

# Efficacy of single fraction conventional radiation therapy for painful uncomplicated bone metastases: a systematic review

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## Objective

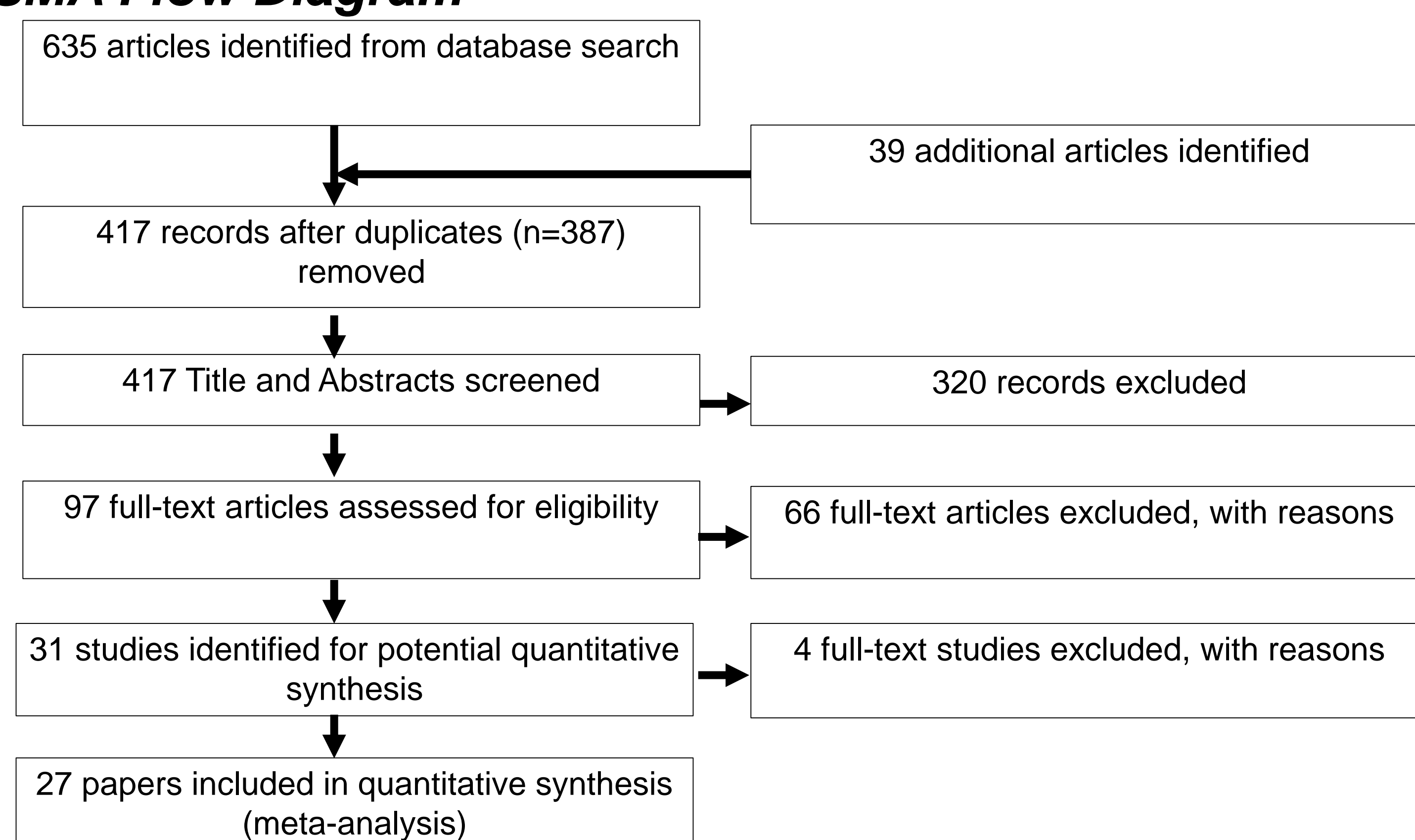
- Portray pain response rates for single fraction radiation therapy (SFRT)

- A literature search was conducted in Ovid MEDLINE(R) <1946 to June 2015 Week 3>, Embase Classic & Embase <1947 to 2016 Week 26> and Cochrane Central Register of Controlled Trials <May 2016>
- References were included if they reported outcomes of SFRT administered for the first time
- When possible, partial response (PR), complete response (CR) and overall response (OR) rates were noted under the analysis of both Intention-To-Treat (ITT) and Evaluable Patients (EP)

