

# Walk Test Not a Good Indicator of Lung Function

BY DEEANNA FRANKLIN  
Associate Editor

The 6-minute walk test is highly reproducible during trials of patients with interstitial lung disease secondary to scleroderma, but it may not be a valid outcome measurement because it correlates poorly with other standard physiologic measurements for lung functioning, reported Dr. Maya H. Buch, of the University of Michigan Scleroderma Pro-

gram in Ann Arbor, and her colleagues.

In a study of 163 patients with interstitial lung disease (ILD) secondary to scleroderma (SSc), researchers had each participant perform a 6-minute walk test (6MWT). In a space without additional oxygen, they were instructed to walk back and forth in a hallway as many times as they could for 6 minutes. Participants were allowed to stop, slow down, and rest as needed. The test was stopped if patients were exhausted or experienced chest pain,

leg cramps, or diaphoresis. Those with very mild or very severe lung impairment were excluded (Ann. Rheum. Dis. 2006 [Epub doi:10.1136/ard.2006.054866]). The data were taken from the results of a 12-month, double-blind, placebo-controlled study that compared the drug bosentan with a placebo for the treatment of SSc-ILD. Participants came from 29 centers in 10 countries. There were 122 women and 41 men; 95 (58%) patients were classified as having diffuse SSc and the remaining 42%

had limited SSc. Their mean age was 52.3 years, and the mean disease duration was 6.4 years.

When it came to the 6MWT, 152 participants had less than 15% variability between their first and second tests. Eleven patients required a third test, and there was less than 15% variability between their second and third 6MWT. Mean distance walked was 396.6 m on test one, compared with 399.5 m on test two. Mean overall distance for the two walks was 398 m, and "the mean absolute difference for an individual patient between the two walks was 20.75 m," said Dr. Buch and her colleagues.

After the 6MWT, a rating of dyspnea was measured using a Borg scale. After walk one, the mean Borg dyspnea index was 2.75, and after walk two it was 2.79. The overall mean Borg score was 2.77, with a mean absolute difference between

the assessments of 0.8. According to the researchers, the mean percentage predicted diffusing capacity was 46% and mean percentage predicted forced vital capacity (FVC) was 71%.

There was only a minimal correlation between the 6MWT and the Borg dyspnea scale. There was a weak correlation between the 6MWT and percentage predicted FVC, and the walk test did not correlate at all with mean percentage predicted diffusing capacity. Also, there was a "very weak correlation" between mean percentage predicted diffusing capacity and the Borg dyspnea scale.

**The study found high intertest reproducibility of the 6MWT, but failed to demonstrate its correlation with pulmonary function parameters.**

"The primary finding of this study is the high intertest reproducibility of the test. We, however, failed to demonstrate correlation of the 6MWT with pulmonary function parameters. This raises the question of what exactly is being measured by the test," commented Dr. Buch and her colleagues. They speculated that "multiple confounding variables in the assessment of SSc-ILD" might account for the failure of correlation between the 6MWT and the traditional lung function parameters. These variables would include subtle cardiopulmonary responses and comorbidity not detected by the lung function tests. Other possibilities not related to SSc that might account for the lack of correlation include variability in FVC and interlaboratory variation in measurement of mean percentage predicted diffusing capacity.

Additionally, participants may have exhibited different psychological responses to exercise, which "could lead to either a training effect or decompensation. Separately, temporal and adaptive changes in breathing patterns could also facilitate exercise performance," said the researchers. They concluded that further studies and greater "clarification of the relative contributions of nonpulmonary manifestations of SSc on exercise capacity" are needed. ■

