

# Clinical trials of heparin (UFH or LMWH) for thrombosis prevention in general surgery

TrialResults-center [www.trialresultscenter.org](http://www.trialresultscenter.org)

## 1 low molecular weight heparin

Trial	Treatments	Patients	Trials design and methods
<b>enoxaparin vs no treatment</b>			
Ho [43] n=134/169	Enoxaparin 4000 anti-Xa units versus No treatment	-	Open
<b>nadroparin vs no treatment</b>			
Marassi [41] n=31/33	Nadroparin 2850 anti-Xa units versus No treatment	-	Open
<b>dalteparin vs placebo</b>			
Ockelford , 1989 n=102/95	Dalteparin 2500 anti-Xa units versus Placebo	general surgery	Blind
<b>fluxum vs placebo</b>			
Valle , 1988 n=50/50	Parnaparin 3200 anti-Xa units versus Placebo	general surgery	Blind
<b>nadroparin vs placebo</b>			
Balas [40] n=94/95	Nadroparin 2850 anti-Xa units versus Placebo	-	Blind
Pezzuoli , 1989 n=2247/2251 follow-up:	Nadroparin 2850 anti-Xa units versus Placebo	general surgery	Blind
<b>tinzaparin vs placebo</b>			
Bergqvist [42] n=39/41 follow-up:	Tinzaparin 3500 anti-Xa units versus Placebo	-	Parallel groups Blind
<b>antixarin vs unfractionated heparin</b>			
Limmer , 1994 n=103/100	Antixarin 2500 anti Xa units versus UFH 15 000 units	General surgery	Open
<b>ardeparin vs unfractionated heparin</b>			
Godwin , 1993 n=595/309	Ardeparin 90 and 50 units/kg b.i.d versus UFH 10 000 units	Abdominopelvic surgery	Blind

continued...

<b>Trial</b>	<b>Treatments</b>	<b>Patients</b>	<b>Trials design and methods</b>
<b>certoparin vs unfractionated heparin</b>			
Schmitz-Huebner , 1984 n=84/42 follow-up: 1 month	Certoparin (dose 1 and dose 2) b.i.d. versus UFH 10 000 units	Abdominal surgery	Blind
Sasahara , 1986 n=137/132 follow-up: 7 days	Certoparin 3000 + DHE versus UFH 10 000 units +DHE	Abdominal surgery	Blind
Voigt , 1986 n=103/97 follow-up: 10 days	Certoparin 3000 + DHE versus UFH 10 000 units	Abdominal surgery	Blind
Welzel , 1988 n=98/103 follow-up: 7 days	Certoparin 2500 + DHE versus UFH 10 000 units+DHE	Abdominal surgery	Open
Kakkar , 1989 n=88/91 follow-up:	Certoparin 3000 + DHE versus UFH 10 000 units+DHE	Abdominal surgery	Blind
Adolf , 1989 n=205/205 follow-up: 1 month	Certoparin 3000 versus UFH 15 000 units	Abdominal surgery	Blind
Heilmann , 1989 n=150/150 follow-up: 10 days	Certoparin 3000 versus UFH 15 000 units	Gynaecological surgery	Blind
Baumgartner , 1989 n=99/102 follow-up: 10 days	Certoparin 3000 + DHE versus UFH 5 000 units+DHE	Abdominal surgery	Blind
Hoffmann and Largiade , 1990  n=464/452 follow-up:	Certoparin 3000 + DHE versus UFH 10 000 units	Abdominal surgery	NA
Kopenhagen , 1990 n=51/53	Certoparin 3000 anti Xa units versus UFH 15 000 units	Abdominal surgery	Blind
Schielke , 1991 n=47/51	Certoparin 3000 anti Xa units + DHE versus UFH 10 000 units + DHE	Abdominal surgery	Open
Kopenhagen , 1992 n=336/337	Certoparin 3000 anti Xa units versus UFH 15 000 units	Abdominal surgery	Blind
Hoffmann and Largiader , 1992 n=298/296	Certoparin 3000 anti Xa units versus UFH 10 000 units	Abdominothoracic surgery	Blind
Heilmann , 1997 n=179/179	Certoparin 3000 anti Xa units versus UFH 15 000 units	Gynaecological and breast surgery	Blind

continued...

