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The following statements and products have not been evaluated by the Food and Drug Administration. Dietary supplements are not intended to diagnose, treat, cure or prevent any disease.

The following information and contents of this report are based upon medical, university and health industry research. This information is provided for educational purposes and is intended to complement and does not replace the health care advice and relationship received from a physician or qualified healthcare professional.

I've made every reasonable attempt to conduct a thorough search of the published medical literature. The possibility always exists that some significant articles may be missed. Not all research articles are summarized in these reports.

You should consult with your healthcare practitioner before making any changes in your cancer treatment program. It may be helpful to give this report to your healthcare provider when requesting a change in your cancer treatment program.

I've left some of the scientific and medical terms in this report for your doctors. I'm sorry that they

are difficult to understand.

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Radiation Cancer Treatment – Natural Treatment Support

Curcumin

In laboratory studies curcumin has radiosensitizing (increased effectiveness of radiation) effect on human nasopharyngeal carcinoma CNE-2 cells.¹

Curcumin enhanced Oral Squamous Cell Carcinoma radiosensitivity through the inhibition of radiation-induced NF- κ B activity and expression of effector proteins both in laboratory cell studies and mouse cancer studies. With 4 Gy or greater radiation doses, synergistic effects of curcumin were observed. The combination group (curcumin plus radiation) had significantly better tumor control compared with that of curcumin or radiation alone.²

The Department of Radiation Oncology, Perelman School of Medicine, University of Pennsylvania found in laboratory tests Head and Neck Squamous Cell Carcinoma (HNSCC) cell tests curcumin was effective at increasing the radiation response of the radiation resistant HPV (-) cell lines it had no effect on the HPV (+) cells. After the successful test the researchers tested the combination of oral curcumin and radiation in mice with HPV (-) HNSCC. The researchers stated *"The combination of curcumin feeding and fractionated RT had a significant effect on tumor doubling time and overall animal survival. We therefore propose that curcumin and RT should be*

*considered as a first line treatment of HPV (-) HNSCC."*³

An extensive research overview of the effects of curcumin, including its positive effect with radiation treatment, on HNSCC by the Department of Surgery, VA Greater Los Angeles Healthcare System, West Los Angeles, CA is available at:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3055228/>

The Tel Aviv University School of Medicine found curcumin inhibited HNSCC cell growth and augmented the effect of radiation in laboratory cell studies and in animal studies.⁴

The University of Rochester Medical Center gave oral curcumin or placebo to breast cancer patients undergoing radiation treatment. Curcumin significantly reduced radiation induced dermatitis compared to the placebo group.⁵

Medical research studies demonstrate curcumin improves the efficacy of radiation treatment for:

- Breast Cancer (cell study)⁶
- Burkitt's lymphoma (cell study)⁷
- Colorectal cancer (cell studies)⁸⁹
- Ewing's sarcoma (cell study)¹⁰
- Head and neck cancer (cell and animal studies)¹¹
- Liver cancer (cell study)¹²
- non-Hodgkin's lymphoma (cell study)¹³
- Pancreatic cancer (cell study)¹⁴

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- Oral Squamous Cell Carcinoma (cell study)¹⁵
- Neuroblastoma (cell study)¹⁶
- Rhabdomyosarcoma (cell study)¹⁷
- Squamous carcinoma (cell study)¹⁸
- Research review prior to 2009 was suspended due to time limitations.

Since curcumin has poor water solubility and is not well absorbed many researchers and drug companies are developing and testing many different semi-synthetic oral and injection versions.^{19 20 21}

Tap or click on the following links to learn about [CurcuPlex CR](#) and [DIMension-3](#).

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Diindolylmethane (DIM)

The Department of Radiation Oncology, Wayne State University found DIM was effective at increasing radiation-induced cell killing in two different prostate cancer cell lines. DIM inhibited NF- κ B and HIF-1 α DNA activities and blocked radiation induced activation of these transcription factors. The researchers also found in mice with PC3 prostate tumors DIM and radiation resulted in significant primary tumor growth inhibition and control of metastasis. Researcher state, "*DIM augments radiation-induced cell killing and tumor growth inhibition. DIM impairs critical survival signaling pathways activated by radiation, leading to enhanced cell killing. These novel observations suggest that DIM could be used as a safe compound to enhance the efficacy of radiotherapy for castrate-resistant Prostate Cancer.*"²²

Researchers at Texas A&M University found DIM inhibited proliferation and induced apoptosis in colon and pancreatic cancer cell lines. Treatment with DIM decreased survivin protein within 2 hours. Radiation treatment of the cancer cells increased survivin after 24 to 48 hours. "*In cancer cells co-treated with gamma-radiation and DIM, induction of survivin by radiation was inhibited suggesting applications for these drugs in combination cancer chemotherapy with gamma-radiation.*"²³

Tap or click on the following links to learn about [DIMension-3](#).

