
OBJECTIVE: The aim of this work was to evaluate whether the treatment effects on magnetic resonance imaging (MRI) markers at the trial level were able to predict the treatment effects on relapse rate in relapsing-remitting multiple sclerosis.

METHODS: We used a pooled analysis of all the published randomized, placebo-controlled clinical trials in relapsing-remitting multiple sclerosis reporting data both on MRI variables and relapses. We extracted data on relapses and on MRI "active" lesions. A regression analysis weighted on trial size and duration was performed to study the relation between the treatment effect on relapses and the treatment effect on MRI lesions. We validated the estimated relation on an independent set of clinical trials satisfying the same inclusion criteria but with a control arm other than placebo.

RESULTS: A set of 23 randomized, double-blind, placebo-controlled trials in relapsing-remitting multiple sclerosis was identified, for a total of 63 arms, 40 contrasts, and 6,591 patients. A strong correlation was found between the effect on the relapses and the effect on MRI activity. The adjusted R(2) value of the weighted regression line was 0.81. The regression equation estimated using the placebo-controlled trials gave a satisfactory prediction of the treatment effect on relapses when applied to the validation set.
INTERPRETATION: More than 80% of the variance in the effect on relapses between trials is explained by the variance in MRI effects. Smaller and shorter phase II studies based on MRI lesion end points may give indications also on the effect of the treatment on relapse end points.

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