

Supplementary material

Section 1 Systematic Review – Search Strategy

The following databases were searched:

- MEDLINE (Ovid)
- EMBASE (Ovid)
- The Cochrane Library

The searches were conducted on the 14th September 2014. The date span of the search was from the origin of the database to the search date.

Table S1: Search strategy

Basic Search Terms	((((((((((((((((((((BONE MORPHOGENIC PROTEIN) OR BONE MORPHOGENIC PROTEIN 2) OR BONE MORPHOGENIC PROTEIN 7) OR osteogenic protein) OR osteogenic protein 1) OR dibotetermin) OR dibotetermin alfa) OR dibotetermin alpha) OR eptotetermin) OR eptotetermin alfa) OR eptotetermin alpha) OR bmp) OR bmp2) OR bmp-2) OR rhbmp-2) OR bmp7) OR bmp-7) OR rhbmp-7) OR op1) OR op-1)) AND ((((((((((((((((((((((spinal fusion) OR *arthritis, rheumatoid) OR *neurofibromatosis) OR *osteoporosis) OR *osteopenia) OR *pseudoarthrosis) OR *scoliosis) OR *pars articularis) OR *sacro iliac crest) OR *sacro iliac fusion) OR *autogenous bone graft) OR *arthrodesis) OR *allograft) OR *autograft) OR *fracture healing)) AND (((((union) OR fusion) OR non union) OR non-union) OR non fusion) OR non-fusion)
Detailed Search Terms	((((((((((((((((((((((((("bone and bones"[MeSH Terms] OR ("bone"[All Fields] AND "bones"[All Fields]) OR "bone and bones"[All Fields] OR "bone"[All Fields]) AND MORPHOGENIC[All Fields] AND ("proteins"[MeSH Terms] OR "proteins"[All Fields] OR "protein"[All Fields])) OR ((("bone and bones"[MeSH Terms] OR ("bone"[All Fields] AND "bones"[All Fields]) OR "bone and bones"[All Fields] OR "bone"[All Fields]) AND MORPHOGENIC[All Fields] AND ("proteins"[MeSH Terms] OR "proteins"[All Fields] OR "protein"[All Fields]) AND 2[All Fields])) OR ((("bone and bones"[MeSH Terms] OR ("bone"[All Fields] AND "bones"[All Fields]) OR "bone and bones"[All Fields] OR "bone"[All Fields]) AND MORPHOGENIC[All Fields] AND ("proteins"[MeSH Terms] OR "proteins"[All Fields] OR "protein"[All Fields]) AND 7[All Fields])) OR (osteogenic[All Fields] AND ("proteins"[MeSH Terms] OR "proteins"[All Fields] OR "protein"[All Fields])) OR ("bone morphogenetic protein 7"[MeSH Terms] OR "bone morphogenetic protein 7"[All Fields] OR "osteogenic protein 1"[All Fields]) OR dibotetermin[All Fields] OR (dibotetermin[All Fields] AND alfa[All Fields]) OR (dibotetermin[All Fields] AND alpha[All Fields]) OR eptotetermin[All Fields] OR (eptotetermin[All Fields] AND alfa[All Fields]) OR (eptotetermin[All Fields] AND alpha[All Fields]) OR bmp[All Fields] OR bmp2[All Fields] OR ("bone morphogenetic protein 2"[MeSH Terms] OR "bone morphogenetic protein 2"[All Fields] OR "bmp 2"[All Fields]) OR rhbmp-2[All Fields] OR bmp7[All Fields] OR ("bone morphogenetic protein 7"[MeSH Terms] OR "bone morphogenetic protein 7"[All Fields] OR "bmp 7"[All Fields]) OR rhbmp-7[All Fields] OR op1[All Fields] OR op-1[All Fields]) AND ((((((((((((((((((((((spinal fusion"[MeSH Terms] OR ("spinal"[All Fields] AND "fusion"[All Fields]) OR "spinal fusion"[All Fields]) OR ("arthritis, rheumatoid"[MeSH Terms] OR ("arthritis"[All Fields] AND "rheumatoid"[All Fields]) OR "rheumatoid arthritis"[All Fields] OR ("arthritis"[All Fields] AND "rheumatoid"[All Fields]) OR "arthritis, rheumatoid"[All Fields]) OR ("neurofibromatoses"[MeSH Terms] OR "neurofibromatoses"[All Fields] OR "neurofibromatosis"[All Fields]) OR ("osteoporosis, postmenopausal"[MeSH Terms] OR ("osteoporosis"[All Fields] AND "postmenopausal"[All Fields]) OR "postmenopausal osteoporosis"[All Fields] OR "osteoporosis"[All Fields] OR "osteoporosis"[MeSH Terms]) OR ("bone diseases, metabolic"[MeSH Terms] OR ("bone"[All Fields] AND "diseases"[All Fields] AND "metabolic"[All Fields]) OR "metabolic bone diseases"[All Fields] OR "osteopenia"[All Fields]) OR ("pseudarthrosis"[MeSH Terms] OR "pseudarthrosis"[All Fields] OR "pseudoarthrosis"[All Fields]) OR ("scoliosis"[MeSH Terms] OR "scoliosis"[All Fields]) OR ("pars[All Fields] AND articularis[All Fields]) OR (*sacro[All Fields] AND ("ilium"[MeSH Terms] OR "ilium"[All Fields] OR "iliac"[All Fields]) AND ("crest syndrome"[MeSH Terms] OR ("crest"[All Fields] AND "syndrome"[All Fields]) OR "crest syndrome"[All Fields] OR "crest"[All Fields])) OR (*sacro[All Fields] AND ("ilium"[MeSH Terms] OR "ilium"[All Fields] OR "iliac"[All Fields]) AND ("Nucl Eng Des/Fusion"[Journal] OR "fusion"[All Fields])) OR (*autogenous[All Fields] AND ("bone transplantation"[MeSH Terms] OR ("bone"[All Fields] AND "transplantation"[All Fields] OR "bone transplantation"[All Fields] OR ("bone"[All Fields] AND "graft"[All Fields] OR "bone graft"[All Fields])) OR ("arthrodesis"[MeSH Terms] OR "arthrodesis"[All Fields]) OR ("transplantation, homologous"[MeSH Terms] OR ("transplantation"[All Fields] AND "homologous"[All Fields]) OR "homologous transplantation"[All Fields] OR "allograft"[All Fields]) OR ("transplantation, autologous"[MeSH Terms] OR ("transplantation"[All Fields] AND "autologous"[All Fields]) OR "autologous transplantation"[All Fields] OR "autograft"[All Fields]) OR ("fracture healing"[MeSH Terms] OR ("fracture"[All Fields] AND "healing"[All Fields]) OR "fracture healing"[All Fields])) AND (((((union[All Fields] OR ("Nucl Eng Des/Fusion"[Journal] OR "fusion"[All Fields]) OR (non[All Fields] AND union[All Fields])) OR non-union[All Fields] OR (non[All Fields] AND ("Nucl Eng Des/Fusion"[Journal] OR "fusion"[All Fields])) OR non-fusion[All Fields] AND ((Clinical Trial[ptyp] OR Meta-Analysis[ptyp] OR Randomized Controlled Trial[ptyp] OR systematic[sb]) AND "humans"[MeSH Terms])

