

The Most Efficient Shock Wave Source



An independent study* presented at the 95 th annual AUA Meeting in Atlanta proved the STORZ MEDICAL shock wave source to be the most efficient.

IN VITRO COMPARISON OF SHOCK WAVE LITHOTRIPSY MACHINES

Joel M. H. Teichman, Andrew J. Portis, Patricia P. Cecconi, William L. Bub, Robert C. Endicott, Bela Denes, Margaret S. Pearle and Ralph V. Clayman
The Journal of Urology · Vol. 164, 1259-1264, October 2000

Who did the testing?

A group of Urologists and Scientists from San Antonio, St. Louis and Dallas / USA including Dr. Ralph V. Clayman.

Joel M. H. Teichman, Andrew L. Portis, Patricia J. Parker, William L. Bub, Robert C. Endicott, Bela Denes, Margaret S. Pearle, Ralph V. Clayman. San Antonio, TX; St. Louis, MO; Dallas, TX

Was the study influenced by any manufacturer?

The study was supported by 5 of the 7 participating manufacturers and can therefore be regarded to be neutral. Employees of the manufacturers were excluded from the measurement itself.

What was the objective?

To find out whether or not lithotripters of different brands and with different shock wave generation differ in the ability to fragment stones.

How did they measure the fragmentation ability?

The shock waves were applied in vitro. Human stones of different compositions were placed in a mesh and brought into the shock wave focus.

Testing Parameters and criteria

500, 2000 and the max. number of shock waves allowed by the FDA were applied to the different stones. The FDA limit is different for each lithotripter.

The percentage of remaining fragments >2 mm was regarded to be the indicator for the efficacy of the specific lithotripter.

(The less remaining fragments >2 mm, the better.)

Results

Remaining Stone Fragments >2 mm in % of total recovered stone mass
The lower the number, the better

	Fragments > 2mm in % of stone mass											
	CHPD			COM			CYS			MAPH		
	500 SW	2000 SW	FDA limit	500 SW	2000 SW	FDA limit	500 SW	2000 SW	FDA limit	500 SW	2000 SW	FDA limit
STORZ MEDICAL MODULITH SLX	2±3	0±0	0±0	0±0	0±0	0±0	0±0	0±0	0±0	0±0	0±0	0±0
Dornier HM3	34±39	0±0	0±1	0±0	0±0	0±1	3±7	0±0	1±2	1±1	2±3	0±1
Siemens Lithostar C	20±13	0±1	0±0	2±3	0±0	0±0	11±12	1±2	1±3	4±8	2±4	1±1
Medstone STS-T	46±18	10±18	10±15	5±3	0±1	0±0	72±35	0±0	10±21	4±7	0±0	0±0
Healthtronics (HMT/Philips) Lithotron	35±29	11±18	3±2	5±4	0±0	0±1	67±31	25±28	14±18	40±41	10±15	3±4
Dornier DOLI	59±23	29±20	29±20	52±23	4±5	4±5	23±29	3±4	3±4	2±3	0±1	0±1
Medispec Econolith	57±27	18±33	18±33	10±13	9±14	9±14	22±17	9±18	9±18	7±10	0±0	0±0

- CHPD = Calcium Hydrogene Phosphat Dihydrate Stone
- COM = Calcium Oxalate Monohydrate Stone
- CYS = Cystine stone
- MAPH = Magnesium Ammonium Phosphate Hexahydrate stone

FDA Shock Wave Limits

STORZ MEDICAL MODULITH SLX	2000
Dornier HM3	2400
Siemens Lithostar C	4000
Medstone STS-T	2400
Healthtronics (HMT/Philips) Lithotron	3000
Dornier DOLI	2000
Medispec Econolith	2000