Van Kerrebroeck et al.<sup>1</sup> A 12-week, randomized, double-blind, placebo-controlled, multicenter trial that compared the efficacy and safety of tolterodine tartrate capsules (4 mg qd) and tolterodine tartrate tablets (2 mg bid) with placebo in 1529 adults with urinary frequency and urgency incontinence. All patients were advised to take their medication in the morning. Primary objective of this study was to evaluate the effect of active drugs or placebo on incontinence episodes using a 7-day bladder diary. Mean urgency incontinence episodes at baseline per week were 22.1 for patients treated with tolterodine tartrate capsules 4 mg qd, 23.2 for patients treated with tolterodine tartrate tablets 2 mg bid, and 23.3 for placebo-treated patients. Secondary objectives included other diary variables such as pad usage and various patient-reported outcomes. Landis et al.<sup>2</sup> A post hoc subgroup analysis of 986 patients from Van Kerrebroeck et al that compared the efficacy of tolterodine tartrate capsules (4 mg qd) with placebo in severe urgency incontinence. Severe urgency incontinence was defined as 21 to 168 urgency incontinence episodes/week. Median urgency incontinence episodes at baseline per week were 34 for patients treated with tolterodine tartrate capsules 4 mg qd and 31.5 for placebo-treated patients. References: 1. Van Kerrebroeck P, Kreder K, Jonas U, Zinner N, Wein A, for the Tolterodine Study Group. Tolterodine once-daily: superior efficacy and tolerability in the treatment of the overactive bladder. *Urology*. 2001;57:414-421. 2. Landis JR, Kaplan S, Swift S, Versi E. Efficacy of antimuscarinic therapy for overactive bladder with varying degrees of incontinence severity. *J Urol*. 2004;171:752-756. 3. Data on file. Pfizer Inc, New York, NY.

**Detrol<sup>®</sup> LA**  
tolterodine tartrate  
extended release capsules

PHARMACIA

Brief Summary of Prescribing Information

## INDICATIONS AND USAGE

DETROL LA Capsules are once daily extended release capsules indicated for the treatment of overactive bladder with symptoms of urge urinary incontinence, urgency, and frequency.

## CONTRAINDICATIONS

DETROL LA Capsules are contraindicated in patients with urinary retention, gastric retention, or uncontrolled narrow-angle glaucoma. DETROL LA is also contraindicated in patients who have demonstrated hypersensitivity to the drug or its ingredients.

## PRECAUTIONS

### General

**Risk of Urinary Retention and Gastric Retention:** DETROL LA Capsules should be administered with caution to patients with clinically significant bladder outflow obstruction because of the risk of urinary retention and to patients with gastrointestinal obstructive disorders, such as pyloric stenosis, because of the risk of gastric retention (see **CONTRAINDICATIONS**).

**Controlled Narrow-Angle Glaucoma:** DETROL LA should be used with caution in patients being treated for narrow-angle glaucoma.

**Reduced Hepatic and Renal Function:** For patients with significantly reduced hepatic function or renal function, the recommended dose for DETROL LA is 2 mg daily. (see **CLINICAL PHARMACOLOGY, Pharmacokinetics in Special Populations** in full prescribing information).

### Patients with Congenital or Acquired QT Prolongation:

In a study of the effect of tolterodine immediate release tablets on the QT interval (See **CLINICAL PHARMACOLOGY, Cardiac Electrophysiology** in full prescribing information), the effect on the QT interval appeared greater for 8 mg/day (two times the therapeutic dose) compared to 4 mg/day and was more pronounced in CYP2D6 poor metabolizers (PMs) than extensive metabolizers (EMs). The effect of tolterodine 8 mg/day was not as large as that observed after four days of therapeutic dosing with the active control moxifloxacin. However, the confidence intervals overlapped. These observations should be considered in clinical decisions to prescribe DETROL LA for patients with a known history of QT prolongation or patients who are taking Class IA (eg, quinidine, procainamide) or Class III (eg, amiodarone, sotalol) antiarrhythmic medications (See **PRECAUTIONS, Drug Interactions**). There has been no association of Torsade de Pointes in the international post-marketing experience with DETROL or DETROL LA.

### Information for Patients

Patients should be informed that antimuscarinic agents such as DETROL LA may produce the following effects: blurred vision, dizziness, or drowsiness.

### Drug Interactions

**CYP3A4 Inhibitors:** Ketoconazole, an inhibitor of the drug metabolizing enzyme CYP3A4, significantly increased plasma concentrations of tolterodine when coadministered to subjects who were poor metabolizers (see **CLINICAL PHARMACOLOGY, Variability in Metabolism and Drug-Drug Interactions** in full prescribing information). For patients receiving ketoconazole or other potent CYP3A4 inhibitors such as other azole antifungals (eg, itraconazole, miconazole) or macrolide antibiotics (eg, erythromycin, clarithromycin) or cyclosporine or vinblastine, the recommended dose of DETROL LA is 2 mg daily (see **DOSAGE AND ADMINISTRATION**).

