

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

Note: Consider Clinical Trials as treatment options for eligible patients.

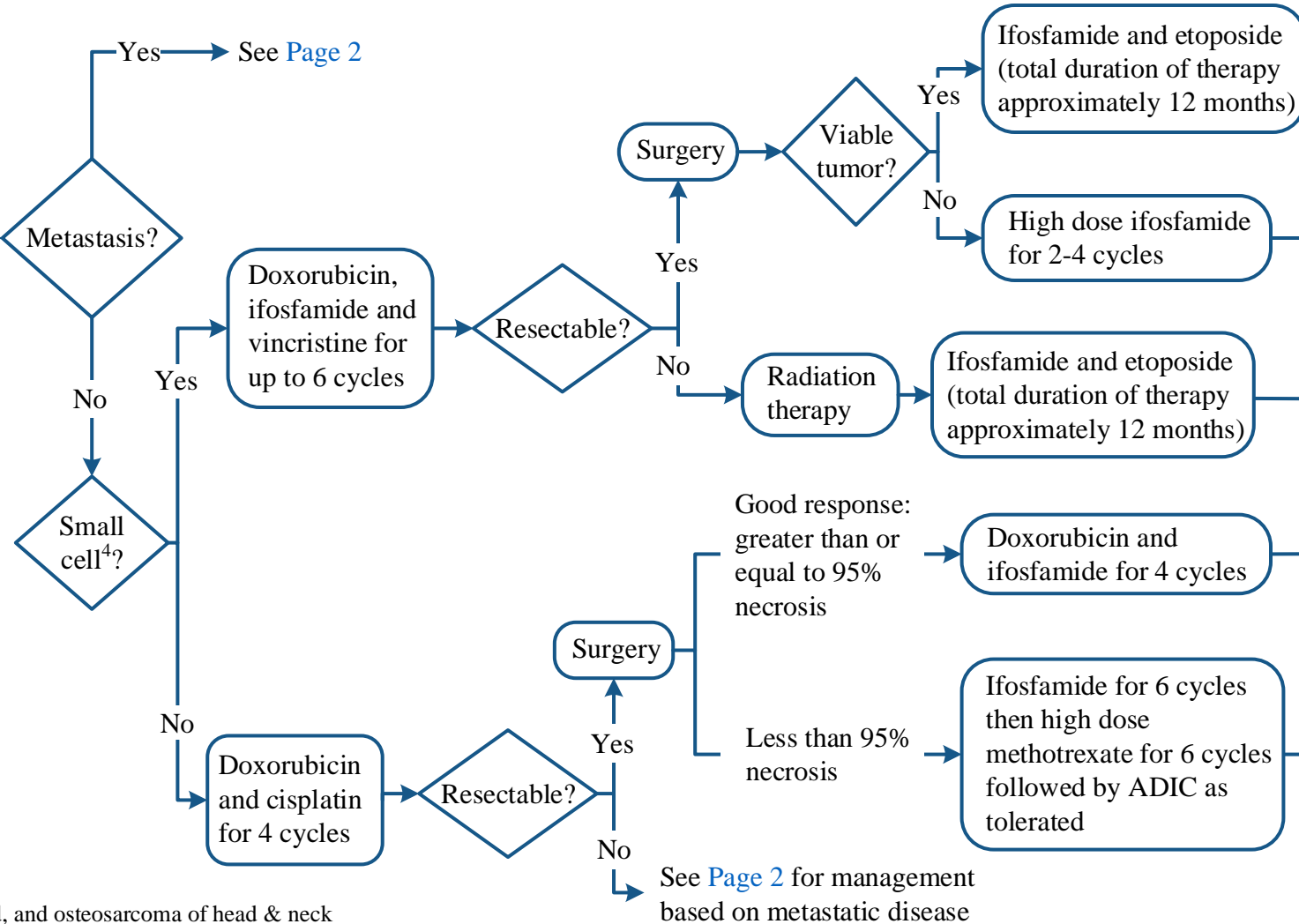
The chemotherapy regimens recommended are intensified by both dose and schedule, which often requires the specialized monitoring and management provided at a comprehensive cancer center.