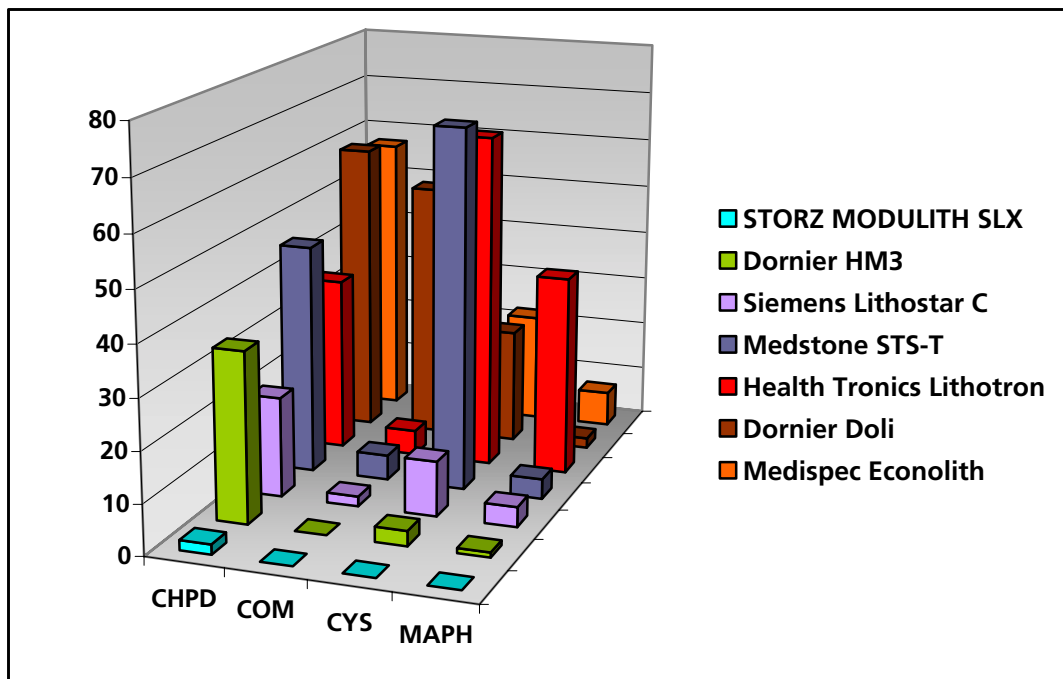
Results

(500 Shock Waves)

MODULITH[®] SLX compared to other current lithotripters

All lithotripters applied 500 shock waves to the stone

Remaining Stone Fragments >2 mm in % of total recovered stone mass



CHPD = Calcium Hydrogene Phosphat Dihydrate Stone
 COM = Calcium Oxalate Monohydrate Stone
 CYS = Cystine stone
 MAPH = Magnesium Ammonium Phosphate Hexahydrate stone

The only system that left almost no fragments >2mm was the Storz Medical MODULITH SLX

