

Consider Deactivating ICD Close to End of Life

BY SHERRY BOSCHERT
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SAN FRANCISCO — One reason that few implantable cardioverter defibrillators get shut off to prevent a painful, unnecessary shock near the end of a patient's life is that physicians disagree about who should begin the deactivation discussion, Dr. Amy S. Kelley said.

In addition, some physicians prefer further aggressive medical treatments and

they postpone discussing deactivation of implantable cardioverter defibrillators (ICDs), according to a survey mailed to 4,876 physicians and completed by 558. Inadequate knowledge about or awareness of ICDs also contributed to physicians' lack of attention to the issue, Dr. Kelley said in a poster presentation at the annual meeting of the Gerontological Society of America.

"People at the bedside caring for a dying patient... may not be familiar with how the ICD works, and the fact that they are

very easy to deactivate," said Dr. Kelley of the University of California, Los Angeles. "Even if it's functioning as a pacemaker, the shut-off function is entirely separate and could be deactivated in a moment's time at the bedside with a magnet and an electrophysiologist or even a nurse [present]."

The 96 general internists, 106 cardiologists, 163 geriatricians, and 193 electrophysiologists surveyed were asked if they would discuss ICD deactivation, advance directives, and "do not resuscitate" orders

with terminally ill patients described in five vignettes. (See box.) The survey also solicited comments, and investigators analyzed 310 comments provided by 177 physicians to identify recurrent themes.

Of the 177 who commented, 6% said they had never thought about deactivating an ICD, 2% were unaware of the separate pacer and defibrillator functions, and 1% declared a lack of knowledge about defibrillators, noted Dr. Kelley and her associates. Overall, 21% expressed a preference for further medical treatments over deactivation of the ICD.

Of the 177, 13% accepted primary responsibility for initiating discussions about deactivating pacemakers, 10% said another specialist should start the discussion, and 7% said the patient or family should bring it up first.

"I want [a patient or the family] to know they have the option to possibly pass quietly from arrhythmia versus the possibility of being shocked," Dr. Kelley said.

Informed consent for ICD implantation should include information about deactivation options, 77% of physicians in the current survey agreed. Most (58%) said guidance from experts about managing patients with ICDs would be helpful in their practices. There are no guidelines for managing the deactivation of ICDs.

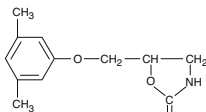
The study has been accepted for publication in the American Journal of Geriatric Cardiology, Dr. Kelley said.

SKELAXIN® (Metaxalone) Tablets

DESCRIPTION

SKELAXIN® (metaxalone) is available as an 800 mg oval, scored pink tablet.

Chemically, metaxalone is 5-[(3,5-dimethylphenoxy)methyl]-2-oxazolindione. The empirical formula is C₁₇H₁₉NO₃, which corresponds to a molecular weight of 221.25. The structural formula is:



Metaxalone is a white to almost white, odorless crystalline powder freely soluble in chloroform, soluble in methanol and in 96% ethanol, but practically insoluble in ether or water.

Each tablet contains 800 mg metaxalone and the following inactive ingredients: alginate acid, ammonium calcium alginate, B-Rose Liquid, corn starch and magnesium stearate.

CLINICAL PHARMACOLOGY

Mechanism of Action: The mechanism of action of metaxalone in humans has not been established, but may be due to general central nervous system depression. Metaxalone has no direct action on the contractile mechanism of striated muscle, the motor end plate or the nerve fiber.

Pharmacokinetics:

The pharmacokinetics of metaxalone have been evaluated in healthy adult volunteers after single dose administration of SKELAXIN under fasted and fed conditions at doses ranging from 400 mg to 800 mg.

Absorption

Peak plasma concentrations of metaxalone occur approximately 3 hours after a 400 mg oral dose under fasted conditions. Thereafter, metaxalone concentrations decline log-linearly with a terminal half-life of 9.0 ± 4.8 hours. Doubling the dose of SKELAXIN from 400 mg to 800 mg results in a roughly proportional increase in metaxalone exposure as indicated by peak plasma concentrations (C_{max}) and area under the curve (AUC). Dose proportionality at doses above 800 mg has not been studied. The absolute bioavailability of metaxalone is not known.

The single-dose pharmacokinetic parameters of metaxalone in two groups of healthy volunteers are shown in Table 1.

