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## TEST REPORT

# Beneficial effects of water after enrichment with electrons by Qi-Home Cell© – Investigations with cultured cells

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### 1 Background and question of the investigation

According to the homepage of the provider, Qi-Home Cell© was designed for indoor use and, with its efficiency radius of 7.5 m, optimally covers the space of a single-family house. By use of different *in vitro*-tests, we conducted an investigation on the possible beneficial effects of Qi water in comparison to the same tap water which was not exposed to Qi-Home Cell©. The *in vitro*-tests of Dartsch Scientific GmbH are established for more than 10 years in the international scientific literature and have been successfully used for a number of different issues.

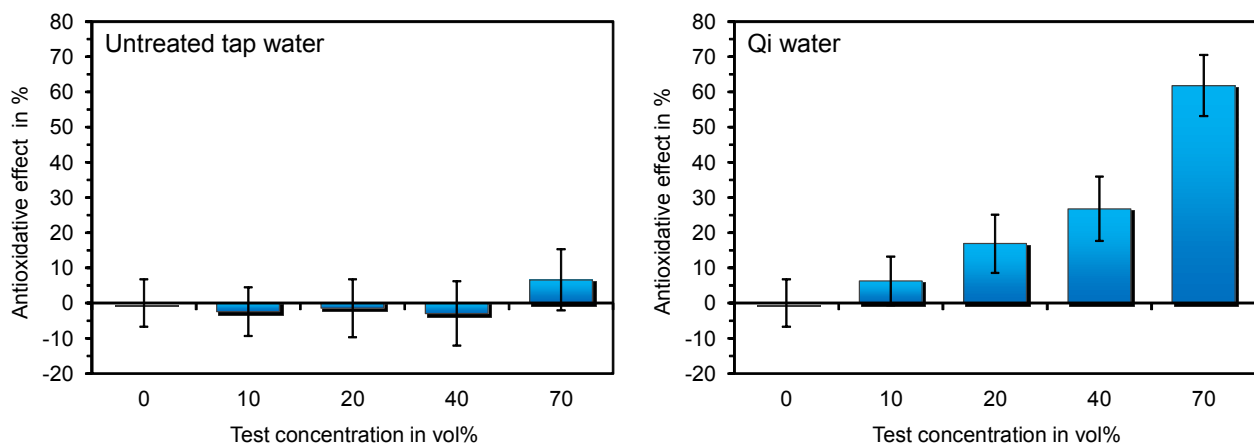
### 2 Experimental design

Tap water was enriched with electrons by treatment with Qi-Home Cell© for 24 hours at a distance of 100 mm (= Qi water). The same tap water without treatment served as a control. The anonymised water samples were sent to Dartsch Scientific GmbH in two different packages at different days. Samples were internally handled by a further anonymisation. The assignment of the samples were stored in a closed envelope by the provider and were opened in the presence of witnesses after the results have been transmitted. By this method, it was assured that the investigations were not influenced in an unwanted way. However, the difference between both water samples was evident und was correctly assigned later on.

### 3 Antioxidative effect

In this cell-free test system, it was tested whether Qi water is able to inactivate free oxygen radicals better than the initial tap water and, thus, prevent oxidative stress. The different concentrations of the two test waters ranging up to 70 vol% and WST-1 (a water-soluble tetrazolium dye; Roche Diagnostics, Mannheim, Germany) were mixed. The reaction was started by the addition of potassium peroxide in distilled water (1 mg/ml). The superoxide anion radicals present in the reaction mixture which were not inactivated by the test water, caused a cleavage of the dye which was accompanied by a change in its optical density (= colour). The optical density was continuously recorded as a differential measurement  $\Delta OD = 450 - 690 \text{ nm}$  on the Elisa reader (BioTekSLx808 with software Gen 5 version 3.00) and, after linear regression of the reaction curves, was evaluated in the form of the slope ( $\Delta OD$  per min) and compared between the two test waters. The relative data for Qi water in comparison to the tap water was finally evaluated. Three parallel experiments were conducted.

As shown in Fig. 1, the untreated tap water had no antioxidative effect at all. In contrast, Qi water which has been enriched with electrons by Qi-Home Cell<sup>©</sup> caused a dose-dependent antioxidative effect with a maximum oxygen radical inactivation of 65 % at a test concentration of 70 vol%. However, a significant antioxidative effect in comparison to untreated control was also achieved at concentrations  $\geq 20 \text{ vol\%}$  of Qi water ( $p < 0,05$ ; Wilcoxon-Mann-Whitney test).



