

Purpose

- Autologous skin grafts (ASGs) are the gold-standard for the reconstruction of wounds, but are limited by donor availability and may incur additional donor morbidity
- Allogeneic/xenogeneic grafts provide temporary coverage but are eventually rejected ¹⁻³
- Acellular tissue engineered skin constructs (ATSCs) and cellular tissue-engineered skin constructs (CTSCs) use is increasing (see Fig 1) ^{4,5}
- This systematic review compares graft incorporation and survival outcomes for ASGs, ASGs co-grafted with ATSCs, and CTSCs in humans.

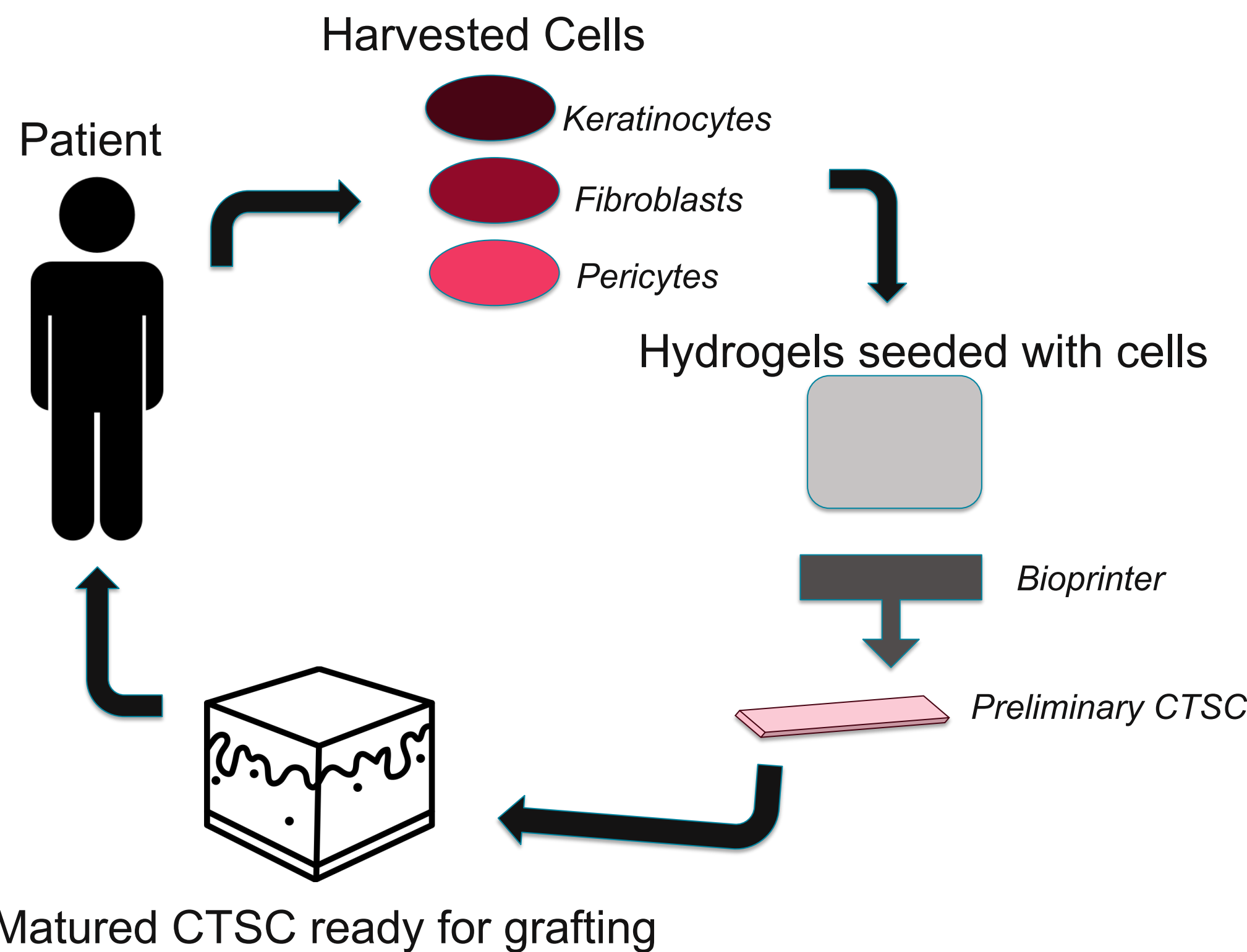


Fig 1. Sample schema for CTSC development

Methods

- Systematic review conducted employing PRISMA guidelines (see Fig 2.)⁵
- MEDLINE, EMBASE, Web of Science, and Cochrane central queried
- Case reports/series, reviews, *in vitro/in vivo* work, non-English articles, or articles without full text were excluded. Articles were screened and data was extracted by four authors independently