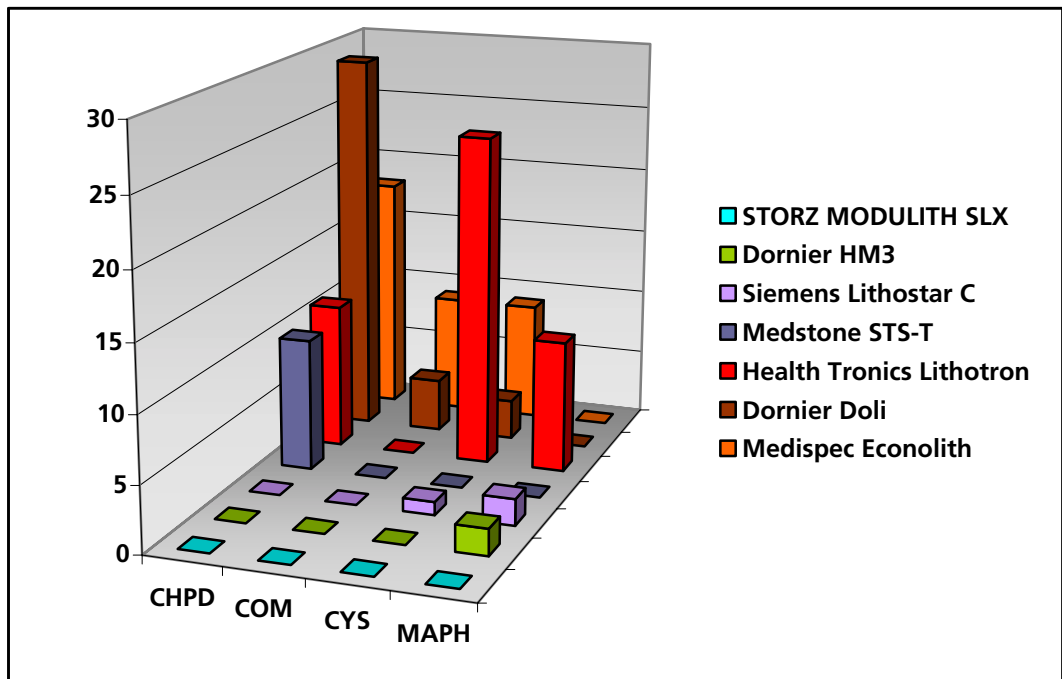
Results

(2000 Shock Waves)

MODULITH[®] SLX compared to other current lithotripters

All lithotripters applied 2000 shock waves to the stone

Remaining Stone Fragments >2 mm in % of total recovered stone mass



CHPD = Calcium Hydrogene Phosphat Dihydrate Stone
COM = Calcium Oxalate Monohydrate Stone
CYS = Cystine stone
MAPH = Magnesium Ammonium Phosphate Hexahydrate stone

The only system that left no fragments >2mm was the Storz Medical MODULITH SLX

Results

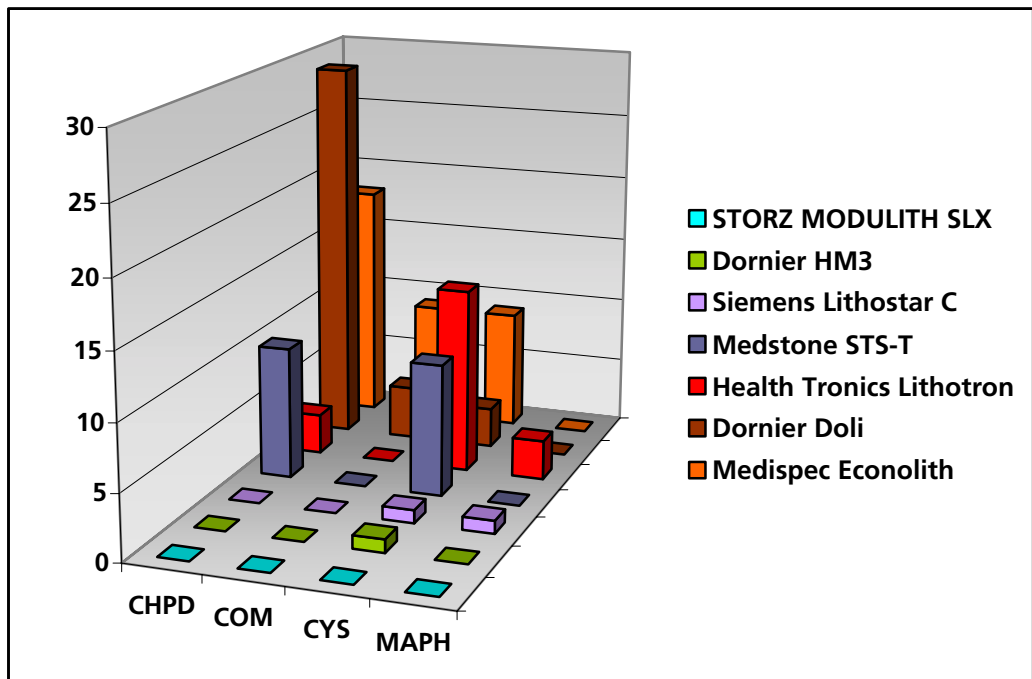
(FDA limit)

MODULITH® SLX compared to other current lithotripters

These results were obtained with the maximum shock wave number allowed by the FDA.

