Knowledge Check 1

1 **Fill in the blanks:** Biomarker testing in oncology is complex, as of June 2022, there were: _____ FDA-approved biomarker-linked interaction, _____ actionable genomic alterations, and _____ cancer types:

a ≥70, 43, and 28
b ≥75, 47, and 36
c ≥85, 50, and 40
d ≥100, 62, and 53

2 How does biopsy choice and site impact testing outcomes? **Select all that apply:**

a The decalcification process can risk impairing the sample yield and integrity with bone biopsies
b Receptor status can change over the course of the disease
c Variability between the primary tumor and metastatic site can occur
d Rebiopsy after disease progression does not provide clinically meaningful data

3 **Which of the following statements is true for liquid biopsy test results?**

a Provide a snapshot of the cellular and molecular characteristics of 1 part of a single tumor
b Can be linked with histology
c All of the above
d None of the above

4 **Testing for biomarkers generally requires _____% of tumor nuclei in collected samples to be above the LOD:**

a 10%
b 15%
c 18%
d 20%

5 **True or false**, ROSE can be performed without a cytopathologist present?

a True
b False

ANSWERS

Precision Medicine

1 **A.** As of June 2022, there were more than 70 US Food and Drug Administration (FDA)-approved biomarker-linked indications and 43 actionable genomic alterations.[1,2]

2 **A, B, and C.**

A: Bone biopsy requires decalcification, which may impair sample yield and integrity, potentially negatively impacting biomarker testing outcomes.[3]

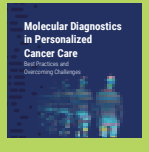
B: The receptor status may change over the course of the disease in certain cancers. Rebiopsy after disease progression may provide important and/or new information.[4-7]

C: Biomarker discordance between the primary tumor and a metastatic site may occur. Additional/different drivers/mutations may occur through clonal evolution over the course of the disease.[8-12]

3 **C.** Liquid biopsy test results may reflect the overall genomic landscape of the tumor and all metastatic sites[13,14]. It cannot directly correlate ctDNA results with histology or cellular phenotype and it may miss an alteration if ctDNA concentration is below the LOD, leading to a false negative.[14-17]

4 **D.** Testing for biomarkers generally requires 20% of tumor nuclei in samples.[18,19] Testing samples with a lower tumor proportion may result in false negatives, depending on the LOD.[20-23] Training may help lower discrepancies in estimating tumor content.[18]

5 **TRUE:** Telecytology allows ROSE to be done with an off-site cytopathologist; in telecytology-performed ROSE, the cytopathologist reviews images of the slides sent via a secured network.[24-26]



This knowledge check is connected to the chapter
"The Growing Role for Molecular Diagnostics in Cancer Care."
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ctDNA, circulating tumor deoxyribonucleic acid; LOD, limit of detection; ROSE, rapid on-site evaluation.

References: **1**. Chakravarty D et al. *J Clin Oncol.* 2022;40(11):1231-1258. **2**. OncoKB. https://www.oncokb.org/actionableGenes#levels=1&sections=Tx. Accessed June 13, 2022. **3**. Singh VM et al. *Ann Diagn Pathol.* 2013;17(4):322-326. **4**. Shachar SS et al. *Clin Breast Cancer.* 2016;16(3):e43-e48. **5**. Swanton C. *Cancer Res.* 2012;72(19):4875-82. **6**. Gerlinger M et al. *N Engl J Med.* 2012;366(10):883–892. **7**. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Breast Cancer V.4.2022. © National Comprehensive Cancer Network, Inc. 2022. All rights reserved. Accessed June 21, 2022. To view the most recent and complete version of the guideline, go online to NCCN.org. **8**. Stefanovic S et al. *Oncotarget.* 2017;8(31):51416-51428. **9**. Bhullar DS et al. *EBioMedicine.* 2019;40:363-374. **10**. Bardelli A et al. *Proc Natl Acad Sci U S A.* 2001;98(10):5770-5775. **11**. Sidransky D et al. *Nature.* 1992;355(6363):846-847. **12**. Yachida S et al. *Nature.* 2010;467(7319):1114-1117. **13**. Arneth B. *BMC Cancer.* 2018;18(1):527. **14**. Iuliani M et al. *Front Oncol.* 2020;10:789. **15**. Merker JD et al. *J Clin Oncol.* 2018;36(16):1631-1641. **16**. Davis AA et al. *EBioMedicine.* 2020;58:102914. **17**. Gerratana L et al. *Eur J Cancer.* 2021;143:147-157. **18**. Mikubo M et al. *J Thorac Oncol.* 2020;15(1):130-137. **19**. Frampton GM et al. *Nat Biotechnol.* 2013;31(11):1023-1031. **20**. Liam CK et al. *Respirology.* 2020;25(9):933-943. **21**. Grafen M et al. *Lab Invest.* 2017;97(7):863-872. **22**. Kim L, Tsao MS. *Eur Respir J.* 2014;44(4):1011-1022. **23**. Dietel M et al. *Thorax.* 2016;71(2):177-184. **24**. Kraft AO. *Cancer Cytopathol.* 2017;125(S6):449-454. **25**. Sirintrapun SJ et al. *J Pathol Inform.* 2017;8:33. **26**. Thrall M et al. *J Pathol Inform.* 2011;2:51.

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