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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 chlorophyll, 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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Hepatic Abscess Caused by *Salmonella typhi*

Hepatic abscess, a rare complication of *Salmonella* infection is associated with high mortality(1). This is the second documented culture positive report of liver abscess due to *Salmonella typhi*(2).

An eight-year-old male was admitted with history of fever with chills for ten days and severe intermittent pain in the epigastrium for three days. On examination he had a temperature of 37.2°C, no pallor, icterus or cyanosis. Vitals were stable.

Systemic examination revealed presence of fullness and lump in the epigastrium over the liver, accompanied by pain, tenderness and guarding. The liver was enlarged to 3.5 cm below the costal margin. Rest of the systemic examination was normal.

Ultrasound abdomen revealed multiple heterogeneous, hypoechoic spherical lesions in both lobes of the liver. A guided needle aspirate (6 mL) from the largest lesion (5.5 × 3.8 cm) in the left lobe was sent for microbiological evaluation. Empirical therapy was started keeping a possibility of a mixed bacterial and parasitic infection.

Liver function test during the second week revealed: total bilirubin; 0.4 mg/dL, AST; 174 IU/L, ALT; 112 IU/L, alkaline phosphatase; 294 mg/dL. Widal test result

in the first week were: somatic O antigen (T_o) = 50, flagellar antigen of serotype Typhie (T_H):>800, flagellar antigen of serotype Paratyphi A (A_H) <50, B_H <50 and in the second week T_o = 100, T_H >800, A_H <50; B_H <50. Amebic sero-conversion observed during second week of illness and was negative thereafter. The abscess aspirate was reddish brown and on direct examination revealed multiple pus cells but no pathogens. Culture yielded *S. typhi*. The abscess became sterile on day fourteen. The bacterium was not isolated from any other sample from the patient. During the hospital stay the patient remained an-icteric. Epigastric tenderness and guarding disappeared after ten days; he became afebrile after twenty-four days of hospitalization and was discharged after six weeks. Thereafter, the patient remained asymptomatic during follow up.

Isolation of *S. typhi* from the aspirate in pure culture and presence of multiple abscesses, reddish brown aspirate and positive qualitative serology for *E. histolytica* were responsible for diagnosis of a mixed bacterial and parasitic infection (3).

However, a repeat serology for *E. histolytica* in the third week was non-reactive, which proved earlier sero-conversion to be an anamnestic response and use of color of the aspirate as contributory to provisional diagnosis, a questionable criterion.

Failure to perform a quantitative test (to observe four fold rise in antibody titers) was