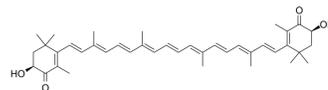


## Astaxanthin

|                           |  |
|---------------------------|--|
| <b>Cat. No.:</b>          | HY-B2163   |
| <b>CAS No.:</b>           | 472-61-7   |
| <b>Molecular Formula:</b> | C <sub>40</sub> H <sub>52</sub> O <sub>4</sub>   |
| <b>Molecular Weight:</b>  | 596.84   |
| <b>Target:</b>            | PPAR; Reactive Oxygen Species; STAT; NF-κB; Apoptosis  |
| <b>Pathway:</b>           | Cell Cycle/DNA Damage; Metabolic Enzyme/Protease; Vitamin D Related/Nuclear Receptor; Immunology/Inflammation; NF-κB; JAK/STAT Signaling; Stem Cell/Wnt; Apoptosis |
| <b>Storage:</b>           | -20°C, protect from light, stored under nitrogen<br>* The compound is unstable in solutions, freshly prepared is recommended.                                      |



### SOLVENT & SOLUBILITY

|   |   |                          |              |           |            |
|---|---|--------------------------|--------------|-----------|------------|
| <b>In Vitro</b>   | DMSO : 2 mg/mL (3.35 mM; Need ultrasonic)<br>Acetone : < 1 mg/mL (insoluble)  |                          |              |           |            |
|   |   | Solvent<br>Concentration | Mass<br>1 mg | 5 mg      | 10 mg      |
|   | <b>Preparing Stock Solutions</b>  | 1 mM                     | 1.6755 mL    | 8.3775 mL | 16.7549 mL |
|   |   | 5 mM                     | ---          | ---       | ---        |
|   |   | 10 mM                    | ---          | ---       | ---        |
| Please refer to the solubility information to select the appropriate solvent. |   |                          |              |           |            |
| <b>In Vivo</b>  | 1. Add each solvent one by one: 0.5% CMC-Na/saline water<br>Solubility: 3.33 mg/mL (5.58 mM); Suspended solution; Need ultrasonic and warming<br><br>2. Add each solvent one by one: 20% HP-β-CD in saline<br>Solubility: 3.33 mg/mL (5.58 mM); Suspended solution; Need ultrasonic and warming |                          |              |           |            |

### BIOLOGICAL ACTIVITY

|                                     |   |       |
|-------------------------------------|---|-------|
| <b>Description</b>                  | Astaxanthin, the red dietary carotenoid, is an orally effective and potent antioxidant. Astaxanthin inhibits NF-κB and down-regulates VEGF in blood glucose. Astaxanthin exerts anti-cancer cell proliferation, increases apoptosis, impairs migration and invasion by activating PPAR $\gamma$ and reducing the expression of STAT3. Astaxanthin also has neuroprotective and anti-inflammatory activity and can be used in studies of cancer, diabetic retinopathy, cardiovascular disease, and in the coloring of animal feed <sup>[1][2][3][4][5]</sup> . |       |
| <b>IC<sub>50</sub> &amp; Target</b> | PPAR $\gamma$   | STAT3 |
| <b>In Vitro</b>                     | Astaxanthin (50, 100, 150, 200 $\mu$ M; 48 h) inhibits the proliferation of DU145 cells (IC <sub>50</sub> <200 $\mu$ M) <sup>[1]</sup> .  |       |

Astaxanthin (200  $\mu$ M; 24 h) reduces the expression of STAT3 and the related pathway proteins (at both protein and mRNA levels) by inhibiting proliferation, increasing apoptosis and weakening migration and invasion<sup>[1]</sup>

Astaxanthin protects RPE cells from abnormal activation and oxidative stress (induced by high glucose) by down-regulating VEGF in high glucose at protein levels<sup>[2]</sup>.

Astaxanthin (1-50  $\mu$ M; 72 h) upregulates protein expression of PPAR $\gamma$  in time- and dose-dependent manners in K562 cells<sup>[3]</sup>.

