In Reply: Dr Kapoor addresses the important issue of rate- vs rhythm-control strategy for AF. We agree that symptomatic patients with persistent AF may benefit from a rhythm-control strategy and recommend therapeutic choices be made on an individual basis. We do not dispute the efficacy of amiodarone in treatment of AF. However, there are other efficacious antiarrhythmics for restoration and maintenance of sinus rhythm that pose less long-term patient risk. For example, the SAFE-T investigators found sotalol and amiodarone similarly efficacious in patients with ischemic heart disease. The SAFET followed up patients (mean age, 67.1 [SD, 9.3] years) for a mean of 3.5 years. In the AFFIRM trial, patients (mean age, 69.7 [SD, 9.0] years) were likewise followed up for a mean of 3.5 years. This period may not adequately reflect the impact of adverse effects on younger patients treated with amiodarone. The AFFIRM investigators noted that patients with AF often need treatment for decades, not years.

Discrepancies between AFFIRM and SAFE-T may be due to differences in patient enrollment and study end points. Patients with self-terminating, short episodes (<2 days) could be enrolled in AFFIRM but not in SAFE-T. Symptomatic patients considered unsuitable for a rate-control strategy may not have been enrolled in AFFIRM. The primary end point of SAFE-T was time to first AF recurrence after sinus rhythm had been restored. Maintenance of sinus rhythm was not a primary end point of AFFIRM. In young patients with paroxysmal AF and no structural heart disease, propafenone, flecainide, and sotalol seem more prudent than long-term amiodarone and are consistent with current American College of Cardiology/American Heart Association/European Society of Cardiology guidelines.

Dr Coceani raises an important question about the safety of amiodarone therapy in CHF. We do not contend that amiodarone per se is beneficial or recommend amiodarone prophylaxis in patients with CHF. Risks, benefits, and alternatives to antiarrhythmic agents should be analyzed carefully in patients with CHF. Negative inotropic or proarrhythmic potential should never be minimized. Dofetilide and amiodarone are the safest options for patients with CHF and atrial tachyarrhythmias who require pharmacotherapy to restore and/or maintain sinus rhythm. Amiodarone is the safest agent for patients with CHF who require pharmacotherapy (beyond β blockade) for ventricular arrhythmias. The beneficial role of amiodarone in acute management of ventricular arrhythmias (regardless of hemodynamic stability), electrical storm, and as an adjunct to diminish frequent implantable cardioverter-defibrillator shocks cannot be ignored. Patients with these problems are likely to have left ventricular dysfunction and some degree of CHF.

The retrospective data from COMET are concerning but should be interpreted in perspective. Patients taking amiodarone were older and likely sicker, and reasons for amiodarone prescription were not reported in 56% of patients. Primary end points of COMET were all-cause mortality and the composite end point of all-cause mortality or all-cause admission. Data derived from post hoc analysis are susceptible to chance findings that would not be confirmed when prospectively evaluated, particularly in a large study (such as in SCD-HeFT).

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Clinical Magnetic Resonance Imaging of Ancient Dry Human Mummies Without Rehydration

To the Editor: Ancient human mummies are a unique source to study the evolution of disease. Noninvasive imaging of such historic tissues is of increasing interest in paleoanthropological and paleopathological studies, with conventional radiograph and computed tomography (CT) scan being the standard modalities. However, the ability to differentiate soft tissues by CT scan in mum-
Mummies is limited and the ionizing radiation is of uncertain safety to the samples. Clinical magnetic resonance imaging (MRI) has been applied to ancient dry tissues after sample-altering rehydration, a process deemed necessary due to the lack of unbound protons. We show the ability of standard clinical MRI to visualize historic dry tissues without rehydration by use of a newly available MRI pulse sequence.

**Methods.** Ancient artificially embalmed Egyptian mummies (1 head, 2 hands, and 1 foot; circa 1500-1100 BCE; private collection of FR.) and a naturally mummified Peruvian corpse (circa 1100 CE; Museum of History and Ethnography, St Gallen, Switzerland) were examined using a 3-dimensional ultra-short-echo time (UTE) sequence on a standard 1.5-T clinical MRI scanner (256x2 matrix; 32,768 projections, nonselective radiofrequency pulses of 60 microseconds duration; Magnetom Avanto, Siemens AG Medical Solutions, Erlangen, Germany). The 3-dimensional isotropic original data sets were cropped around the sample and volume rendered on standard Leonardo workstations (Siemens AG Medical Solutions) and by Amira version 4.1 software (ZUSE Institute, Berlin, Germany). Correlative multislice CT imaging of all samples was conducted (Orthopedic University Hospital Balgrist, Zurich, Switzerland).

**Results.** We analyzed proton density–weighted images (isotropic spatial resolution, 0.8-1.1 mm) of soft tissues, bones, mumification-related wrappings, or embalming materials (FIGURE 1A and B). All samples showed transverse relaxation times (T2) of approximately 300 microseconds, except 1 mummy hand with a T2 of 1.5 milliseconds. Longitudinal relaxation time (T1) was approximately 5 to 10 milliseconds. The magnetic resonance images generally allowed spatial dry mummy tissue discrimination. Subchondral bone appeared bright in comparison with CT scan, and different bone qualities (cortical vs trabecular) could be assessed (FIGURE 2). Tissues with a high content of collagen type I such as the anuli fibrosi of the intervertebral disk were visible. Among other visualized structures, arteries and ligaments could be discriminated (FIGURE 3), as well as bone marrow, meninges, and teeth.

**Comment.** Magnetic resonance imaging using a UTE sequence and standard clinical hardware may be a suitable modality for noninvasive studies of dry soft tissues in paleoanthropological, paleopathological, or forensic research. Yet radiology of mumified samples should be interpreted cautiously because dehydration changes the imaging properties (density on radiograph and CT scan, hydrogen density and mobility on MRI) of the tissues. The relaxation times of tissue such as mumified muscles and bone are generally very short (<1 millisecond) in comparison with those in vivo (eg, T2 of human calf muscle is approximately 25 milliseconds), which has previously made magnetic resonance–based imaging impossible. However, the UTE sequence allows for imaging of dry tissues with extremely short relaxation times.

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**Figure 1.** Magnetic Resonance Image and Computed Tomography Image of an Ancient Egyptian Mummy

**Figure 2.** Magnetic Resonance Image of an Ancient Egyptian Mummy

Magnetic resonance–based 3-dimensional reconstruction (virtual coronal cut through mid-face) of an ancient Egyptian mummy head. Differences in signal densities of external/internal lamina (yellow arrowheads) vs diploetic bone and the high signal of embalming-related substances in the orbits and the mouth cavity (black arrowheads) are visible. MRI technical data: see Figure 1.
Clinical MRI allows for a sustainable approach favored for rare historic specimens. Our study suggests that morphological alterations by invasive rehydration of the sample before imaging can now be avoided for dry tissues. This study is limited by evaluation of only 2 specimens, and further research is needed to assess the usefulness of the technique on a broader range of tissues. If this is confirmed, the technique may allow anatomical variations and pathological alterations such as atherosclerotic lesions, intervertebral disk protrusion, or degenerative arthritis to be effectively examined qualitatively as well as quantitatively by spatial proton density distribution. In addition, embalming substances show a large signal variation in the MRI, allowing for improved analysis of chemically diverse materials.

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