

Lipoblastomas are circumscribed while lipoblastomatosis is diffuse and infiltrative. It is important to completely excise the tumor to avoid leaving residual tumor and to prevent recurrences which mostly occur within 2 years. Confusion with myxoid liposarcoma, well-differentiated liposarcoma, and typical lipomas may occur.

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Wheat Grass Juice in Thalassemia

The recent communication(1) and the article(2) about beneficial effects of wheat grass juice (WGJ) in thalassemia patients were interesting. The possible explanation for beneficial effect of wheat grass juice (WGJ) in thalassemia could be as follows:

Taking a look at heme synthesis, it takes place partially in mitochondria and partially in cytosol. The 1st step in hemesynthesis—condensation of succinyl CoA and glycine to form Δ aminolevulinic acid—is the rate-limiting step. Hence, synthesis of heme can occur at a limited rate. Iron gets incorporated in protoporphyrin in the final step only(3).

Comparing chemical structure of chlorophyll and heme(4), we find that they have strikingly similar structure each having 4 pyrrole rings, with some differences in side attachments, and at centre, there is iron in heme and magnesium in chlorophyll. Considering kinetics of iron absorption, it is known that heme iron is absorbed much better than any other form(5), and hence perhaps chlorophyll also. Considering all these facts together, it is possible that when we give wheat grass juice to patients of thalassemia.

Chlorophyll (being structurally similar to heme), gets absorbed rapidly and to a large extent. At cellular level (in bone marrow), the cells get almost a “readymade” molecule, which after few changes, can be converted to heme. Thus heme production occurs faster.

Since heme production occurs faster, globin chains combine with it and form less of insoluble inclusion bodies, hence less destruction of RBCs. Thus the RBC life span is prolonged. Perhaps studies with radio-isotope labeled WGJ can help us understand absorption, transport and fate of ingested chlorophyll.

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Reply

We are pleased that our recent communication "Natural Antioxidant Therapy For Patients With Hemolytic Anaemia"(1) has sparked some discussion. While wheatgrass juice (WGJ) therapy has been shown to be effective in treating illness (2,3), the exact mechanism(s) of action yet remains uncertain. Historically, the beneficial effects of WGJ have been ascribed to chloro-phyll, bioflavonoids, vitamins, minerals, or some unknown bioactive substance(2). Although Pole offers a range of possible explanations for the beneficial effect of WGJ based on the strikingly similar structures of chlorophyll and heme, we believe alternative explanations for the mechanism of action are more likely. Firstly, heme metabolism does not normally have a salvage mechanism to scavenge protoporphyrin ring structures generated as part of heme degradation, *i.e.* heme is not recycled(4). Hence, it would be unlikely that such molecules obtained from the diet would be salvaged for heme synthesis. Secondly, the defect in beta-thalassemia is the abnormal production of beta-globin chains and not insufficient heme production. Nevertheless,

speculation that the decreased transfusion requirements of patients consuming WGJ may be due to greater haemoglobin and/or red cell stability may have merit. A recent report of preliminary studies by Ioannou et al of WGJ extract in cell culture suggest that WGJ extract induces the production of fetal haemoglobin(5). These results, albeit *in vitro*, raise the possibility that the beneficial effects *in vivo* noted by Marwaha, *et al.*(3) were due to induction of gamma-globin chain synthesis leading to greater fetal haemoglobin content in the red cell; this would result in less redundant alpha-globin chains in the red cell, less Heinz body formation, and greater red cell stability with less red cell destruction. Unquestionably, this hypothesis needs further study, but holds the promise of some very exciting and simple therapeutic possibilities that may preclude the need for repeated blood transfusions.

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