### Drug-Laboratory-Test Interactions

Interactions between tolterodine and laboratory tests have not been studied.

### Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenicity studies with tolterodine immediate release were conducted in mice and rats. At the maximum tolerated dose in mice (30 mg/kg/day), female rats (20 mg/kg/day), and male rats (30 mg/kg/day), AUC values obtained for tolterodine were 355, 291, and 462 µg·h/L, respectively. In comparison, the human AUC value for a 2-mg dose administered twice daily is estimated at 34 µg·h/L. Thus, tolterodine exposure in the carcinogenicity studies was 9- to 14-fold higher than expected in humans. No increase in tumors was found in either mice or rats. No mutagenic effects of tolterodine were detected in a battery of *in vitro* tests, including bacterial mutation assays (Ames test) in 4 strains of *Salmonella typhimurium* and in 2 strains of *Escherichia coli*, a gene mutation assay in L5178Y mouse lymphoma cells, and chromosomal aberration tests in human lymphocytes. Tolterodine was also negative *in vivo* in the bone marrow micronucleus test in the mouse. In female mice treated for 2 weeks before mating and during gestation with 20 mg/kg/day (corresponding to AUC value of about 500 µg·h/L), neither effects on reproductive performance or fertility were seen. Based on AUC values, the systemic exposure was about 15-fold higher in animals than in humans. In male mice, a dose of 30 mg/kg/day did not induce any adverse effects on fertility.

### Pregnancy

Pregnancy Category C. At oral doses of 20 mg/kg/day (approximately 14 times the human exposure), no anomalies or malformations were observed in mice. When given at doses of 30 to 40 mg/kg/day, tolterodine has been shown to be embryolethal and reduce fetal weight, and increase the incidence of fetal abnormalities (cleft palate, digital abnormalities, intra-abdominal hemorrhage, and various skeletal abnormalities, primarily reduced ossification) in mice. At these doses, the AUC values were about 20- to 25-fold higher than in humans. Rabbits treated subcutaneously at a dose of 0.8 mg/kg/day achieved an AUC of 100 µg·h/L, which is about 3-fold higher than that resulting from the human dose. This dose did not result in any embryotoxicity or teratogenicity. There are no studies of tolterodine in pregnant women. Therefore, DETROL LA should be used during pregnancy only if the potential benefit for the mother justifies the potential risk to the fetus.

### Nursing Mothers

Tolterodine immediate release is excreted into the milk in mice. Offspring of female mice treated with tolterodine 20 mg/kg/day during the lactation period had slightly reduced bodyweight gain. The offspring regained the weight during the maturation phase. It is not known whether tolterodine is excreted in human milk; therefore, DETROL LA should not be administered during nursing. A decision should be made whether to discontinue nursing or to discontinue DETROL LA in nursing mothers.

### Pediatric Use

Efficacy in the pediatric population has not been demonstrated. A total of 710 pediatric patients (486 on DETROL LA, 224 on placebo) aged 5-10 with urinary frequency and urge incontinence were studied in two Phase 3 randomized, placebo-controlled, double-blind, 12-week studies.

The percentage of patients with urinary tract infections was higher in patients treated with DETROL LA (6.6%) compared to patients who received placebo (4.5%). Aggressive, abnormal and hyperactive behavior and attention disorders occurred in 2.9% of children treated with DETROL LA compared to 0.9% of children treated with placebo.

### Geriatric Use

No overall differences in safety were observed between the older and younger patients treated with tolterodine (see **CLINICAL PHARMACOLOGY, Pharmacokinetics in Special Populations** in full prescribing information).

### ADVERSE REACTIONS

The Phase 2 and 3 clinical trial program for DETROL LA Capsules included 1073 patients who were treated with DETROL LA (n=537) or placebo (n=536). The patients were treated with 2, 4, 6, or 8 mg/day for up to 15 months. Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. The adverse reaction information from clinical trials does, however, provide a basis for identifying the adverse events that appear to be related to drug use and for approximating rates. The data described below reflect exposure to DETROL LA 4 mg once daily every morning in 505 patients and to placebo in 507 patients exposed for 12 weeks in the Phase 3, controlled clinical study.