<b>Trial</b>	<b>Treatments</b>	<b>Patients</b>	<b>Trials design and methods</b>
Haas , 1999 n=11542/11536	Certoparin 3000 anti Xa units versus UFH 15 000 units	General surgery	Blind
<b>dalteparin vs unfractionated heparin</b>			
Briel , 1988 n=95/98 follow-up:	Dalteparin 5000 versus UFH 10 000 units+DHE	Gynaecological surgery	NA
Bergqvist , 1986 n=215/217 follow-up: 1 month	Dalteparin 5000 versus UFH 10 000 units	Abdominal surgery	Blind
Onarheim , 1986 n=25/27 follow-up: 1 month	Dalteparin 5000 versus UFH 10 000 units	Abdominal surgery	Blind
Koller , 1986 n=23/20 follow-up: 30 days	Dalteparin 7500 versus UFH 10 000 units	Abdominal surgery	Blind
Koller , 1986 n=75/75 follow-up: 30 days	Dalteparin 2500 versus UFH 10 000 units	Abdominal surgery	Blind
Fricker , 1988 n=40/40 follow-up: 1-2 months	Dalteparin 5000 versus UFH 15 000 units	Abdominopelvic surgery	Open
Bergqvist , 1988 n=505/497 follow-up: 1 month	Dalteparin 5000 versus UFH 10 000 units	Abdominal surgery	Blind
Caen , 1988 n=195/190 follow-up: 1 month	Dalteparin 2500 versus UFH 10 000 units	Abdominal surgery	Blind
Borstad , 1988 n=105/110 follow-up:	Dalteparin 5000 versus UFH 10 000 units	Gynaecological surgery	Blind
Creperio , 1990 n=20/20 follow-up:	Dalteparin 2500 versus UFH 10 000 units	General surgery	Blind
Hartl , 1990 n=126/124 follow-up: >7 days	Dalteparin 2500 versus UFH 10 000 units	Abdominal surgery	Blind
Borstad , 1992 n=77/75	Dalteparin 2500 anti Xa units versus UFH 10 000 units	Gynaecological surgery	Blind
Kakkar , 1993 n=1894/1915	Dalteparin 2500 anti Xa units versus UFH 10 000 units	Abdominal surgery	Blind
<b>enoxaparin vs unfractionated heparin</b>			

continued...

<b>Trial</b>	<b>Treatments</b>	<b>Patients</b>	<b>Trials design and methods</b>
Samama 2 , 1988 n=127/123 follow-up: 7 days	Enoxaparin 4000 versus UFH 15 000 units	General surgery	Open
Samama 1 , 1988 n=168/167 follow-up: 7 days	Enoxaparin 2000 versus UFH 15 000 units	General surgery	Open
Samama 3 , 1988 n=160/147 follow-up: 7 days	Enoxaparin 6000 versus UFH 15 000 units	General surgery	Open
Kaaja , 1992 n=37/31	Enoxaparin 2000 anti Xa units versus UFH 10 000 units	Gynaecological surgery	Blind
Gazzaniga (ISG) , 1993 n=561/561	Enoxaparin 2000 anti Xa units versus UFH 10 000 units	General and vascular surgery	Open
Nurmohamed , 1995 n=737/734	Enoxaparin 2000 anti Xa units versus UFH 15 000 units	General surgery	Blind
McLeod (Canadian) , 1995 n=674/675	Enoxaparin 4000 anti Xa units versus UFH 15 000 units	Colorectal surgery	Blind
Gonzalez , 1996 n=84/82	Bemiparin 2500 anti Xa units versus UFH 10 000 units	Abdominal surgery	Blind
ENOXACAN , 1997 n=555/560	Enoxaparin 4000 anti Xa units versus UFH 15 000 units	Abdominopelvic surgery	Blind
<b>nadroparin vs unfractionated heparin</b>			
Kakkar and Murray , 1985 n=200/200 follow-up: 10 days	Nadroparin 2850 versus UFH 10 000 units	General surgery	Blind
EFS , 1988 n=968/941 follow-up: 1 month	Nadroparin 2850 versus UFH 15 000 units	Abdominal surgery	Open
Dahan , 1989 n=46/41 follow-up:	Nadroparin 2850 versus UFH 15 000 units	Thoracic surgery	Open
Barbui , 1990 n=171/173	Nadroparin 2850 anti Xa units versus UFH 10 000 units	General surgery	Open
Eurin , 1994 n=241/239	Nadroparin 2850 anti Xa units versus UFH 15 000 units	Abdominopelvic surgery	Open
<b>parnaparin vs unfractionated heparin</b>			