Fig 2. PRISMA Diagram

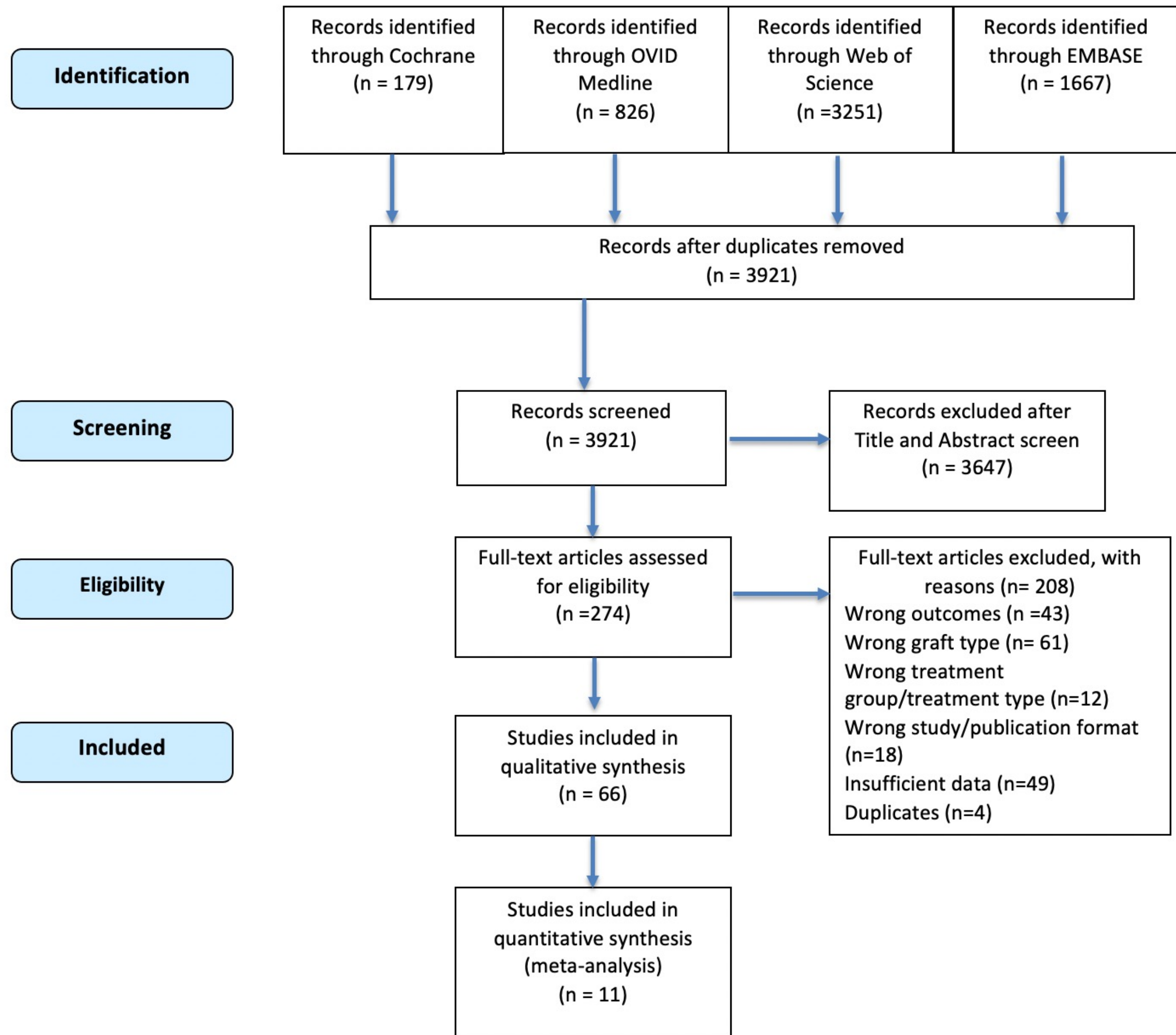


Fig 3. Odds of Graft Failure: Co-Grafts of ATSCs with STSG vs. STSG alone

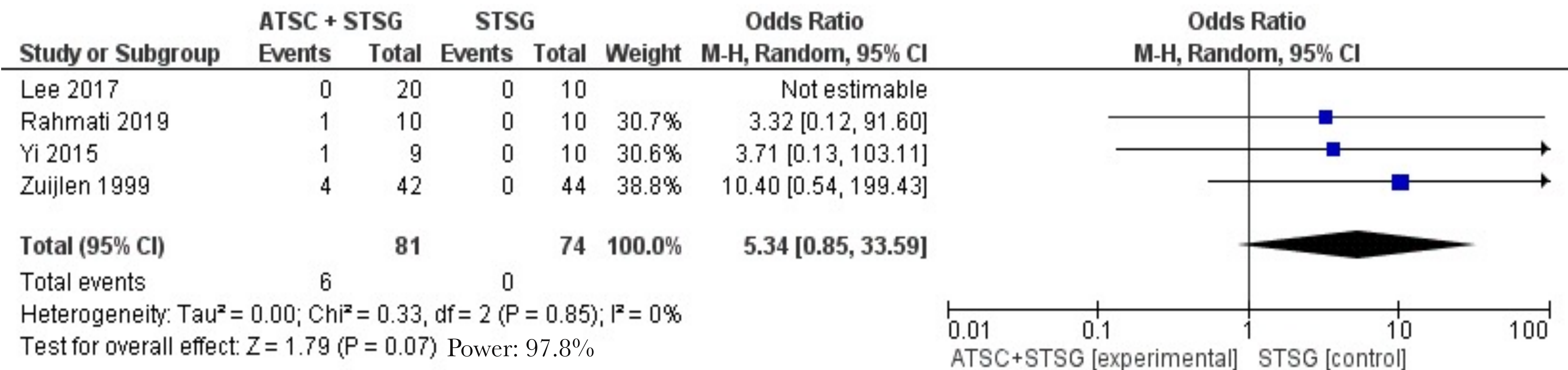
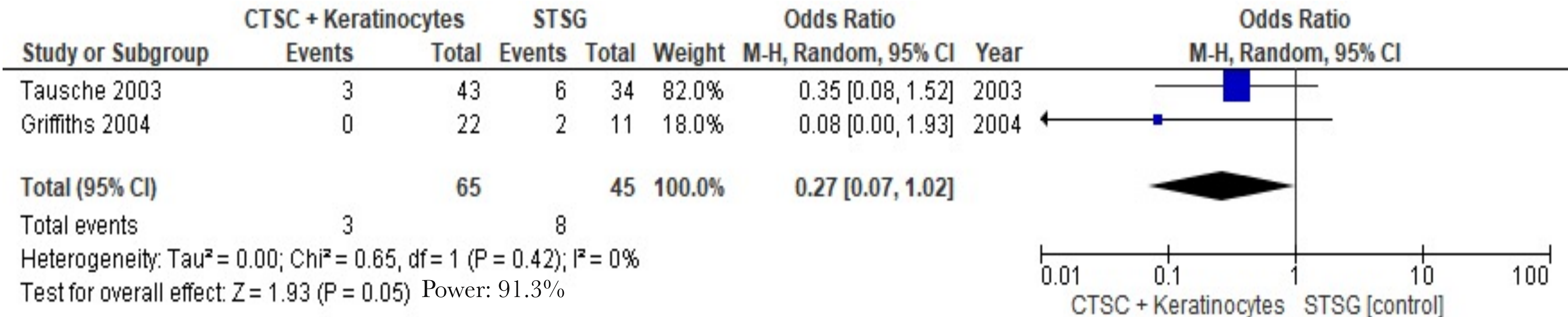


Fig 4. Odds of Graft Failure: Epidermal CTSCs vs STSG alone



Graft Comparison	Outcome measure	P value
STSG + ATSC vs. STSG Alone	Failure rate	0.07
	Percent re-epithelialization	0.92
	Vancouver scar scale	0.09
Epidermal CTSC vs STSG	Failure rate	0.05

Table 1. Summary meta-analysis findings by grafts compared and outcome measures

Results

- 66 articles (25 prospective cohorts, 14 retrospective cohorts, 8 non-randomized, and 19 randomized studies) and total 4076 patients were included
- No significant differences found in graft failure rates and mean difference in percent re-epithelialization for STSGs compared to co-grafts of ATSCs with STSG’s (p=0.07 and p=0.92 respectively; Fig 3., Table 1.)
- No significant difference in Vancouver scar scale scores⁶ for co-grafts of ATSCs and STSGs compared to STSGs alone (p=0.09, Table 1)
- Pooled study results of epidermal CTSCs revealed non-significant improvement in re-epithelialization rates compared to STSGs (20.4% vs. 14% respectively)
- Decreased odds of graft failure approaching significance was found for epidermal CTSCs compared to STSG (p=0.05; Fig 4., Table 1).

Conclusions

- This systematic review is the first of its kind illustrating comparable wound healing outcomes between STSGs alone and co-grafting of STSGs with ATSCs.
- Further Level 1 evidence is still required to support use of ATSCs and CTSCs clinically

References

- Andreassi A, et al. Classification and pathophysiology of skin grafts. *Clin Dermatol*. 2005.
- Adams DC, Ramsey ML. Grafts in dermatologic surgery: review and update on full- and split-thickness skin grafts, free cartilage grafts, and composite grafts. *Dermatol Surg*. 2005.
- Braza M, Fahrenkopf, MP. Split-Thickness Skin Grafts. *StatPearls*; 2020.
- Converse JM et al. Inosculation of vessels of skin graft and host bed: a fortuitous encounter. *Br J Plast Surg*. 1975.
- Page MJ, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021.
- Nedelec B, Shankowsky HA, Tredget EE. Rating the resolving hypertrophic scar: comparison of the Vancouver Scar Scale and scar volume. *J Burn Care Rehabil*. 2000.