Dose (mg)	C _{max} (ng/mL)	T _{max} (h)	AUC ₀₋₁₂ (ng·h/mL)	t _{1/2} (h)	CL/F (L/h)
400 ¹	983 (53)	3.3 (35)	7479 (51)	9.0 (53)	68 (50)
800 ²	1816 (43)	3.0 (39)	15044 (46)	8.0 (58)	66 (51)

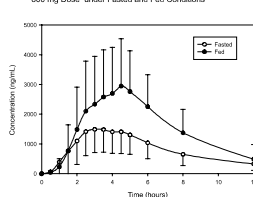
¹Subjects received 1x400 mg tablet under fasted conditions (N=42)
²Subjects received 2x400 mg tablets under fasted conditions (N=59)

Food Effects

A randomized, two-way, crossover study was conducted in 42 healthy volunteers (31 males, 11 females) administered one 400 mg SKELAXIN tablet under fasted conditions and following a standard high-fat breakfast. Subjects ranged in age from 18 to 48 years (mean age = 23.5 ± 5.7 years). Compared to fasted conditions, the presence of a high fat meal at the time of drug administration increased C_{max} by 177.5% and increased AUC (AUC₀₋₁₂, AUC_∞) by 123.5% and 115.4%, respectively. Time-to-peak concentration (T_{max}) was also delayed (4.3 h versus 3.3 h) and terminal half-life was decreased (2.4 h versus 9.0 h) under fed conditions compared to fasted.

In a second food effect study of similar design, two 400 mg SKELAXIN tablets (800 mg) were administered to healthy volunteers (N=59, 37 males, 22 females), ranging in age from 18-50 years (mean age = 25.6 ± 8.7 years). Compared to fasted conditions, the presence of a high fat meal at the time of drug administration increased C_{max} by 193.6% and increased AUC (AUC₀₋₁₂, AUC_∞) by 146.4% and 142.2%, respectively. Time-to-peak concentration (T_{max}) was also delayed (4.9 h versus 3.0 h) and terminal half-life was decreased (4.2 h versus 8.0 h) under fed conditions compared to fasted conditions. Similar food effect results were observed in the above study when one SKELAXIN 800 mg tablet was administered in place of two SKELAXIN 400 mg tablets. The increase in metaxalone exposure coinciding with a reduction in half-life may be attributed to more complete absorption of metaxalone in the presence of a high fat meal (Figure 1).

Figure 1. Mean (SD) Concentrations of Metaxalone following an 800 mg Dose, under Fasted and Fed Conditions.



Distribution, Metabolism, and Excretion

Although plasma protein binding and absolute bioavailability of metaxalone are not known, the apparent volume of distribution (V/F ~ 800 L) and lipophilicity (log P = 2.42) of metaxalone suggest that the drug is extensively distributed in the tissues. Metaxalone is metabolized by the liver and excreted in the urine as unidentified metabolites.

Pharmacokinetics in Special Populations

Age: The effects of age on the pharmacokinetics of metaxalone were determined following single administration of two 400 mg tablets (800 mg) under fasted and fed conditions. The results were analyzed separately, as well as in combination with the results from three other studies. Using the combined data, the results indicate that the pharmacokinetics of metaxalone are significantly more affected by age under fasted conditions than under fed conditions, with bioavailability under fasted conditions increasing with age.

The bioavailability of metaxalone under fasted and fed conditions in three groups of healthy volunteers of varying age is shown in Table 2.

Age (years)	Younger Volunteers		Older Volunteers	
	Fasted	Fed	Fasted	Fed
N	59	21	23	23
C _{max} (ng/mL)	1816 (43)	3510 (41)	2719 (46)	3168 (59)

T _{max} (h)	Younger Volunteers		Older Volunteers	
	Fasted	Fed	Fasted	Fed
N	59	21	23	23
AUC ₀₋₁₂ (ng·h/mL)	14531 (47)	20683 (41)	19836 (40)	23797 (48)
AUC _∞ (ng·h/mL)	15045 (46)	20833 (41)	20490 (39)	24194 (47)

Gender: The effect of gender on the pharmacokinetics of metaxalone was assessed in an open label study, in which 48 healthy adult volunteers (24 males, 24 females) were administered two SKELAXIN 400 mg tablets (800 mg) under fasted conditions. The bioavailability of metaxalone was significantly higher in females compared to males as evidenced by C_{max} (2115 ng/mL versus 1335 ng/mL) and AUC_∞ (17884 ng·h/mL versus 10328 ng·h/mL). The mean half-life was 11.1 hours in females and 7.6 hours in males. The apparent volume of distribution of metaxalone was approximately 22% higher in males than in females, but not significantly different when adjusted for body weight. Similar findings were also seen when the previously described combined dataset was used in the analysis.

Hepatic/Renal Insufficiency: The impact of hepatic and renal disease on the pharmacokinetics of metaxalone has not been determined. In the absence of such information, SKELAXIN should be used with caution in patients with hepatic and/or renal impairment.

INDICATIONS AND USAGE

SKELAXIN (metaxalone) is indicated as an adjunct to rest, physical therapy, and other measures for the relief of discomforts associated with acute, painful musculoskeletal conditions. The mode of action of this drug has not been clearly identified, but may be related to its sedative properties. Metaxalone does not directly relax tense skeletal muscles in man.