continued...

<b>Trial</b>	<b>Treatments</b>	<b>Patients</b>	<b>Trials design and methods</b>
<b>Catania , 1988</b> n=88/85 follow-up:	Parnaparin 3200 versus UFH 15 000 units	Abdominal surgery	Open
<b>Salcuni , 1988</b> n=73/68 follow-up:	Parnaparin 3200 versus UFH 15 000 units	Abdominal surgery	Open
<b>Verardi , 1989</b> n=44/44 follow-up:	Parnaparin 6400 versus UFH 10 000 units	Abdominal/urological surgery	NA
<b>Garcea , 1992</b> n=45/45	Parnaparin 3200 anti Xa units versus UFH 15 000 units	Abdominal surgery	Open
<b>reviparin vs unfractionated heparin</b>			
<b>Kakkar , 1993</b> n=672/679	Reviparin 1750 anti Xa units versus UFH 10 000 units	General and gynaecological surgery	Blind
<b>SSHA vs unfractionated heparin</b>			
<b>Torngren , 1984</b> n=309/162 follow-up: Discharge	SSHA 50 mg and 37.5 mg versus UFH 10 000 units	General surgery	Blind
<b>tinzaparin vs unfractionated heparin</b>			
<b>Leizorovicz , 1991</b> n=861/429	Tinzaparin 2500 and 3500 anti Xa units versus UFH 10 000 units	Abdominothoracic and gynaecological surgery	Blind

## References

**Ho [43], :**

Ho YH, Seow-Choen F, Leong A, Eu KW, Nyam D, Teoh MK Randomized, controlled trial of low molecular weight heparin vs. no deep vein thrombosis prophylaxis for major colon and rectal surgery in Asian patients. *Dis Colon Rectum* 1999;42:196-202; discussion 202-3 [10211496]

**Marassi [41], :**

Marassi A, Balzano G, Mari G, D'Angelo SV, Della Valle P, Di Carlo V, D'Angelo A Prevention of postoperative deep vein thrombosis in cancer patients. A randomized trial with low molecular weight heparin (CY 216). *Int Surg* 1993;78:166-70 [8394842]

**Ockelford , 1989:**

Ockelford PA, Patterson J, Johns AS A double-blind randomized placebo controlled trial of thromboprophylaxis in major elective general surgery using once daily injections of a low molecular weight heparin fragment (Fragmin). *Thromb Haemost* 1989;62:1046-9 [2559484]

**Valle , 1988:**

Valle I, Sola G, Origone A Controlled clinical study of the efficacy of a new low molecular weight heparin administered subcutaneously to prevent post-operative deep venous thrombosis. *Curr Med Res Opin* 1988;11:80-6 [2851413]

**Balas [40], :**

BalasPEet al. Efcacy and safety of nadroparin (Fraxiparine) versus placebo in the prophylactic treatment of deep vein thrombosis in patients with high thrombo-embolic risk undergoing general surgery.01 *Thromb Res* 1992; 65(Suppl 1): S113 (Abstract)ag