## Methods

## Results

### PRISMA Flow Diagram



### Pain Response by Dose

Dose	Response Rate	
	ITT	EP
Overall Response		
4Gy	322/598 (54%)	322/488 (66%)
6Gy	274/369 (74%)	274/340 (81%)
8Gy	1807/3006 (60%)	1807/2500 (72%)
10Gy	108/134 (81%)	108/129 (84%)
Complete Response		
4Gy	128/598 (21%)	129/488 (26%)
6Gy	112/369 (30%)	112/340 (33%)
8Gy	659/2970 (22%)	649/2433 (27%)
10Gy	50/134 (37%)	50/129 (39%)
Partial Response		
4Gy	193/598 (32%)	193/488 (40%)
6Gy	162/369 (44%)	162/340 (48%)
8Gy	1120/2970 (38%)	1120/2466 (45%)
10Gy	58/134 (43%)	58/129 (45%)

Study	Dose	Pain Assessment Tool	Time to Pain Response	CR and PR Criteria	Pain Response Rates					
					OR		CR		PR	
					ITT	EP	ITT	EP	ITT	EP
Amouzegar-Hashemia et al 2008	8Gy	4-point numerical scale	1 month	CR: pain reduction of 2 grades or more PR: pain reduction of 1 grade or more but less than 2 grades	21/36 (58%)	21/27 (78%)	6/36 (17%)	6/27 (22%)	15/36 (42%)	15/27 (56%)
Anter 2015	8Gy	Numeric Rating Scale	3 months	CR: no pain 3 months after RT PR: at least 2 points lower than baseline	33/51 (65%)	33/44 (75%)	8/51 (16%)	8/44 (18%)	25/51 (49%)	25/44 (57%)
Badzio et al 2003	8Gy	4-point pain intensity scale	4 weeks	CR: complete disappearance of pain and withdrawal of analgesic drugs PR: decrease in pain score or decrease in dose of analgesic drug	53/72 (74%)	53/64 (83%)	23/72 (32%)	23/64 (36%)	30/72 (42%)	30/64 (47%)
Bayard et al 2014	8Gy	Visual Analog Score	1 month	CR: no pain PR: decrease in pain score	35/45 (78%)	35/45 (78%)	7/45 (16%)	7/45 (16%)	28/45 (62%)	28/45 (62%)
Berwouts et al 2015	8Gy	Visual Analog Score	1 month	CR: no pain with no increase in daily oral morphine equivalent PR: score reduction of 2 or more, and no increase in daily oral morphine equivalent	8/15 (53%)	8/14 (57%)	2/15 (13%)	2/14 (14%)	6/15 (40%)	6/14 (43%)
Bone Pain Trial Working Party 1999	8Gy	Pain Questionnaire	1 month	CR: no pain PR: lesser degree of pain	282/383 (74%)	282/351 (80%)	92/383 (24%)	92/351 (26%)	190/383 (50%)	190/351 (54%)
Cole 1989	8Gy	Physician consult and patient diary	6 months	N/A	13/16 (81%)	13/14 (93%)	N/A	N/A	N/A	N/A
Foro Arnalot et al 2008	8Gy	Ordinal pain scale	3 weeks	CR: absence of pain without need for increasing analgesia PR: improvement of equal or greater than 2 on scale with no need for increasing analgesia	59/78 (76%)	59/76 (78%)	12/78 (15%)	12/76 (16%)	47/78 (60%)	47/76 (62%)
Gaze et al 1997	10Gy	Five-point categorical scale	1 month	CR: complete pain relief PR: decrease in pain score	108/134 (81%)	108/129 (84%)	50/134 (37%)	50/129 (39%)	58/134 (43%)	58/129 (45%)
Guden et al 2002	6Gy	11-point scale	4 weeks	CR: no pain PR: decrease in pain by at least 4 points	55/62 (89%)	55/62 (89%)	23/62 (37%)	23/62 (37%)	32/62 (52%)	32/62 (52%)
Hartsell et al 2005	8Gy	Brief Pain Inventory	3 months	CR: no pain PR: at least 2 points lower than initial response	187/455 (41%)	187/288 (65%)	44/455 (10%)	44/288 (15%)	143/455 (31%)	143/288 (50%)
Hayashi et al 2014	8Gy	11-point scale	1 month	CR: absence of pain without need for increasing analgesics PR: improvement of equal or greater than 2 on pain scale without need for increasing analgesia, or decrease in analgesia	9/12 (75%)	9/12 (75%)	2/12 (17%)	2/12 (17%)	7/12 (58%)	7/12 (58%)
