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Putting your health in your own hands: A new strategy for primary stroke prevention

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As evidenced by the increasing stroke burden worldwide, currently used primary stroke prevention strategies are not effective enough. One of the main reasons for insufficient effectiveness of the currently used primary stroke prevention strategies are the lack of community-wide primary preventative interventions, low awareness of the population about their risk factors and risk of having a stroke. Although most strokes are happening in people at low risk of stroke, these people are largely missed out in the currently used high-risk primary stroke prevention strategies and they are not motivated enough to manage their risk factors and reduce the risk of having a stroke. Other important factor that contributes to the lack of effectiveness of the currently used primary stroke prevention strategies is an availability of health professionals in developing countries and cost associated with visiting health practitioners to assess the risk of having a cardiovascular disease. To overcome these barriers AUT University has developed a not-for-profit Stroke Riskometer App that not only allows identification of stroke-related risk factors and estimation of the absolute risk of having a stroke within the next 5 and 10 years but also estimates a relative risk of stroke, thus motivating people at low risk to initiate self-management recommendations for stroke prevention outlined in the app. All stroke prevention recommendations in the App are based on international guidelines for primary stroke prevention. Based on the Framingham stroke prediction algorithm and upgraded to include several additional environmental risk factors for stroke, the App has been endorsed by the World Stroke Organization, World Federation of Neurology and International Association of Neurology and Epidemiology. A new research version of the App for carrying out large international observational and experimental studies on prevention of stroke, heart attack, dementia and diabetes mellitus is being developed and validated on large cohort studies and will be available for free downloads in12 most spoken languages by the end of 2014. This signifies a new paradigm for not only primary prevention of stroke on a population level but also for conducting a research to reduce the burden of stroke, heart attack, dementia and diabetes mellitus worldwide.

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Therapeutic strategies to enhance post stroke recovery of aged brains

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We and others have shown that potential mechanisms for self-repair also operate in the post-ischemic aged brain. Attractive therapeutic strategies to enhance post stroke recovery of aged brains include both physical methods and methods of cellular therapy that can enhance the endogenous restorative mechanisms of the injured brain by supporting processes of neovascularization, neurogenesis and neural reorganization. In the first hours post-stroke H2S-induced hypothermia may be a viable clinical approach to protecting the brain from cerebral injury long-term hypothermia. Since stroke afflicts mostly the elderly, it is highly desirable to test the efficacy of cell therapy in the microenvironment of aged brains that is generally refractory to regeneration. In particular, stem cells from the bone marrow allow an autologous transplantation approach that can be translated in the near future to the clinical practice. Such a bone marrow-derived therapy includes the grafting of stem cells as well as the delayed induction of endogenous stem cell mobilization and homing by the stem cell mobilizer Granulocyte-colony Stimulating Factor (G-CSF). We tested the hypothesis that grafting of bone marrow-derived pre-differentiated mesenchymal cells (BM MSCs) in G-CSF-treated animals improves the long-term functional outcome in aged rodents. To this end, G-CSF alone (50 µg/kg) or in combination with a single dose (106 cells) of rat BM MSCs were administered intravenously to Sprague-Dawley rats at six hour safer transient occlusion (90 min) of the middle cerebral artery. Infarct volume was measured by MRI at 3 and 48 days post-stroke and additionally by immunhistochemistry at day 56. Functional recovery was tested during the entire post-stroke survival period of 56 days. Daily treatment for post-stroke aged rats with G-CSF led to a robust and consistent improvement of neurological function after 28 days. The combination therapy also led to robust angiogenesis in the formerly infarct core and beyond in the "islet of regeneration". However, G-CSF+BM MSCs may not impact at all on the spatial reference-memory task or infarct volume and therefore did not further improve the post-stroke recovery. We suggest that in a real clinical practice involving older post-stroke patients, successful regenerative therapies would have to be carried out for a much longer time.

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