

## IARC Handbooks of Cancer Prevention Primary preventive agents and activities

| Agents (CAS Registry No.)   | Volume (year) | Evidence for cancer-preventive effect  |            | Overall evaluation, or evidence                            | Organ site(s)   |
|---|---------------|--|------------|--|---|
|   |               | Humans   | Animals    |  |   |
| Aspirin (50-78-2)   | 1 (1997)      | Limited  | Sufficient | Limited  | Colon, rectum   |
| Indomethacin (53-86-1)  | 1 (1997)      | Inadequate   | Sufficient | Inadequate   |   |
|   |               |  |            | <i>Familial adenomatous polyposis: limited<sup>a</sup></i> |   |
| Piroxicam (36322-90-4)  | 1 (1997)      | Inadequate   | Sufficient | Inadequate   |   |
| Sulindac (38194-50-2)   | 1 (1997)      | Inadequate<br><i>Familial adenomatous polyposis: limited</i>   | Sufficient | Inadequate   |   |
|   |               |  |            | <i>Familial adenomatous polyposis: limited<sup>a</sup></i> | Colon, rectum   |
| Beta-Carotene (7235-40-7)   | 2 (1998)      | <i>Dietary levels: inadequate</i><br><br><i>High doses: evidence suggesting lack of cancer-preventive effect</i> | Sufficient | Inadequate <sup>b</sup>                                    |   |
| Alpha-Carotene (7488-99-5)  | 2 (1998)      | Inadequate   | Limited    | Inadequate   |   |
| Lycopene (502-68-5)   | 2 (1998)      | Inadequate   | Limited    | Inadequate   |   |
| β-Cryptoxanthin (472-70-8)  | 2 (1998)      | Inadequate   | No data    | Inadequate   |   |
| Canthaxanthin (514-78-3)  | 2 (1998)      | No data  | Sufficient | Inadequate   |   |
| Fucoxanthin (3351-86-8)   | 2 (1998)      | Inadequate   | Limited    | Inadequate   |   |
| Lutein (127-40-2)   | 2 (1998)      | Inadequate   | Limited    | Inadequate   |   |
| Zeaxanthin (144-68-3, 29472-68-2)                                       | 2 (1998)      | Inadequate   | No data    | Inadequate   |   |
| Vitamin A compounds:<br>Retinol (68-26-8)<br>Retinyl acetate (127-47-9) | 3 (1998)      | <i>Preformed vitamin A: evidence suggesting lack</i>   | Limited    | <i>Preformed vitamin A: evidence suggesting lack</i>       | Upper aerodigestive tract, stomach, colon, rectum, lung, breast (postmenopausal), prostate, bladder |

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| Retinyl palmitate (79-81-2)<br>Retinal (116-31-4) |               | of cancer-preventive effect           |            | of cancer-preventive effect <sup>c</sup> |  |
| All- <i>trans</i> -retinoic acid (302-79-4)       | 4 (1999)      | Inadequate                            | Inadequate | Inadequate                               |  |
| 13- <i>cis</i> -Retinoic acid (4759-48-2)         | 4 (1999)      | Limited                               | Limited    | Limited                                  | Oral cavity, aerodigestive tract (second primary)                        |
| 9- <i>cis</i> -Retinoic acid (5300-03-8)          | 4 (1999)      | Inadequate                            | Limited    | Inadequate                               |  |
| 4-Hydroxyphenyl-retinamide (65646-68-6)           | 4 (1999)      | Inadequate                            | Sufficient | Limited <sup>d,e</sup>                   |  |
| Etretinate (54350-48-0)                           | 4 (1999)      | Inadequate                            | Limited    | Inadequate                               |  |
| Acitretin (160024-33-9)                           | 4 (1999)      | Inadequate                            | Inadequate | Inadequate                               |  |
| N-Ethylretinamide (33631-41-3)                    | 4 (1999)      | Inadequate                            | ESLE       | Inadequate                               |  |
| Targretin (153559-49-0)                           | 4 (1999)      | Inadequate                            | Inadequate | Inadequate                               |  |
| LGD 1550 (178600-20-9)                            | 4 (1999)      | Inadequate                            | Inadequate | Inadequate                               |  |
| Sunscreens  | 5 (2001)      | Limited                               | Sufficient | Limited                                  | Skin (squamous cell carcinoma)   |
| Weight control - see "Absence of body fatness"    |               |                                       |            |  |  |
| Regular physical activity                         | 6 (2002)      | Sufficient                            |            | Cancer-preventive effect                 | Colon, breast (sufficient)<br>Corpus uteri, prostate (limited)           |
| Fruit and vegetables                              | 8 (2003)      | Limited                               | Sufficient | Cancer-preventive effect <sup>e</sup>    | Mouth and pharynx, larynx, oesophagus, stomach, colorectum, lung, kidney |
| - Fruit   | 8 (2003)      |                                       |            | Probable cancer-preventive effect        | Oesophagus, stomach, lung  |
|   |               |                                       |            | Possible cancer-preventive effect        | Mouth, pharynx, larynx, colorectum, kidney, urinary bladder              |
| - Vegetables                                      | 8 (2003)      |                                       |            | Probable cancer-preventive effect        | Oesophagus, colorectum   |
|   |               |                                       |            | Possible cancer-preventive effect        | Mouth, pharynx, larynx, stomach, lung, ovary, kidney                     |

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| Cruciferous vegetables         | 9 (2004)      | Limited                               | Sufficient | Probable cancer-preventive effect <sup>e</sup> | Stomach, lung   |
| - Isothiocyanates              |               | Inadequate                            |            |  |   |
| - Indoles                      |               | Inadequate                            |            |  |   |
| - Phenethyl isothiocyanate     |               |                                       | Sufficient |  |   |
| - Benzylisothiocyanate         |               |                                       | Sufficient |  |   |
| - 3-Phenylpropylisothiocyanate |               |                                       | Sufficient |  |   |
| - Indole-3-carbinol            |               |                                       | Sufficient |  |   |
| - 3,3'-Diindolylmethane        |               |                                       | Sufficient |  |   |
| - Glucosinolates               |               |                                       | Limited    |  |   |
| - Sulforaphane                 |               |                                       | Limited    |  |   |
| Absence of excess body fatness | 16 (in prep.) | Sufficient                            | Sufficient | Cancer-preventive effect                       | Oesophagus (adenocarcinoma), stomach (gastric cardia), colon and rectum, liver, gallbladder, pancreas, breast (postmenopausal), corpus uteri, ovary, kidney (renal-cell), meningioma, thyroid, multiple myeloma |

ESLE, evidence suggesting lack of effect

The wordings of the evaluation read as follows:

<sup>a</sup> "Some evidence"

<sup>b</sup> "Conflicting evidence"

<sup>c</sup> "Little evidence"

<sup>d</sup> "Shows promise as cancer-preventive agent"

<sup>e</sup> With supporting evidence from mechanistic data

<sup>f</sup> "Indicative evidence"

Last updated 30 January 2018