Hoskin et al 1992	4Gy	4-point categorical pain scale	4 weeks	CR: no pain PR: improvement in pain score by at least one category	75/137 (55%)	75/98 (77%)	25/137 (18%)	25/98 (26%)	50/137 (37%)	50/98 (51%)
	8Gy				94/133 (71%)	94/96 (98%)	22/133 (17%)	22/96 (23%)	72/133 (54%)	72/96 (75%)
Hoskin et al 2015	4Gy	4-point categorical pain scale	4 weeks	CR: no pain PR: improvement in pain score by at least one category	186/326 (57%)	186/260 (72%)	87/326 (27%)	87/260 (33%)	99/326 (30%)	99/260 (38%)
	8Gy				227/325 (70%)	227/274 (83%)	95/325 (29%)	95/274 (35%)	132/325 (41%)	132/274 (48%)
Jeremic et al 1998	4Gy	4-point categorical pain scale	4 weeks	CR: complete disappearance of pain PR: improvement in pain score by at least one category	51/109 (47%)	51/109 (47%)	16/109 (15%)	16/109 (15%)	35/109 (32%)	35/109 (32%)
	6Gy				70/108 (65%)	70/108 (65%)	23/108 (21%)	23/108 (21%)	47/108 (44%)	47/108 (44%)
	8Gy				81/110 (74%)	81/110 (74%)	28/110 (25%)	28/110 (25%)	53/110 (48%)	53/110 (48%)
Majumder et al 2012	8Gy	Visual Analog Scale	1 month	CR: no pain PR: reduction of 2 or more points without analgesic increase	24/31 (77%)	24/27 (89%)	3/31 (10%)	3/27 (11%)	21/31 (68%)	21/27 (78%)
Nielson et al 1998	8Gy	Visual Analog Scale	4 weeks	CR: absence of pain PR: improvement of at least one-category	60/120 (50%)	60/106 (57%)	11/120 (9%)	11/106 (10%)	49/120 (41%)	49/106 (46%)
Nuzzo et al 2015	8Gy	Visual Analog Scale	3 weeks	CR: no pain with no associated increase in daily oral morphine equivalent PR: reduction of 2 or more on pain score without change in daily oral morphine, or no change in score and increase in daily oral morphine of at least 25%	109/248 (44%)	109/248 (44%)	58/248 (23%)	58/248 (23%)	51/248 (21%)	51/248 (21%)
Price et al 1986	8Gy	4-point pain scale	28 days	CR: complete loss of pain PR: reduced pain	33/140 (24%)	33/49 (67%)	13/140 (9%)	13/49 (27%)	20/140 (14%)	20/49 (41%)
Price et al 1988	4Gy	4-point pain scale	2 months	CR: no pain PR: improvement in pain score by at least one category	10/26 (38%)	10/21 (48%)	1/26 (4%)	1/21 (5%)	9/26 (35%)	9/21 (43%)
Roos et al 2005	8Gy	4-point categorical pain scale	4 weeks	CR: no pain with no analgesia or adjuvant analgesia PR: improvement in pain score by at least one grade with no increase in analgesia	73/137 (53%)	73/119 (61%)	35/137 (26%)	35/119 (29%)	38/137 (28%)	38/119 (32%)
Safwat et al 2007	8Gy	5-point categorical scale	6 weeks	N/A	14/20 (70%)	14/20 (70%)	N/A	N/A	N/A	N/A
Steenland et al 1999	8Gy	11-point scale	N/A	CR: 0 to 1 pain score, independent of analgesics consumption PR: decrease in initial pains score by at least two points	392/579 (68%)	392/545 (72%)	199/579 (34%)	199/545 (37%)	193/579 (33%)	193/545 (36%)
Uppelschoten et al 1995	6Gy	4-point pain scale	4 weeks	CR: total disappearance of pain PR: decrease in pain of at least one category	149/199 (75%)	149/170 (88%)	66/199 (33%)	66/170 (39%)	83/199 (42%)	83/170 (49%)

## Conclusions

- The most commonly administered 8Gy cannot decisively be determined as the optimal dose for pain relief, but the few head-to-head studies that compared 8Gy to 4Gy and 6Gy proved that it was more efficacious

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