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

#### Apoptosis Analysis<sup>[1]</sup>

|                  |   |
|------------------|---|
| Cell Line:       | DU145 cells   |
| Concentration:   | 200 $\mu$ M (pre-incubation)  |
| Incubation Time: | 24 h  |
| Result:          | Increased the percentage of apoptotic cells from 8.5% to 13.1% (compared to blank control). |

#### Cell Migration Assay <sup>[1]</sup>

|                  |  |
|------------------|--|
| Cell Line:       | DU145 cells  |
| Concentration:   | 200 $\mu$ M  |
| Incubation Time: | 24 h   |
| Result:          | Decreased the migration and invasion of DU145 cells (about 41% of cells could not pass from one chamber to another, and 36% cells could not pass through the transwell membrane as compared to the control group). |

#### Cell Proliferation Assay<sup>[2]</sup>

|                  |   |
|------------------|---|
| Cell Line:       | ARPE-19 cells   |
| Concentration:   | 50 $\mu$ M (pre-incubation)   |
| Incubation Time: | 7 days  |
| Result:          | Significantly decreased cell proliferation exposed to high glucose. |

#### Western Blot Analysis<sup>[1]</sup>

|                  |  |
|------------------|--|
| Cell Line:       | DU145 cells  |
| Concentration:   | 200 $\mu$ M  |
| Incubation Time: | 24 h   |
| Result:          | Reduced the expression of STAT3 at both protein and mRNA levels (downregulated the protein expression of JAK2, BCL-2 and NF- $\kappa$ B and upregulated the protein expression of BAX, Caspase3 and Caspase9). |

#### Western Blot Analysis<sup>[3]</sup>

|                  |              |
|------------------|--------------|
| Cell Line:       | K562 cells   |
| Concentration:   | 1-50 $\mu$ M |
| Incubation Time: | 72 h         |

|         |  |
|---------|--|
| Result: | Significantly promoted PPAR $\gamma$ protein expression in time- and dose-dependent manners. |
|---------|--|

### In Vivo

Astaxanthin (200 mg/kg; intragastric administration; once daily for 3 weeks) inhibits the growth of DU145 tumor xenografts in nude mice<sup>[1]</sup>.

Astaxanthin (125 or 500 mg/kg; in animal feedings; 7 days) provides significant cardioprotection and reduces oxidative stress in rats<sup>[4]</sup>.

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

|               |   |
|---------------|---|
| Animal Model: | Nude mice (approximately 20 g; DU145 tumor xenografts model) <sup>[1]</sup> . |
|---------------|---|

|         |           |
|---------|-----------|
| Dosage: | 200 mg/kg |
|---------|-----------|

|                 |  |
|-----------------|--|
| Administration: | Intragastric administration; once daily for 3 weeks. |
|-----------------|--|

|         |  |
|---------|--|
| Result: | Exerted a significant inhibitory effect on tumor growth. |
|---------|--|

|               |  |
|---------------|--|
| Animal Model: | Female C57BL/6 mice (7 weeks old) <sup>[4]</sup> . |
|---------------|--|

|         |                  |
|---------|------------------|
| Dosage: | 125 or 500 mg/kg |
|---------|------------------|

|                 |                             |
|-----------------|-----------------------------|
| Administration: | In animal feedings; 7 days. |
|-----------------|-----------------------------|

|         |   |
|---------|---|
| Result: | Significantly reduced mean infarct size in the two treated groups (125 and 500 mg/kg) to 45.1% and 39.1%, respectively.<br>Exhibited myocardial salvage of 26 and 36% for 125 and 500 mg/kg groups, respectively.<br>Significantly reduced level of 9-HETE in a dose-dependent manner. 9-HETE is a regioisomer oxidation product of arachidonic acid believed to be a product of free radical-mediated oxidation. |
|---------|---|

## CUSTOMER VALIDATION

- Biomed Pharmacother. 2023 Sep 10;167:115471.
- Chem Biol Interact. 2023 Aug 28;110684.
- Exp Biol Med. 2023 Jan 23;15353702221147568.
- Acta Histochem. 2023 Jun 19;125(6):152069.
- Research Square Preprint. 2022 May.

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## REFERENCES

[1]. Sun SQ, et al. Anti-Tumor Effects of Astaxanthin by Inhibition of the Expression of STAT3 in Prostate Cancer. Mar Drugs. 2020 Aug 7;18(8):415.

[2]. Fu D, et al. Effect of astaxanthin on retinal pigment epithelial cells in high glucose: an in-vitro study. Biomed Res, 2017, 28(15): 6839-6843.

[3]. Zhang X, et al. Carotenoids inhibit proliferation and regulate expression of peroxisome proliferators-activated receptor gamma (PPAR $\gamma$ ) in K562 cancer cells. Arch Biochem Biophys. 2011 Aug 1;512(1):96-106.

[4]. Gross GJ, et al. Seven day oral supplementation with Cardax (disodium disuccinate astaxanthin) provides significant cardioprotection and reduces oxidative stress in

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rats. Mol Cell Biochem. 2006 Feb;283(1-2):23-30.

[5]. Zhang L, et al. Multiple Mechanisms of Anti-Cancer Effects Exerted by Astaxanthin. Mar Drugs. 2015 Jul 14;13(7):4310-30.

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**Caution: Product has not been fully validated for medical applications. For research use only.**

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