Effect of omega-3 acid ethyl esters on left ventricular remodeling after acute myocardial infarction

In the past several decades, Omega-3 fatty acids (O3FA) primarily from fish oil have been reported to have many beneficial effects, either directly on the heart or through other effects that indirectly help the heart. However, when it was tested on patients who suffered an acute heart attack by looking at whether patients can live longer by taking omega-3 fatty acids early after the heart attack, there has been some conflicting data in some of the large clinical trials.

There are several major factors that inspired the designs of the current OMEGA-REMODEL study:

Over recent years, many highly effective treatments to improve the survival of heart attack victims have become routine.
The studies in the past used a relatively lower dose of O3FA (1g per day)
Some have also raised the question whether just patient mortality should be the only/best way we should considered in assessing new treatments for heart attack patients.
Cardiac remodeling: after a heart attack, heart muscle not damaged by the initial heart attack insult has to overwork to compensate for the damage from the heart attack. Over time scarring may form in the overworked heart muscle, in addition to weakened heart function, may lead to the heart to fail. New imaging method: a MRI of the heart, can precisely determine the heart function and the amount of scarring of the overworked heart muscle not damaged from the heart attack.

Main results of our OMEGA-Remodel study:

Approximately 360 patients from 3 teaching hospitals in Boston were enrolled. All patients received all standard treatments based on clinical guidelines.
We randomize ½ of the patients to receiving high dose (4 g per day for 6 months) of omega-3 fatty acids after the acute heart attack.
Patients who received O3FA, and specifically those who could absorb proportionally high amount of O3FA into their body, improved the function of the heart and also reduced scarring in the undamaged heart muscle. The amount of improvement in the heart appeared to be proportional to how much O3FA was incorporated into the body.
On average, those who took O3FA had approximately a 6% both in improvement of the heart function and in reducing heart muscle scarring. Those who achieved the highest quartile of O3FA increase had a 13% improvement in heart function. These numbers may sound small but these 360 patients were treated very well at these hospitals and majority of them received and could tolerate all the standard treatments we usually give HA patients, e.g. in the whole spectrum of heart attack patients they were not considered very sick, most with only a mildly weakened heart after the heart attack. So we believe that this observed benefit from O3FA based on imaging can be clinically significant from O3FA.

None of the patients in the study experienced any major side effects from the O3FA.
We also found that some of the blood biomarkers associated with inflammation of the body, were proportionally driven down by O3-FA.
Therapies that can improve healing of the heart or prevent adverse remodeling by suppressing inflammation, remain very limited. There had been other drugs in the past that attempted to suppress inflammation after a HA and turned out to be harmful. So O3FA if it continues to work as promising as our study shows, may offer a hopeful treatment option.

Implications:

We believe this study highlights the benefits of high-dose O3FA (at 4 gram/day) taken during the initial 6 months in heart attack patients: based on evidence from our study that directly visualized heart structures and functions. While it was not the direct focus of our current study, we believe it is logical to infer that O3FA may be a beneficial treatment that reduces incidence of patients' heart failure or even mortality after a heart attack.
While achieve benefits from consumption of fish in patients who suffered a heart attack may appear reasonable, it is not likely that dietary fish intake can achieve benefits on the heart to the extent we observed in our study, because the O3FA content in our study drug was much higher than what can be obtained from consuming a diet high in fatty fish.
More research studies are warranted in further assessing the impact on patient outcomes in large-scale trials, effects from other resembling preparations of O3FA, and cellular mechanisms of O3FA on the heart.

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