INITIAL EVALUATION

- History and physical (H&P)
- CBC with differential, platelets, total protein, albumin, calcium, total bilirubin, alkaline phosphatase, LDH, ALT, sodium, potassium, chloride, CO₂, PT, and PTT
- Plain films of primary to include whole bone
- CT of the primary site²
- MRI of the primary site
- Bone scan
- Chest x-ray and CT chest
- PET scan (exploratory)
- Consider PET/CT for osteosarcomas and small cell sarcomas
- Core needle biopsy if not done outside
- Histology review by bone tumor pathologist
- Screening MRI spine for small cell
- EKG and cardiac scan (MUGA or ECHO) if history of cardiac disease
- Insert central venous catheter
- Sarcoma Multidisciplinary Planning Conference
- Lifestyle risk assessment³

TREATMENT

(Note: See Page 3 for chemotherapy regimen references)



SURVEILLANCE

- H&P:
 - Every 3 months for 2 years, then
 - Every 4 months for 2 years, then
 - Every 6 months for 1 year, then
 - Annually
- CBC with differential, platelets, total protein, albumin, calcium, glucose, creatinine, total bilirubin, alkaline phosphatase, LDH, and ALT every visit
- Plain films of primary at each visit
- For pelvic primaries: MRI and x-ray each visit with H&P above
- X-ray to symptomatic bone metastases
- Bone scan for symptomatic patients with history of bone metastases
- Chest x-ray each visit with H&P above
- CT chest if chest x-ray equivocal or for surgical planning
- Sarcoma Multidisciplinary Planning Conference if further multidisciplinary decisions required

ADIC = doxorubicin and dacarbazine

¹ Excluding chondrosarcoma not otherwise specified, and osteosarcoma of head & neck

² CT of the primary site is not routinely done, it is optional based on clinical scenario

³ See [Physical Activity](#), [Nutrition](#), and [Tobacco Cessation](#) algorithms; ongoing reassessment of lifestyle risks should be a part of routine clinical practice

⁴ Small cell includes the following: rhabdomyosarcoma, Ewing's Sarcoma/Primitive, neuroectodermal tumor, mesenchymal chondrosarcoma, and unclassified small cell sarcoma

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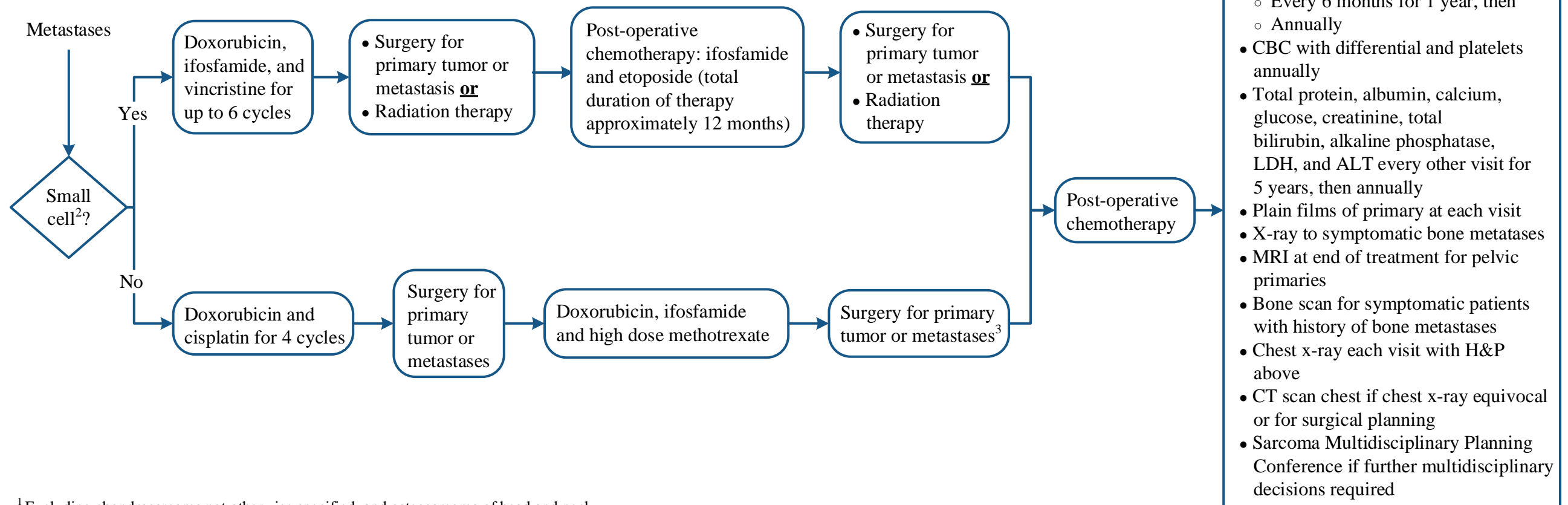
The chemotherapy regimens recommended are intensified by both dose and schedule, which often requires the specialized monitoring and management provided at a comprehensive cancer center.