STORZ MEDICAL MODULITH SLX	2000
Dornier HM3	2400
Siemens Lithostar C	4000
Medstone STS-T	2400
Healthtronics (HMT/Philips) Lithotron	3000
Dornier DOLI	2000
Medispec Econolith	2000

Remaining Stone Fragments >2 mm in % of total recovered stone mass



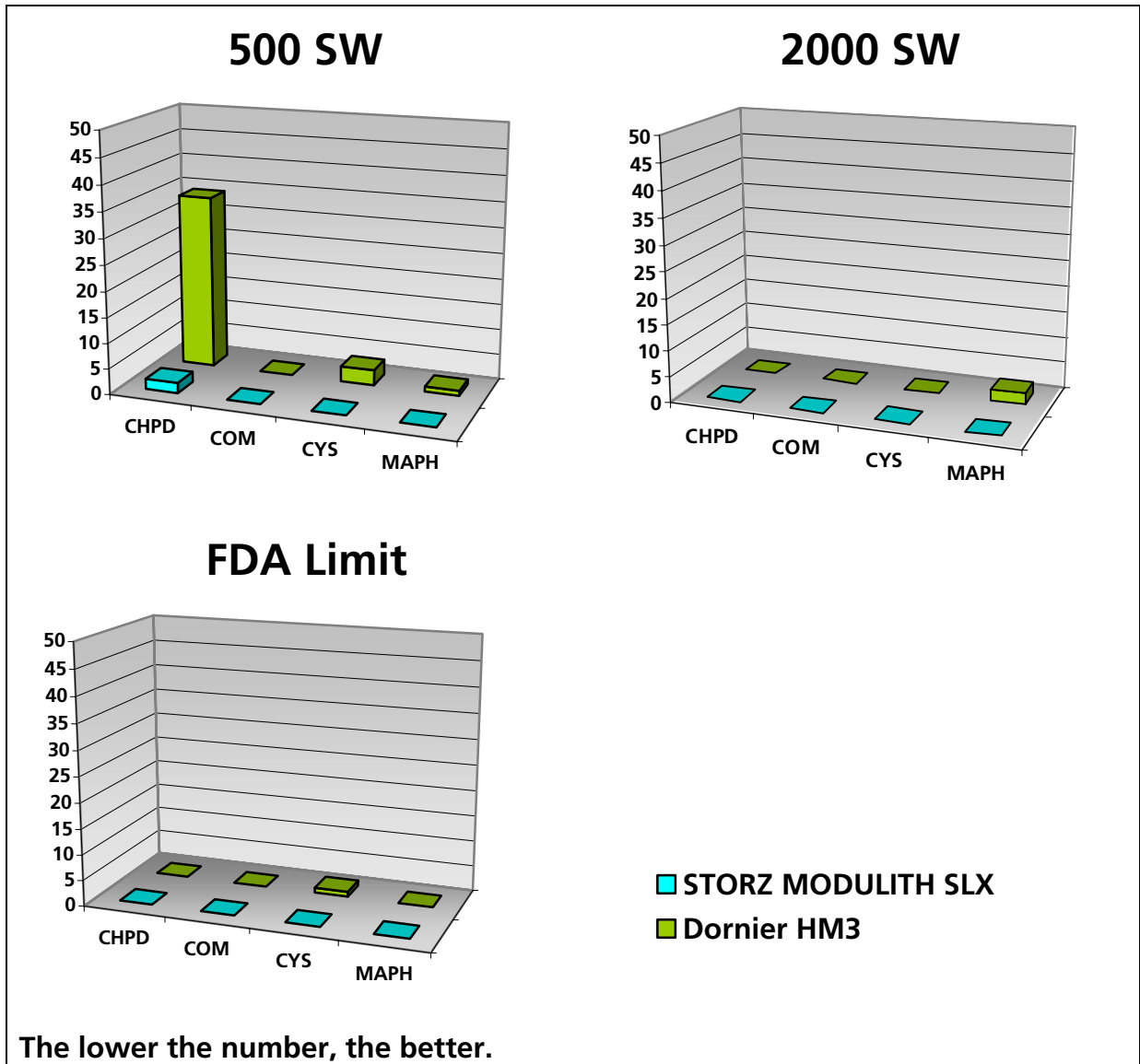
CHPD = Calcium Hydrogene Phosphat Dihydrate Stone
 COM = Calcium Oxalate Monohydrate Stone
 CYS = Cystine stone
 MAPH = Magnesium Ammonium Phosphate Hexahydrate stone

The only system that left no fragments >2mm was the Storz Medical MODULITH SLX

Results

MODULITH® SLX compared to Dornier HM3

Remaining Stone Fragments >2 mm in % of total recovered stone mass.