**Pezzuoli, 1989:**

Pezzuoli G, Neri Seneri GG, Settembrini P, Coggi G, Olivari N, Buzzetti G, Chierichetti S, Scotti A, Scatigna M, Carnovali M Prophylaxis of fatal pulmonary embolism in general surgery using low-molecular weight heparin Cy 216: a multicentre, double-blind, randomized, controlled, clinical trial versus placebo (STEP). STEP-Study Group. *Int Surg* 1989 Oct-Dec;74:205-10 [2560470]

Pezzuoli G, Neri Seneri GG, Settembrini PG, Coggi G, Olivari N, Negri G, Codemo R, Galli G, Roveri S Effectiveness and safety of the low-molecular-weight heparin CY 216 in the prevention of fatal pulmonary embolism and thromboembolic death in general surgery. A multicentre, double-blind, randomized, controlled clinical trial versus placebo (STEP). STEP Study Group. *Haemostasis* 1990;20 Suppl 1:193-204 [1964662]

**Bergqvist [42], :**

Bergqvist D, Flordal PA, Friberg B, Frisell J, Hedberg M, Ljungstrm KG, Mtzsch T, Trngren S Thromboprophylaxis with a low molecular weight heparin (tinzaparin) in emergency abdominal surgery. A double-blind multicenter trial. *Vasa* 1996;25:156-60 [8659218]

**Limmer, 1994:**

**Godwin, 1993:**

**Schmitz-Huebner, 1984:**

Schmitz-Huebner U, Bnte H, Freise G, Reers B, Rskemeyer C, Scherer R, Schulte H, van de Loo J Clinical efficacy of low molecular weight heparin in postoperative thrombosis prophylaxis. *Klin Wochenschr* 1984;62:349-53 [6374278]

**Sasahara, 1986:**

Sasahara AA, Koppenhagen K, Hring R, Welzel D, Wolf H Low molecular weight heparin plus dihydroergotamine for prophylaxis of postoperative deep vein thrombosis. *Br J Surg* 1986;73:697-700 [3530367]

**Voigt, 1986:**

Voigt J, Hamelmann H, Hedderich J, Seifert J, Buchhammer T, Khler A [Effectiveness and side effects of low-molecular weight heparin-dihydroergotamine in preventing thromboembolism in abdominal surgery] *Zentralbl Chir* 1986;111:1269-305 [3544605]

**Welzel, 1988:**

Welzel D, Wolf H, Koppenhagen K Antithrombotic defense during the postoperative period. Clinical documentation of low molecular weight heparin. *Arzneimittelforschung* 1988;38:120-3 [2835055]

**Kakkar, 1989:**

Kakkar VV, Stringer MD, Hedges AR, Parker CJ, Welzel D, Ward VP, Sanderson RM, Cooper D, Kakkar S Fixed combinations of low-molecular weight or unfractionated heparin plus dihydroergotamine in the prevention of postoperative deep vein thrombosis. *Am J Surg* 1989;157:413-8 [2539025]

**Adolf, 1989:**

Adolf J, Knee H, Roder JD, van de Flierdt E, Siewert JR [Thromboembolism prophylaxis with low molecular weight heparin in abdominal surgery] *Dtsch Med Wochenschr* 1989;114:48-53 [2535983]

**Heilmann, 1989:**

Heilmann L, Kruck M, Schindler AE [Prevention of thrombosis in gynecology: double-blind comparison of low molecular weight heparin and unfractionated heparin] *Geburtshilfe Frauenheilkd* 1989;49:803-7 [2553528]

**Baumgartner, 1989:**

Baumgartner A, Jacot N, Moser G, Krhenbhl B Prevention of postoperative deep vein thrombosis by one daily injection of low molecular weight heparin and dihydroergotamine. *Vasa* 1989;18:152-6 [2545054]

**Hoffmann and Largiade, 1990:**

**Koppenhagen, 1990:**

**Schielke, 1991:**

**Koppenhagen, 1992:**

**Hoffmann and Largiader, 1992:**

**Heilmann, 1997:**

**Haas, 1999:**

**Briel, 1988:**

Briel RC, Doller P, Hermann CP [Prevention of thromboembolism in hysterectomies with low molecular weight heparin Fragmin] *Geburtshilfe Frauenheilkd* 1988;48:160-4 [2836259]

