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### MUCOGUARD powder: supports in the treatment of chemotherapy induced mucositis

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#### ABSTRACT

Chemotherapy – Induced oral mucositis most commonly affects anterior oral cavity where as radiation therapy (RT) potentially affects any mucosal surface exposed, from lips to cervical esophagus. Oral mucositis is a painful inflammatory and ulcerative process of the mucous membrane of the mouth. It is due to the result of chemotherapy/radiotherapy directly impacting on the ability of the epithelium for self-repair, leading to tissue atrophy and ulceration. Chemotherapy-induced oral mucositis causes the mucosal lining of the mouth to atrophy and break down forming ulcers. This article reviews the current available scientific literature regarding the effect of Mucoguard powder as A Natural Nutrient to Promote Healing painful inflammatory and ulcerative process of the mucous membrane of the mouth in cancer patients.

**Keywords:** L-Glutamine, Mucoguard Powder, Chemotherapy, Mucositis.

#### INTRODUCTION

When the body is stressed (from injuries, infections, burns, trauma, or surgical procedures), it releases the hormone cortisol into the bloodstream. High levels of cortisol can lower body's stores of glutamine. Several studies show that adding glutamine to nutrition helps reduce the rate of death in trauma and critically ill people. Clinical studies shows that glutamine supplements strengthens the immune system and reduce infections, particularly infections associated with chemotherapy.

People with cancer have low levels of glutamine. For this reason, some researchers speculate that glutamine may be helpful when added to conventional cancer treatment.

Supplemental glutamine is often given to malnourished cancer patients undergoing chemotherapy or radiation treatments, and chemotherapy induced oral mucositis.

#### Prevalence and diagnosis of oral mucositis

The incidence of the oral mucositis is estimated to be in the range of:

- 100% of patients receiving radiation therapy for head and neck cancers [3, 6, 7].
- Up to 100% of patients undergoing high-dose chemotherapy with hematopoietic stem-cell transplantation [4, 5].
- 30-75% of patients undergoing chemotherapy [3].

### Patho physiology of Chemotherapy-induced Oral Mucosistis (CIOM)

Glutamine in Mucoguard may prevent neurotoxicity of paclitaxel, cisplatin, oxaplatin bortezomib and lenolidamide, and is beneficial in the reduction of the dose-limiting gastrointestinal toxic effects of irinotecan and 5-FU-induced mucositis and stomatitis. Dietary glutamine in mucoguard reduces the severity of the immunosuppressive effect induced by methotrexate and improves the immune status of rats recovering from chemotherapy[15].

Docetaxel appears to be associated with anti-mitotic chemotherapy, resulting apoptotic inducing

mechanism, leading to tumor regression. Causes the mucosal lining of the mouth to atrophy and break down forming ulcers [7].

An early trail of glutamine mucoguard was conducted in 21 women with metastatic breast cancer demonstrated with high-dose paclitaxel ad melphalan (Alkeran) as a conditioning regimen for autologous stem cell transplantation (SCT). Patients who used glutamine experienced a decrease in the severity and duration in patients who crossed over from Saforis to the placebo arm in cycle2, there was suggestion of a carryover effect, with a 36% reduction in the risk of mucositis compared with placebo alone (P=0.027) [14].

### COMPOSITION OF MUCOGUARD POWDER

# MUCOGUARD™

L-Glutamine Powder

Helps support healthy oral & GI tract function

| <b>Supplement Facts</b> |                                |                                      |             |
|-------------------------|--------------------------------|--------------------------------------|-------------|
| Serving size : 6gm      |                                | Total 180gms per container           |             |
| Nutrients               | Average values per 100g powder | Average values serving per 6g powder | % ICMR RDA* |
| Energy                  | 66.67 kcal                     | 4.00kcal                             | **          |
| Protein                 | 0.00g                          | 0.00g                                | **          |
| Carbohydrates           | 16.67g                         | 1.00g                                | **          |
| Fat                     | 0.00g                          | 0.00g                                | **          |
| L-Glutamine             | 83.33g                         | 5g                                   | **          |

\* Indian Council of Medical Research Recommended Daily Allowances. \*\*Not Established.

### Mechanism of Action of L-Glutamine in MUCOGUARD powder

L – Glutamine (Gln) in mucoguard is a neutral amino acid rich in nitrogen that plays an important role in mucosal cellular metabolism. It is also important in acid-base regulation, gluconeogenesis, and as a precursor of nucleotide bases and the antioxidant glutathione It is synthesized in the skeletal muscle and brain. Gln in mucoguard regulates the intracellular redox potential [12].

Reduction of plasma glutamine levels by administration of glutaminase caused edema and ulceration of intestinal mucosa [2].

Studies suggested that Gln in mucoguard might reduce proinflammatory cytokine cascade and can increase collagen and fibroblasts syntheses improving mucosal wound healing [11]. Glutathione, a byproduct of glutamine metabolism protects against oxidant injury. Glutathione decreases levels of prostaglandin E2 (PGE2)

production, which is a strong inflammatory mediator [11].