Table S2: Limits applied within each database searched

Database	Limits applied
MEDLINE	Humans; Randomised Controlled Trial; Clinical Trial; Meta-Analysis; Systematic
Cochrane	Central Register of Controlled Trials (in Cochrane Reviews {Reviews and Protocols}, Other Reviews, Trials, Technology Assessments, Economic Evaluations and Cochrane Groups)
EMBASE	Human; exclude Medline journals

Section 2

Quality assessment of included clinical efficacy studies

<http://handbook.cochrane.org/>

Part 3 – Special Topics

Chapter 13 – Including non-randomised studies

The TREND Statement Checklist was used to determine the eligibility criteria of each study which met the inclusion criteria. Data on File.

Section 3

References of included studies in the analysis

1. Lee KB, Johnson JS, Song KJ, Taghavi CE, Wang JC. Use of autogenous bone graft compared with RhBMP in high-risk patients: a comparison of fusion rates and time to fusion. *J Spinal Disord Tech* 2013; 26(5):233-238.
2. Taghavi CE, Lee KB, Keorochana G, Tzeng ST, Yoo JH, Wang JC. Bone morphogenetic protein-2 and bone marrow aspirate with allograft as alternatives to autograft in instrumented revision posterolateral lumbar spinal fusion: a minimum two-year follow-up study. *Spine (Phila Pa 1976)* 2010; 35(11):1144-1150.
3. Rogozinski A, Rogozinski C, Cloud G. Accelerating autograft maturation in instrumented posterolateral lumbar spinal fusions without donor site morbidity. *Orthopedics* 2009; 32(11):809.
4. Mulconrey DS, Bridwell KH, Flynn J, Cronen GA, Rose PS. Bone morphogenetic protein (RhBMP-2) as a substitute for iliac crest bone graft in multilevel adult spinal deformity surgery: minimum two-year evaluation of fusion. *Spine (Phila Pa 1976)* 2008; 33(20):2153-2159.
5. Glassman SD, Carreon L, Djurasovic M, Campbell MJ, Puno RM, Johnson JR et al. Posterolateral lumbar spine fusion with INFUSE bone graft. *Spine J* 2007; 7(1):44-49.
6. Vaidya R, Weir R, Sethi A, Meisterling S, Hakeos W, Wybo CD. Interbody fusion with allograft and rhBMP-2 leads to consistent fusion but early subsidence. *J Bone Joint Surg Br* 2007; 89(3):342-345.