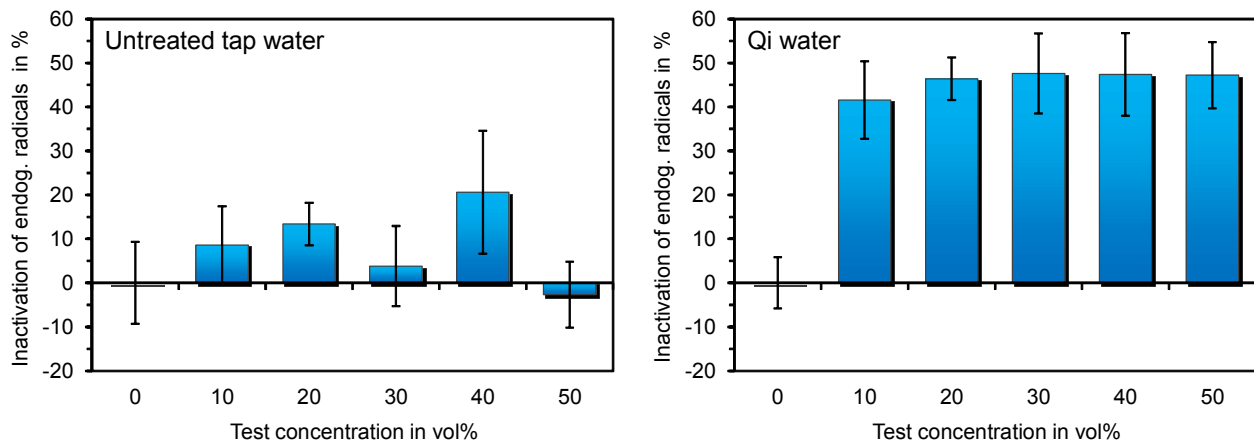
**Fig. 1:** Graphical presentation of the antioxidative effect of Qi water in direct comparison to untreated tap water. It can be easily seen that tap water has no effect, whereas Qi water is able to inactivate free oxygen radicals in a dose-dependent manner with a maximum of 65 % inactivation at a Qi water concentration of 70 vol%. The internal control without test water is set as 0. Data represent mean values  $\pm$  standard deviation of three parallel experiments.

#### **4 Potential for inactivating an excess of endogenously generated radicals**

Neutrophils possess the properties of phagocytic and inflammatory cells in the blood. Besides their phagocytic activity in the blood against penetrated microbial pathogens, cells can also migrate into a pre-damaged tissue area and generate reactive superoxide anion radicals by an oxidative or respiratory burst which may cause further cell damage and keep a chronic inflammatory process going. In case a test substance is able to inactivate the local generation of reactive oxygen radicals by neutrophils, a better healing process might be the result.

Human promyelocytes of cell line HL-60 (ACC-3; ECACC 98070106; Leibniz Institute DSMZ - German Collection for Microorganisms and Cell Cultures, Braunschweig, Germany) were routinely cultured in RPMI 1640 with 10 % growth mixture and 0.5 % gentamycin in an incubator at 37 °C and in a humid atmosphere of 5 % CO<sub>2</sub> and 95 % air. The cells were routinely cultivated in suspension and subcultured regularly on every third day. By a 6 day treatment with 1.5 % dimethylsulfoxide, cells were differentiated to functional neutrophils which possess the properties of phagocytic and inflammatory cells in the blood. By addition of phorbol-12-myristat-13-acetate, cells were stimulated to generate superoxide anion radicals which cause a cleavage and colour change of the tetrazolium dye WST-1 (Roche Diagnostics, Mannheim, Germany). The lower the cleavage of the dye and its change in optical density, less radicals were generated by the cells and present in the reaction mixture. The optical density was continuously recorded by the Elisa reader (Bio-Tek SLx808 with software Gen 5 version 3.00) as a differential measurement  $\Delta OD = 450 - 690$  nm and evaluated after linear regression of the curves (10 to 30 min). The results were calculated as relative values in comparison to the tap water.

In contrast to the dose-dependent antioxidative effect in the case of exogenous free oxygen radicals, the effect of endogenously generated oxygen radicals was dose-independent and almost similar for a test concentrations range from 10 to 50 vol% (Fig. 2). Even the lowest concentration of 10 vol% caused an inactivation by more than 40 % which was not increased markedly up to a test concentration of 70 vol%. Tap water had no effect in this test assay again. For all test concentrations of Qi water, its efficacy against endogenously generated oxygen radicals was statistically significant in comparison to untreated control ( $p < 0,05$ ; Wilcoxon-Mann-Whitney test).



**Fig. 2:** Graphical presentation of the inactivation of endogenously generated oxygen radicals by Qi water in direct comparison to untreated tap water. It can be easily seen that tap water has no effect, whereas Qi water is able to inactivate free oxygen radicals in a dose-independent manner with an average inactivation of about 45 % in the concentration range from 10 to 50 vol%. The internal control without test water is set as 0. Data represent mean values  $\pm$  standard deviation of three parallel experiments.

#### 4 Summary and conclusion

By use of different *in vitro*-tests the beneficial effects of Qi water in comparison to untreated tap water were investigated. Qi water was produced by the enrichment of tap water with electrons via a Qi-Home Cell© for 24 hours at a distance of 100 mm. The samples were anonymised in double form and only the final results were assigned to the appropriate sample. The results clearly demonstrate that Qi water possesses (1) a dose-dependent antioxidative effect against exogenous free oxygen radicals and (2) a dose-independent effect against an excess of endogenously generated radicals as found in inflammatory processes. Therefore, the regular drinking of Qi water can be highly recommended for the improvement and maintenance of well-being.




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