BLACK TEA EXTRACT: A MOST VALUABLE ALTERNATIVE FOR TREATMENT OF BURNS IN DEVELOPING COUNTRIES*

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Introduction: Polygalloyl-glucose esters (PGGEs; polyphenols obtained from nutgalls growing on *Rhus semialata*) have recently been demonstrated to improve healing of burn wounds and reduce scar tissue formation [1], while being non-toxic [2]. Black tea, fermented leaves of *Camellia sinensis*, is also rich in polyphenolic compounds. Furthermore, it is available in high quantities and at low prices in developing countries such as Malawi. Therefore, it might be useful as alternative for dressing materials and topical antimicrobials, which are often in short supply or even unavailable. Aim of the present study was to evaluate an aqueous black tea extract (BTE) for its potential in burn-wound treatment in developing countries.

Material and methods: *Laboratory experiments (The Netherlands).* Aqueous BTE was freeze-dried and subsequently analysed for total contents of polyphenolics and free gallic acid by gravimetry and HPLC [3]. Protein binding and antioxidant activity –two important determinants to predict clinical efficacy– were assessed for dry BTE as described previously [4,5] and compared to a PGGE-reference sample. *Clinical pilot-trial (Malawi).* After approval by the ethical committee and informed consent, ten patients (≥3 years) with fresh partial-thickness or mixed partial- and full-thickness burns of less than 20% of total body surface area were treated with aqueous BTE and compared with routinely treated patients (controls, n=10) for incidence of wound infection, alleviation of pain, wound healing characteristics, and adverse effects.

Results: Dry BTE contained 31.1±3.0% (w/w) total polyphenols and 0.87±0.05% (w/w) free gallic acid (mean±SD; n=3 experiments). In comparison to the PGGE-reference, dry BTE showed significantly (Student's t-test; $p<0.01$) higher ED50-values for protein-binding capacity (0.82±0.05 and 1.50±0.11 mg/ml, respectively) and antioxidant activity (3.8±0.5 and 18.6±3.8 µg/ml, respectively); values representing mean±SD; n=5 experiments. However, the amount of solids (dry BTE) in the preparation intended for clinical use (aqueous BTE) exceeds the ED50-values for protein binding and antioxidant activity 10- and 790-fold, respectively, promising a pharmacotherapeutic effect. This was confirmed in the clinic since aqueous BTE-treated patients showed, in comparison to controls, less *Staphylococcus aureus* infection (1 versus 10 patients, respectively), a better eschar quality (6 versus 3 patients), and reduced hypertrophic scar tissue formation at 3-6 months post burn (1 versus 5 patients). In addition, no adverse reactions were encountered.

Conclusion: Our results indicate that BTE might be a valuable alternative for treatment of burns in developing countries.

References 1. Kreis, et al *Clinical pilot trial report. BRI, Beverwijk, The Netherlands*, 1992, 2. Halkes, et al *Burn* 2002, **28**, 449-453, 3. Delahaye and Verzele *J. Chromatogr.* 1983, **265**, 363-367, 4. Schultz, et al *J. Agric. Food Chem.* 1981, **29**, 823-826, 5. Blois *Nature*, 1958, **181**, 1199-1200.