Adverse events were reported in 52% (n=263) of patients receiving DETROL LA and in 49% (n=247) of patients receiving placebo. The most common adverse events reported by patients receiving DETROL LA were dry mouth, headache, constipation, and abdominal pain. Dry mouth was the most frequently reported adverse event for patients treated with DETROL LA occurring in 23.4% of patients treated with DETROL LA and 7.7% of placebo-treated patients. Dry mouth, constipation, abnormal vision (accommodation abnormalities), urinary retention, and dry eyes are expected side effects of antimuscarinic agents. A serious adverse event was reported by 1.4% (n=7) of patients receiving DETROL LA and by 3.6% (n=18) of patients receiving placebo.

The frequency of discontinuation due to adverse events was highest during the first 4 weeks of treatment. Similar percentages of patients treated with DETROL LA or placebo discontinued treatment due to adverse events. Treatment was discontinued due to adverse events and dry mouth was reported as an adverse event in 2.4% (n=12) of patients treated with DETROL LA and in 1.2% (n=6) of patients treated with placebo.

Table 4 lists the adverse events reported in 1% or more of patients treated with DETROL LA 4 mg once daily in the 12-week study. The adverse events were reported regardless of causality.

**Table 4. Incidence\* (% of Adverse Events Exceeding Placebo Rate and Reported in ≥1% of Patients Treated with DETROL LA (4 mg daily) in a 12-week, Phase 3 Clinical Trial**

Body System	Adverse Event	% DETROL LA n=505	% Placebo n=507
Autonomic Nervous	dry mouth	23	8
General	headache	6	4
	fatigue	2	1
Central/Peripheral Nervous	dizziness	2	1
Gastrointestinal	constipation	6	4
	abdominal pain	4	2
	dyspepsia	3	1
Vision	xerophthalmia	3	2
	vision abnormal	1	0
Psychiatric	somnolence	3	2
	anxiety	1	0
Respiratory	sinusitis	2	1
Urinary	dysuria	1	0

\* in nearest integer.

### Postmarketing Surveillance

The following events have been reported in association with tolterodine use in clinical practice: anaphylactoid reactions, including angioedema; tachycardia; palpitations; peripheral edema; and hallucinations. Because these spontaneously reported events are from the worldwide postmarketing experience, the frequency of events and the role of tolterodine in their causation cannot be reliably determined.

### OVERDOSAGE

A 27-month-old child who ingested 5 to 7 tolterodine immediate release tablets 2 mg was treated with a suspension of activated charcoal and was hospitalized overnight with symptoms of dry mouth. The child fully recovered.

### Management of Overdosage

Overdosage with DETROL LA Capsules can potentially result in severe central anticholinergic effects and should be treated accordingly. ECG monitoring is recommended in the event of overdosage. In dogs, changes in the QT interval (slight prolongation of 10% to 20%) were observed at a suprapharmacologic dose of 4.5 mg/kg, which is about 68 times higher than the recommended human dose. In clinical trials of normal volunteers and patients, QT interval prolongation was not observed with tolterodine immediate release at doses up to 8 mg (4 mg bid) and higher doses were not evaluated. (see **PRECAUTIONS, Patients with Congenital or Acquired QT Prolongation**).

### DOSAGE AND ADMINISTRATION

The recommended dose of DETROL LA Capsules are 4 mg daily. DETROL LA should be taken once daily with liquids and swallowed whole. The dose may be lowered to 2 mg daily based on individual response and tolerability, however, limited efficacy data is available for DETROL LA 2 mg (see **CLINICAL STUDIES** in full prescribing information). For patients with significantly reduced hepatic or renal function or who are currently taking drugs that are potent inhibitors of CYP3A4, the recommended dose of DETROL LA is 2 mg daily (see **CLINICAL PHARMACOLOGY and PRECAUTIONS, Drug Interactions** in full prescribing information).

Distributed by:

Revised November 2005



Pharmacia & Upjohn  
Division of Pfizer Inc, NY, NY 10107