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EPA (eicosapentaenoic) and DHA (docosahexaenoic)

A human study of patients with head and neck and esophageal tumors found enteral feeding (oral or tube feeding) with omega-3 fatty acids EPA and DHA supplement when compared to placebo decreased the loss of Body Cell Mass (includes muscle mass), body weight, and fat free mass and improved functional status (ability to continue daily activities).²⁴

A lung adenocarcinoma cell study found adding DHA to ionizing radiation treatment showed significant decreases in cell proliferation and colony formation compared to radiation alone. DHA supplementation increased the ionizing oxidative stress and enhanced tumor cell death.²⁵

Ramos cells are a highly radiation-resistant and p53-deficient Burkitt's lymphoma cell line. A low concentration of DHA inhibited Gamma-IR-induced activation of NF-kappaB and sensitized Ramos cells to IR-induced cytotoxicity (radiation induced cell damage).²⁶

Rats with chemically induced breast cancer were given either given a placebo or DHA in their diet. Tumor size decreased by 60% at 12 days after irradiation in the DHA group vs. 31% in the control group ($p = 0.03$) and 36% in the DHA plus vitamin E group. Dietary DHA sensitized mammary tumors to radiation. The addition of

vitamin E inhibited the beneficial effect of DHA.²⁷

The Department of Radiology at the University of Iowa found EPA, and DHA supplementation prior to, during, and after irradiation can enhance the radiation-induced cytotoxicity of rat astrocytoma cells.²⁸

A human study found supplementation of EPA reduces immunosuppression of induced by surgery, chemotherapy and radiation therapy.²⁹

Click or tap on the following links to learn more about [CodPure Plus](#), [Omega Pure](#), or [OmegaPure DHA](#).

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EGCG (Epigallocatechin-3-gallate)

CAUTION: In a cell study of prostate cancer EGCG decreased the effectiveness of radiation treatment.³⁰

EGCG enhances radiation treatment of leukemia cells.(cell study)³¹

EGCG enhances radiation treatment of cervical carcinoma, myelogenous leukemia, and multiple myeloma (cell studies).³²

There are not enough studies demonstrating positive effects. I'm not convinced that EGCG supplementation with radiation treatment provides beneficial outcomes.

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Resveratrol

Resveratrol can act as a sensitizer to enhance the therapeutic effects of ionizing radiation against cancer cells.³³

Resveratrol enhances radiation effectiveness in non-small cell lung cancer (NSCLC). (cell study)³⁴

Cancer cell lines treated with resveratrol and piperine exhibited significantly augmented radiation induced cancer cell death and loss of mitochondrial membrane potential, presumably through enhanced ROS generation. Researchers stated "*Applying natural products as sensitizers for radiation induced apoptotic cell death offers a promising therapeutic approach to treat cancer.*"³⁵

Piperine, black pepper extract, is added to herbal products to increase absorption and blood levels of the ingredients.

Resveratrol sensitizes and enhances radiation prostate cancer tumor DNA damage and cell death. (cell study)³⁶

Resveratrol sensitizes brain cancer teratoid/rhabdoid (AT/RT) tumor cells to radiation treatment and enhances antiproliferative, tumor cell death and "*may therefore improve the clinical treatment of AT/RT.*" (cell study)³⁷

Treating melanoma cancer cells first with radiation and then second with resveratrol improved melanoma cell death and necrosis.³⁸

Resveratrol enhanced pancreatic cancer cell radiation treatment and demonstrated increased cancer cell death.³⁹

Resveratrol enhanced glioblastoma radiation treatment by delaying cancer cell growth. Resveratrol by itself also delayed glioblastoma cancer cell growth.⁴⁰

Resveratrol significantly enhances Prostate cancer DU145 radiation treatment cell death.⁴¹

Low doses of resveratrol protected breast cancer cells from radiation and chemotherapy treatment while high doses enhanced the effectiveness of radiation and chemotherapy.⁴²

Tap or click on the following link to learn about [Resveratin by Xymogen.](#)

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Vitamin D3

Research studies demonstrate Vitamin D3 improves the efficacy of radiation treatment for:

- Colon cancer (cell study)⁴³
- Breast cancer (cell studies)^{44 45}
46 47
- Oral / Head and Neck Squamous Cell Carcinoma – not researched
- Prostate cancer⁴⁸
- Due to time constraints and many research articles additional evaluation of research pending

Prescription Vitamin D2 (ergocalciferol) is not as strong and does not work as well as non-prescription D3 (cholecalciferol).⁴⁹
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Click or tap on the following link to learn about [Vitamin D3 by Xymogen](#).

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