Many clinical studies have proved that administration of Gln in mucoguard reduces the incidence and severity of Oral mucositis [8].

Glutamine has already proved to be efficacious against radiation and chemotherapy induced intestinal injury [13].

A prospective randomized study shows that glutamine in mucoguard delays oral mucositis in head neck cancer patients. Moreover, it reduces the frequency and duration of grade 3 and grade 4 mucositis [8].

### **Clinical studies on L-Glutamine in MUCOGUARD powder**

A randomized, prospective study was performed between April 2012 and November 2012 on 70 head and neck cancer patients receiving primary or adjuvant radiation therapy. The patients were enrolled into glutamine arm and control arm. Oral glutamine suspension daily 2h before radiation in the study arm (10 g in 1000 ml of water) ( $n = 35$ ) or nothing before radiation; control arm ( $n = 35$ ). Patient's with grade 3 mucositis (14.29%) and grade 4 mucositis (2.86%) in study arm were significantly less ( $P = 0.02$  and  $P = 0.04$ , respectively) in the glutamine arm. The mean duration of grade 3 or worse mucositis (grade 3 and grade 4) was significantly less (6.6 days vs. 9.2 days) in study arm with  $P < 0.001$ . Mean time of onset of mucositis was significantly delayed in patients who took glutamine in comparison to control arm with  $P < 0.001$  [8].

A pilot trial demonstrated that glutamine in mucoguard in the radiotherapy of head and neck cancer significantly reduce the duration and severity of objective oral mucositis during radiotherapy. It may also shorten the duration of  $\geq$  grade 3 mucositis [9].

Fourteen patients received L-alanyl-L-glutamine and 15 received placebo. Mucositis was assessed by the objective oral mucositis score (OMS) and world health organization grading system. There was a significant difference in incidence of mucositis developed in patients receiving placebo compared with those who received L-alanyl-glutamine ( $p=0.035$ ). The number of patients with severe objective mucositis ( $OMS>1.49$ ) was higher in the placebo group compare with the L-alanyl-L-glutamine group (67% VS. 14%  $P=0.007$ ). L-

alanyl-L-glutamine patients experienced less pain (three highest Numeric Rating Scale scores of 1.3/10 vs. 6.3/10 respectively,  $p=0.008$ ). No adverse effects related to the drug or the infusions were noted in either group [16].

Glutamine in mucoguard may also improve the therapeutic index of both chemotherapy and radiation, increasing cytotoxicity while concurrently protecting against toxicity [16].

Supplemental of glutamine in mucoguard during cancer treatment has the potential to obrogate treatment-related oral toxicity.[16].

### **Pharmacokinetics of L-Glutamine in MUCOGUARD**

Pediatric trial in hematopoietic stem cell transplant (HSCT) recipients tested the effect of L-Glutamine in reducing mucositis in 120 children receiving chemotherapy. Patients were randomized in a double-blind manner to receive glutamine at a dose of 2 g/m (2)/dose (maximum dose 4 g) twice daily until 28 days post transplant or discharge if sooner. Mucositis was graded by a modified Walsh scale. Glutamine in MUCOGUARD appears to be safe and beneficial in reducing the severity of mucositis [17].

### **Indications**

Supplementation of Mucoguard during cancer treatment has the potential to obrogate treatment-related oral toxicity. It is required for maximal stimulation of intestinal epithelial cell proliferation by EGF [16].

L-Glutamine in mucoguard has demonstrated significant **anti-tumor toxicity** from the side effects of chemotherapy

Glutamine in mucoguard may **prevent neurotoxicity** of paclitaxel, cisplatin, oxaplatin bortezomib and lenolidamide, and is beneficial in the reduction of the dose-limiting gastrointestinal toxic effects of irinotecan and 5-FU-induced mucositis and stomatitis

L- Glutamine in mucoguard has shown therapeutic affect on Head and Neck cancers by **reducing the severity of oral Mucositis**.

### **Recommended Usage**

One table spoon per day or as Directed by Healthcare practitioner

## SUMMARY AND CONCLUSION

Radiation-induced mucositis is a normal accompaniment of radical radiotherapy to the head and neck area. Normally, the oral mucosa has a relatively high cell-turnover rate. Exposure to ionising radiation leads to mucosal erythema, small whitish patches and ultimately results in confluent mucositis. Mucositis is a result of imbalance between cell loss and cell proliferation. The

intensity of mucositis can be aggravated by chemo and/or radiation.

Bacteria in the oral mucosa can aggravate pre-existing mucositis. Endotoxins released from the gram-negative bacilli can increase inflammation in the mouth.

Clinical Studies have shown that L-Glutamine Supplementation shows promising result in healing mouth sores and digestive lining irritations in chemotherapy induced mucositis.

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