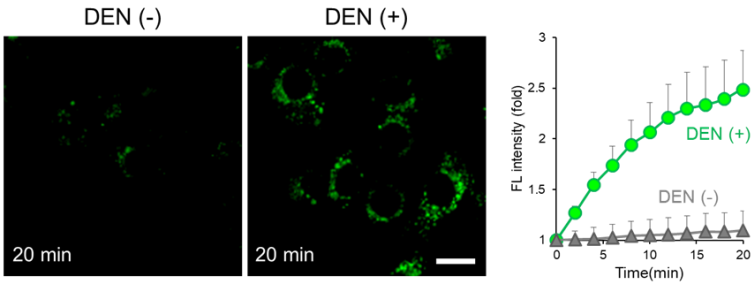
LipiRADICAL™ Green is a specific fluorescent dye for lipid-derived radicals which are the most upstream factor of lipid peroxidation (LPO). LipiRADICAL™ Green can be applied into both *in vitro* assay and cell-based assay to monitor lipid radical productions.

Catalog No. FDV-0042
Size 0.1 mg
Features

- Recommended Ex/Em:~480 nm / 540 nm
- Enable to detect very unstable lipid-derived radicals
- Compatible with *in vitro* assay and in cell-based assay
- An innovative reagent for comprehensive identification of lipid-derived radicals by lipidomics

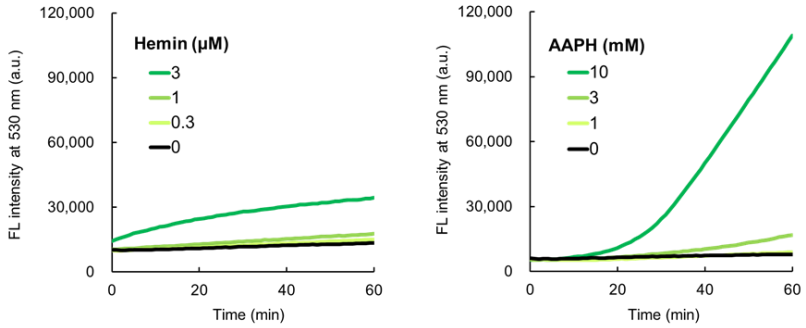
Application note 1; Cell-based detection of lipid radicals induced by diethylnitrosamine (DEN)

Hepa1-6 cells were treated with 1 μM of **"LipiRADICAL™ Green"** for 20 min and washed twice with PBS. For inducing an LPO signal, the cells were co-treated with diethylnitrosamine (DEN) and **"LipiRADICAL™ Green"**, an LPO initiator. Immediately after DEN addition, the cells were observed by confocal microscopy (Ex.458 nm/ Em. 490-674 nm) for 20 min with 2 min interval. The fluorescent signal of **"LipiRADICAL™ Green"** from the DEN-treated cells clearly increased.



Application note 2; *in vitro* detection of lipid radicals derived from LDL

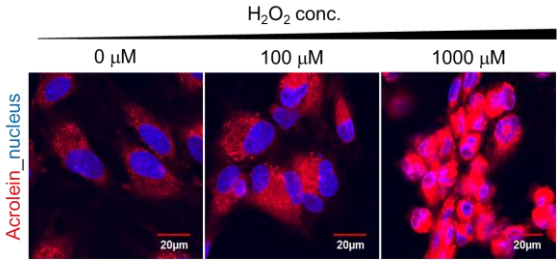
Purified low-density lipoprotein (LDL, 20 μg protein/mL) was mixed with pro-oxidants hemin or AAPH and "**LipiRADICAL Green™"** and the green fluorescence (Ex. 470 nm/ Em 530 nm) was measured for 60 min at 37ºC. Both hemin and AAPH increased green fluorescence indicating the production of lipid radicals from LDL particles in a time-dependent manner.



AcroleinRED™ <Cell-based Acrolein Detection Reagent>

Acrolein is a LPO downstream aldehyde and one of the most toxic oxidative stress marker. AcroleinRED™ is the world first cell-based acrolein detection reagent.

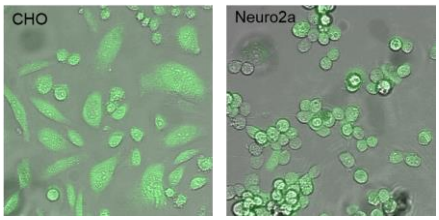
Catalog No. FDV-0022
Size 0.5 mg
Features
- Easy and quick protocol
- Enable to monitor acrolein production under live cells with various stimulations



CellFluor™ GST <Cell-based GST Activity Assay Reagent >

Glutathione *S*-Transferases (GSTs) are major detoxication enzyme family which neutralize LPO-derived toxic aldehydes. CellFluor™ GST is a novel fluorescent probe for monitoring wide GST members' activity both in cell and *in vitro*. CellFluor™ GST releases green fluorophore rhodamine 110 upon GST activities. This probe has cell-permeability and can detect intracellular GST activity.

Catalog No. FDV-0031
Size 0.1 μmol
Features
- Easy and quick protocol
- Broad specificity for various GST family members
- Ex/Em: 496 nm/520 nm (commercial FITC filters are available)



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