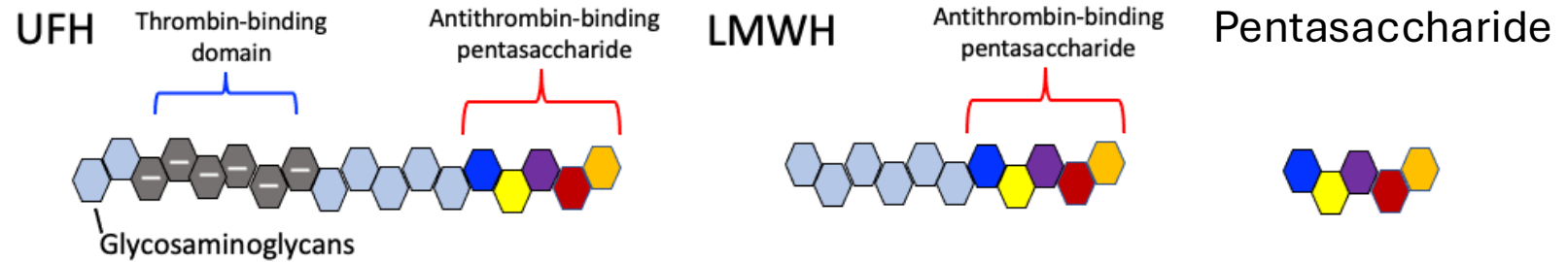


Lovenox: from bench to bedside

Jack Hirsh CM, MD, FRCP(C), FRACP, FRSC, DSc.
**Professor Emeritus of Medicine,
McMaster University**

Heparin, low molecular weight heparin and pentasaccharide



Average saccharide units	50-100	15-25	5
Mean MW in Daltons	15,000	4000-6500	1728



The saga before the clinical development of LMWH



Post-operative Enoxaparin thromboprophylaxis after elective hip surgery (Turpie AG et al.)

	LMWH PK10169 30 mg BID n=50	Placebo n=50
Venous Thrombosis		
Total	12%	42%
Proximal	4%	20%
Bleeding	4%	4%
Treatment with PK10169 30 mg BID or placebo was begun 12 to 24 hours after surgery and continued for 14 days or until discharge.		

Turpie AG, Levine MN, Hirsh J, Carter CJ, Jay RM, Powers PJ, Andrew M, Hull RD, Gent M. A randomized controlled trial of a low-molecular-weight heparin (enoxaparin) to prevent deep-vein thrombosis in patients undergoing elective hip surgery. N Engl J Med. 1986 Oct 9;315(15):925-9

Post operative low dose LMWH for VTE prevention after hip replacement

Efficacy for various doses (Spiro TE et al. n~ 572 pts)

	Enox 10 mg OD	Enox 40 mg OD	Enox 30 mg BID
Total DVT	25%	14%	11%
Proximal DVT	11%	5%	4%
Total Bleeding	5%	11%	13%
Major bleeding	2%	4%	5%

Efficacy and safety of enoxaparin to prevent deep venous thrombosis after hip replacement surgery. Enoxaparin Clinical Trial Group.

Spiro TE, Johnson GJ, Christie MJ, Lyons RM, MacFarlane DE, Blasier RB, Tremaine MD. Ann Intern Med. 1994 Jul 15;121(2):81-9. doi: 10.7326/0003-4819-121-2-199407150-00001. PMID: 8017740.

Post operative low dose LMWH vs UFH for VTE prevention after hip replacement

Efficacy of various dosing regimens (Colwell CW et al, n~ 610 pts)

	UFH 5000 TID	Enox 40 OD	Enox 30 mg BID
Total DVT	12%	15%	5%
Proximal DVT	5%	4%	2%
Total Bleeding	12%	10%	12%
Major bleeding	6%	1%	4%

Other studies with LMWH that transformed clinical practice

LMWH enabling home treatment of acute VTE

Study	Treatment	Number	Recurrent Thrombosis	Major Bleeding
Levine et al NEJM 1996	UFH	253	17	3
	LMWH	247	13	5
Koopman et al NEJM 1996	UFH	198	17	4
	LMWH	202	14	1

LMWH vs. UFH in the treatment of acute VTE

	Pooled Estimate (OR)	No of participants/RCTs
Recurrent VTE (at 3mo)	0.71 (0.56 to 0.90)	6661 (16 RCTs)
Major bleeding	0.69 (0.50 to 0.95)	8780 (25 RCTs)
Mortality	0.84 (0.70 to 1.01)	9663 (24 RCTs)