**Bergqvist, 1986:**

Bergqvist D, Burmark US, Frisell J, Hallbk T, Lindblad B, Risberg B, Trngren S, Wallin G Low molecular weight heparin once daily compared with conventional low-dose heparin twice daily. A prospective double-blind multicentre trial on prevention of postoperative thrombosis. *Br J Surg* 1986;73:204-8 [3512031]

**Onarheim, 1986:**

Onarheim H, Lund T, Heimdal A, Arnesj B A low molecular weight heparin (KABI 2165) for prophylaxis of postoperative deep venous thrombosis. *Acta Chir Scand* 1986;152:593-6 [3544625]

**Koller, 1986:**

Koller M, Schoch U, Buchmann P, Largiadr F, von Felten A, Frick PG Low molecular weight heparin (KABI 2165) as thromboprophylaxis in elective visceral surgery. A randomized, double-blind study versus unfractionated heparin. *Thromb Haemost* 1986;56:243-6 [3551180]

**Koller, 1986:**

Koller M, Schoch U, Buchmann P, Largiadr F, von Felten A, Frick PG Low molecular weight heparin (KABI 2165) as thromboprophylaxis in elective visceral surgery. A randomized, double-blind study versus unfractionated heparin. *Thromb Haemost* 1986;56:243-6 [3551180]

**Fricker, 1988:**

Fricker JP, Vergnes Y, Schach R, Heitz A, Eber M, Grunebaum L, Wiesel ML, Kher A, Barbier P, Cazenave JP Low dose heparin versus low molecular weight heparin (Kabi 2165, Fragmin) in the prophylaxis of thromboembolic complications of abdominal oncological surgery. *Eur J Clin Invest* 1988;18:561-7 [2852111]

**Bergqvist, 1988:**

Bergqvist D, Mtzsch T, Burmark US, Frisell J, Guilbaud O, Hallbk T, Horn A, Lindhagen A, Ljungnr H, Ljungstrm KG Low molecular weight heparin given the evening before surgery compared with conventional low-dose heparin in prevention of thrombosis. *Br J Surg* 1988;75:888-91 [2846113]

**Caen, 1988:**

Caen JP A randomized double-blind study between a low molecular weight heparin Kabi 2165 and standard heparin in the prevention of deep vein thrombosis in general surgery. A French multicenter trial. *Thromb Haemost* 1988;59:216-20 [2838923]

**Borstad, 1988:**

Borstad E, Urdal K, Handeland G, Abildgaard U Comparison of low molecular weight heparin vs. unfractionated heparin in gynecological surgery. *Acta Obstet Gynecol Scand* 1988;67:99-103 [2845707]

**Creperio, 1990:**

Creperio G, Marabini M, Ciocia G, Bergonzi M, Fincato M [Evaluation of the effectiveness and safety of Fragmin (Kabi 2165) versus calcium heparin in the prevention of deep venous thrombosis in general surgery] *Minerva Chir* 1990;45:1101-6 [2177861]

**Hartl, 1990:**

Hartl P, Brcke P, Dienstl E, Vinazzer H Prophylaxis of thromboembolism in general surgery: comparison between standard heparin and Fragmin. *Thromb Res* 1990;57:577-84 [2158151]

**Borstad, 1992:**

**Kakkar, 1993:**

**Samama 2, 1988:**

Samama M, Bernard P, Bonnardot JP, Combe-Tamzali S, Lanson Y, Tissot E Low molecular weight heparin compared with unfractionated heparin in prevention of postoperative thrombosis. *Br J Surg* 1988;75:128-31 [2832030]

Samama MM Prevention of postoperative thromboembolism in general surgery with enoxaparin. *Eur J Surg Suppl* 1994;:31-3 [7519086]

**Samama 1, 1988:**

Samama M, Bernard P, Bonnardot JP, Combe-Tamzali S, Lanson Y, Tissot E Low molecular weight heparin compared with unfractionated heparin in prevention of postoperative thrombosis. *Br J Surg* 1988;75:128-31 [2832030]