- CHPD = Calcium Hydrogene Phosphat Dihydrate Stone
- COM = Calcium Oxalate Monohydrate Stone
- CYS = Cystine stone
- MAPH = Magnesium Ammonium Phosphate Hexahydrate stone

Even the former "Gold Standard" , the Dornier HM3 could not surpass the Storz Medical MODULITH SLX

The original Abstract

[1420] IN VITRO SHOCK WAVE LITHOTRIPSY COMPARISON.

Joel M. H. Teichman, Andrew L. Portis, Patricia J. Parker, William L. Bub, Robert C. Endicott, Bela Denes, Margaret S. Pearle, Ralph V. Clayman. San Antonio, TX; St. Louis, MO; Dallas, TX.

Wednesday, May 3, 2000, 11:40 AM, Auditorium

OBJECTIVES: We test the hypothesis that shock wave lithotripsy machines (SWL) differ in ability to fragment calculi. **METHODS:** Human urinary calculi composed of calcium hydrogen phosphate dihydrate (CHPD), calcium oxalate monohydrate (COM), cystine (CYS), and magnesium ammonium phosphate hexahydrate (MAPH) were randomly distributed among 7 different SWL machines. SWL was done at each machine's suggested kV for 500 shocks, 2000 shocks, and FDA treatment limits for shocks. There were 5 calculi per composition-machine-shock number cohort. After SWL, stone fragments were sorted by size and compared with analysis of variance. **RESULTS:** There were no statistical differences across cohorts for pre-SWL stone mass ($p > 0.9$) or fragment mass recovery yield ($p > 0.6$). The mean differences (mean \pm standard deviation, % of total recovered stone mass) in fragments > 2 mm after FDA treatment limits were:

Machine	CHPD	COM	CYS	MAPH
Dornier HM3 (unmodified)	0 \pm 1	0 \pm 1	1 \pm 2	0 \pm 1
Storz Modulith SLX	0 \pm 0	0 \pm 0	0 \pm 0	0 \pm 0
Siemens Lithostar C	0 \pm 0	0 \pm 0	1 \pm 3	1 \pm 1
Medstone STS-T	10 \pm 15	0 \pm 0	10 \pm 21	0 \pm 0
HealthTronics Lithotron	3 \pm 2	0 \pm 1	14 \pm 18	3 \pm 4
Dornier Doli	29 \pm 20	4 \pm 5	3 \pm 4	0 \pm 0
Medispec Econolith	18 \pm 33	9 \pm 14	9 \pm 18	0 \pm 0
pvalue	0.04	0.15	0.44	0.05

CONCLUSIONS:

SWL machines vary in ability to fragment stones. All machines are satisfactory for fragile compositions (MAPH). The HM3, Modulith, and Lithostar C fragmented durile stones best.

Supported by: Dornier, Healthtronics, Medispec, Medstone, Storz

**As powerful as the HM3
as gentle as Lithotripsy can be**

MODULITH[®] SLX

What earlier studies* already indicated is now once again confirmed:

**There is no shock wave source on the market,
as efficient as the STORZ MEDICAL cylindrical
source**

Only one system, the legendary HM3 could match
(but not surpass) the disintegration power of the
STORZ MEDICAL shock wave source.

* Rassweiler et. al. (Journal of Endourology Vol.6 No.1, 1992)

Köhrmann et. al. (Aktuelle Urologie Nr.6 Nov. 1993)

Buizza et. al. "Italian Study" (Ultrasound in Med. & Biol. Vol.21, No. 2 1995)



Award

Dr. Joel Teichman, surgery, was awarded first prize in the Ambrose/Reed Socioeconomics Prize Essay Contest, sponsored by the American Urological Association (AUA).

Dr. Teichman received the award for his manuscript "In Vitro Shock Wave Lithotripsy Comparison."

first presented at the AUA's annual meeting in Atlanta.