Comparison of Doxorubicin and Alternative Chemotherapeutics in DEB-TACE

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Introduction

- Doxorubicin, an anthracycline antibiotic, is the standard for drug-eluting bead transarterial chemoembolization (DEB-TACE) due to its potent cytotoxicity and bead compatibility.
- However, agents such as mitomycin C, cisplatin, methotrexate, and paclitaxel are also used based on tumor histology, patient tolerance, and regional practice.
- This exhibit compares anthracycline-based beads versus these alternatives in DEB-TACE to guide optimized agent selection for hepatocellular carcinoma treatment.

Materials and

Literature Review: Literature review (2005-2025) comparing DEB-TACE protocols using anthracyclines against non-anthracycline agents including mitomycin C, cisplatin, methotrexate, and paclitaxel.
Protocols: Standardized protocols loaded 100-700 µm microspheres with each drug for selective hepatic arterial infusion.

Results

Complete Response: **39.1%-23.2% (p=0.043)**
Doxorubicin vs. Cisplatin (Gaba et al. 2020)

Optimal Combination (Lit): **Dox+Mito+Gem (P=0.49, 0.37, 0.77)**
(Gao et al.)

Parameter	Doxorubicin	Cisplatin	Mitomycin C	Paclitaxel
Loading Efficiency	82-94%	High	Variable	Challenging
Response Rate	59.6-81.8%	79.7%	Variable	Limited data
Complete Response	39.1%	23.2%	Variable	Not established
Elution Rate (6h)	6%	83.1%	Variable	Variable
Safety Profile	Good	Nephrotoxicity risk	Myelosuppression	Bead compatibility issues

Key Findings
47 studies analyzed: 38 preclinical, 7 retrospective cohorts, 2 prospective trials
Doxorubicin most studied (n=32), followed by cisplatin (n=8), mitomycin C (n=4)
Network meta-analysis included 2,330 patients across 17 RCTs
Doxorubicin maintains benchmark status with superior loading characteristics
Cisplatin shows high loading but rapid elution kinetics
Mitomycin C exhibits variable performance across platforms
Paclitaxel faces bead compatibility challenges
Combination approaches show enhanced efficacy in network analyses

Doxorubicin Loading: **82%-94%**
QuadraSphere microspheres, 2h (Khankan et al. 2010)

Response Rate: **59.6%-81.8% Response Rate**
Multiple studies

Tumor Necrosis: **90%**
Doxorubicin at 7-days (Pre-clinical)

Elution Rate (6h): **6% vs. 83.1%**
Doxorubicin vs. Cisplatin (Maeda et al. 2015)

Conclusion

DEB-TACE with doxorubicin remains the cornerstone of transarterial chemotherapy due to proven cytotoxicity, optimal pharmacokinetics, and superior loading characteristics.

Alternative agents offer unique mechanisms suited for specific patient scenarios: cisplatin for platinum-sensitive tumors (despite nephrotoxicity risk), mitomycin C for DNA crosslinking (with myelosuppression concerns).

Combination approaches showing promise in network analyses, with doxorubicin + mitomycin + gemcitabine demonstrating optimal outcomes.

Selection should consider tumor biology, liver function, prior therapies, and institutional expertise. Additional randomized trials needed to establish evidence-based guidelines for agent selection, dosing optimization, and treatment sequencing.

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