Samama MM Prevention of postoperative thromboembolism in general surgery with enoxaparin. *Eur J Surg Suppl* 1994;:31-3 [7519086]

Samama M, Combe S Prevention of thromboembolic disease in general surgery with enoxaparin (Clexane). *Acta Chir Scand Suppl* 1990;556:91-5 [1963022]

**Samama 3, 1988:**

Samama M, Bernard P, Bonnardot JP, Combe-Tamzali S, Lanson Y, Tissot E Low molecular weight heparin compared with unfractionated heparin in prevention of postoperative thrombosis. *Br J Surg* 1988;75:128-31 [2832030]

Samama MM Prevention of postoperative thromboembolism in general surgery with enoxaparin. *Eur J Surg Suppl* 1994;:31-3 [7519086]

**Kaaja, 1992:**

**Gazzaniga (ISG), 1993:**

Creperio G, Marabini M, Ciocia G, Bergonzi M, Fincato M [Evaluation of the effectiveness and safety of Fragmin (Kabi 2165) versus calcium heparin in the prevention of deep venous thrombosis in general surgery] *Minerva Chir* 1990;45:1101-6 [2177861]

Creperio G, Marabini M, Ciocia G, Bergonzi M, Fincato M [Evaluation of the effectiveness and safety of Fragmin (Kabi 2165) versus calcium heparin in the prevention of deep venous thrombosis in general surgery] *Minerva Chir* 1990;45:1101-6 [2177861]

**Nurmohamed, 1995:**

**McLeod (Canadian), 1995:**

**Gonzalez, 1996:**

**ENOXACAN, 1997:**

**Kakkar and Murray, 1985:**

Kakkar VV, Murray WJ Efficacy and safety of low-molecular-weight heparin (CY216) in preventing postoperative venous thrombo-embolism: a co-operative study. *Br J Surg* 1985;72:786-91 [3899240]

**EFS, 1988:**

Comparison of a low molecular weight heparin and unfractionated heparin for the prevention of deep vein thrombosis in patients undergoing abdominal surgery. The European Fraxiparin Study (EFS) Group. *Br J Surg* 1988;75:1058-63 [2905187]

**Dahan, 1989:**

**Barbui, 1990:**

**Eurin, 1994:**

**Catania, 1988:**

Catania G, Salanitri G Prevention of postoperative deep vein thrombosis by two different heparin types. *Int J Clin Pharmacol Ther Toxicol* 1988;26:304-9 [2842266]

**Salcuni, 1988:**

**Verardi, 1989:**

Verardi S, Cortese F, Baroni B, Boffo V, Casciani CU [Role of low molecular weight heparin in the prevention of postoperative deep venous thrombosis. Our experience in 88 cases] *G Chir* 1989;10:674-8 [2562010]

**Garcea, 1992:**

**Kakkar, 1993:**

**Torngren, 1984:**

Trngren S, Kettunen K, Lahtinen J, Koppenhagen K, Brcke P, Hartl P, Hutter O, Haller U, Lahnborg G, Forsskl B A randomized study of a semisynthetic heparin analogue and heparin in prophylaxis of deep vein thrombosis. *Br J Surg* 1984;71:817-20 [6437467]

**Leizorovicz, 1991:**



## 2 About TrialResults-center.org

TrialResults-center is an innovative knowledge database that collects the results of RCTs and provides dynamic interactive systematic reviews and meta-analysis in the field of all major heart and vessels diseases.

The TrialResults-center database provides a unique view of the treatment efficacy based on all data provided directly from clinical trial results, offering a valuable alternative to personal bibliographic search, published meta-analysis, etc. Furthermore, it would allow comparing easily the various concurrent therapeutic for the same clinical condition.

Rigorous meta-analysis method is used to populate TrialResults-center: widespread search of published and non published trials, study selection using pre-specified criteria, data extraction using standard form.

TrialResults-center is continually updated on a weekly basis. We continually search all new results (whatever their publication channel) and these news results are immediately added to the database with a maximum of 1 week.

TrialResults-center is non-profit and self-funded.