INITIAL PRESENTATION

TREATMENTS

(Note: See Page 3 for chemotherapy regimen references)

SURVEILLANCE



¹ Excluding chondrosarcoma not otherwise specified, and osteosarcoma of head and neck

² Small cell includes the following: rhabdomyosarcoma, Ewing's Sarcoma/Primitive, neuroectodermal tumor, mesenchymal chondrosarcoma, and unclassified small cell sarcoma

³ For patients without further surgical options, consider gemcitabine/docetaxel, regorafenib, or clinical trials

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SUGGESTED READINGS

Doxorubicin/cisplatin for osteosarcoma:

Benjamin, R.S., Chawla, S.P., Carrasco, C.H., Raymond, A.K., Murray J.A., Armen, T., ... Martin, R.G. (1992). Preoperative chemotherapy for osteosarcoma with intravenous adriamycin and intra-arterial cis-platinum. *Annals of Oncology*, 3 (Suppl. 2), S3-S6. doi:10.1093/annonc/3.suppl_2.S3

Jaffe, N., Patel, S. R., & Benjamin, R. S. (1995). Chemotherapy in Osteosarcoma: Basis for Application and Antagonism to Implementation; Early Controversies Surrounding its Implementation. *Hematology/Oncology Clinics of North America*, 9(4), 825-840. doi:10.1016/S0889-8588(18)30074-1

Doxorubicin/ifosfamide for osteosarcoma and soft-tissue sarcomas:

Patel S.R., Vadhan-Raj S., Burgess M.A., Plager C., Papadopoulos N., Jenkins J., & Benjamin R.S. (1998). Results of two consecutive trials of dose-intensive chemotherapy with doxorubicin and ifosfamide is highly active in patients with soft-tissue sarcomas. *American Journal of Clinical Oncology*, 21(3), 317-321.

High-dose ifosfamide for osteosarcoma and soft-tissue sarcoma:

Patel S.R., Vadhan-Raj S., Papadopoulos N., Plager C., Burgess M.A., Hays C., & Benjamin R.S. (1997). High-dose ifosfamide in bone and soft-tissue sarcomas - Results of phase II and pilot studies - Dose response and schedule dependence. *Journal of Clinical Oncology*, 15(6), 2378-2384. doi:10.1200/JCO.1997.15.6.2378

Gemcitabine/docetaxel for osteosarcoma:

Navid, F., Willert, J. R., McCarville, M. B., Furman, W., Watkins, A., Roberts, W., & Daw, N. C. (2008). Combination of gemcitabine and docetaxel in the treatment of children and young adults with refractory bone sarcoma. *Cancer*, 113(2), 419-425. doi:10.1002/cncr.23586

Regorafenib for osteosarcoma:

Davis, L. E., Bolejack, V., Ryan, C. W., Ganjoo, K. N., Loggers, E. T., Chawla, S., ... Maki, R. G. (2019). Randomized Double-Blind Phase II Study of Regorafenib in Patients With Metastatic Osteosarcoma. *Journal of Clinical Oncology*, 37(16), 1424-1431. doi:10.1200/JCO.18.02374

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DEVELOPMENT CREDITS

This practice algorithm is based on majority expert opinion of the Sarcoma Center Faculty at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

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