CONTRAINDICATIONS

Known hypersensitivity to any components of this product. Known tendency to drug induced, hemolytic, or other anemias. Significantly impaired renal or hepatic function.

WARNINGS

SKELAXIN may enhance the effects of alcohol and other CNS depressants.

PRECAUTIONS

Metaxalone should be administered with great care to patients with pre-existing liver damage. Serial liver function studies should be performed in these patients.

False-positive Benedict's tests, due to an unknown reducing substance, have been noted. A glucose-specific test will differentiate findings.

Taking SKELAXIN with food may enhance general CNS depression; elderly patients may be especially susceptible to this CNS effect. (See CLINICAL PHARMACOLOGY: Pharmacokinetics and PRECAUTIONS: Information for Patients section).

Information for Patients

SKELAXIN may impair mental and/or physical abilities required for performance of hazardous tasks, such as operating machinery or driving a motor vehicle, especially when used with alcohol or other CNS depressants.

Drug Interactions

SKELAXIN may enhance the effects of alcohol, barbiturates and other CNS depressants.

Carcinogenesis, Mutagenesis, Impairment of Fertility

The carcinogenic potential of metaxalone has not been determined.

Pregnancy

Reproduction studies in rats have not revealed evidence of impaired fertility or harm to the fetus due to metaxalone. Post marketing experience has not revealed evidence of fetal injury, but such experience cannot exclude the possibility of infrequent or subtle damage to the human fetus. Safe use of metaxalone has not been established with regard to possible adverse effects upon fetal development. Therefore, metaxalone tablets should not be used in women who are or may become pregnant and particularly during early pregnancy unless in the judgement of the physician the potential benefits outweigh the possible hazards.

Nursing Mothers

It is not known whether this drug is secreted in human milk. As a general rule, nursing should not be undertaken while a patient is on a drug since many drugs are excreted in human milk.

Pediatric Use

Safety and effectiveness in children 12 years of age and below have not been established.

ADVERSE REACTIONS

The most frequent reactions to metaxalone include: CNS: drowsiness, dizziness, headache, and nervousness or "irritability";

Digestive: nausea, vomiting, gastrointestinal upset.

Other adverse reactions are:

Immune System: hypersensitivity reaction, rash with or without pruritus;

Hematologic: leukopenia; hemolytic anemia;

Hepatobiliary: jaundice.

Though rare, anaphylactoid reactions have been reported with metaxalone.

OVERDOSAGE

Deaths by deliberate or accidental overdose have occurred with metaxalone, particularly in combination with antidepressants, and have been reported with this class of drug in combination with alcohol.

When determining the LD₅₀ in rats and mice, progressive sedation, hypnosis and finally respiratory failure were noted as the dosage increased. In dogs, no LD₅₀ could be determined as the higher doses produced an emetic action in 15 to 30 minutes.

Treatment: Gastric lavage and supportive therapy. Consultation with a regional poison control center is recommended.

DOSE AND ADMINISTRATION

The recommended dose for adults and children over 12 years of age is one 800 mg tablet three to four times a day.

HOW SUPPLIED

SKELAXIN (metaxalone) is available as an 800 mg oval, scored pink tablet inscribed with 8667 on the scored side and "S" on the other. Available in bottles of 100 (NDC 60793-136-01) and in bottles of 500 (NDC 60793-136-05).

Store at Controlled Room Temperature, between 15°C and 30°C (59°F and 86°F).

Rx Only

Prescribing Information as of April 2007.



King Pharmaceuticals

Distributed by: King Pharmaceuticals, Inc., Bristol, TN 37620
Manufactured by: Mallinckrodt Inc., Hobart, NY 13788

Most Physicians Willing to Talk

In the following scenarios, the percentages indicate how many of the 558 surveyed physicians would discuss ICD deactivation, advance directives, or do not resuscitate (DNR) orders with patients.

► **A man with severe chronic obstructive pulmonary disease who reports a poor quality of life:**

ICD deactivation: 56%
Advance directives: 88%
DNR: 82%

► **A man with advanced dementia who is agitated by medical appointments and tests:**

ICD deactivation: 71%
Advance directives: 84%
DNR: 84%

► **A woman with stage IV ovarian cancer who requests palliative care:**

ICD deactivation: 79%
Advance directives: 94%
DNR: 93%

► **A man with end-stage renal failure who declines dialysis:**

ICD deactivation: 76%
Advance directives: 90%
DNR: 90%

► **A woman with a massive stroke whose family has requested ventilator withdrawal:**

ICD deactivation: 83%
Advance directives: 80%
DNR: 83%



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