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Pharmacological impacts on laboratory biomarkers: A guide for nurses and laboratory professionals

Ahmed Salem Almohammadi
KSA, National Guard Health Affairs

Thaar Moesh Alraggas
KSA, National Guard Health Affairs

Fahed Mohammed Alshammri
KSA, National Guard Health Affairs

Alaa Ibrahim Rashad
KSA, National Guard Health Affairs

Naif Lahiq Mohsen Alotaiby
KSA, National Guard Health Affairs

Awadh Awaadh Saad Alotaiby
KSA, National Guard Health Affairs

Nawaf Sakr Almutairi
KSA, National Guard Health Affairs

Tariq Abdulaziz Al-Falih
KSA, National Guard Health Affairs

Ali Khalil Hassan Khader
KSA, National Guard Health Affairs

Hamad Huran Alanazi
KSA, National Guard Health Affairs

Ali Sadun A Alharbi
KSA, National Guard Health Affairs

Khalid Hazzaa K Almutairi
KSA, National Guard Health Affairs

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Corresponding email: *akk29337@gmail.com*
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***Abstract*---Background:** Clinical biomarkers are very essential for diagnosing, assessing and, managing diseases within the laboratory setting. Nevertheless, these biomarkers can be modified through medications, whether prescribed, purchased at a pharmacy, or obtained from a local health food store, making clinical interpretation of the assay results possible only with increased uncertainty. **Aim:** The main objective of this study is to review the various processes as to how drugs and biomarkers interact, establish the role of the drug-biomarker relationship in the diagnosis of diseases, and analyze how the relationship can be best managed to enhance diagnosis precision and treatment efficacy. **Methods:** The review of the literature and clinical trials allowed for the analysis of the most widespread drugs that affect biomarkers depending on the pathology; liver function, renal status, and cardiovascular condition biomarkers were included in this category. **Results:** Consequently, a type of pharmacodynamic effect, the study established that biomarkers under consideration can be increased or decreased by a range of medications including antibiotics, diuretics, steroids, and chemotherapy preparations thus complicating diagnosis. The effects on liver enzymes, renal function index, and glucose levels were of great interest. **Conclusion:** The issue on interaction between the drug and the biomarker is quite complex and persistent in clinical settings. Healthcare providers need to be conscious of these interactions and use negotiation tools such as medication reconciliation, periodic checking and interdisciplinary collaboration to ascertain accurate identification and proper treatment of the conditions which will in turn enhance the patients' welfare.

***Keywords*---**Pharmacology, drug-biomarker interactions, test performance, biomarkers, pharmacokinetic interference, clinical utilization, medications, prescribers.

Introduction

The fine diagnosis, evaluation and management of illness depend on the accurate interpretation of biomarkers from laboratory data. Biomarkers are substances like proteins, enzymes as well as hormones that act as significant markers of the body's state or alterations in the normal biological condition. However, these medications whether as prescribed drugs or over the counter drugs or some herbal preparations can greatly affect the levels of these biomarkers and thus produce wrong results which complicate clinicians' decisions. This issue becomes even more worrisome in the setting of clinical practice since biomarker alterations resulting from medications may result in incorrect diagnosis, erroneous therapy, and untimely management maneuvers. Hence, knowledge of multiple interactions between drugs and biomarkers is critical for physicians to achieve accurate diagnosis, as well as better treatment outcomes in patients. The objectives of this research are to determine the interface between drug and a biomarker, the clinical relevance of such interface, and ways of mitigating these challenges to enhance health care delivery.[1] This paper aims at explaining the concept of drug

interference in laboratory tests as the topic is relatively new within the field and not much discourse has been made regarding the area.[2]

Analytical insight of drug interference in laboratory tests

Medication interference is the effect of drugs on diagnostic test and it examines the worth and validity of the diagnostic outcomes. This can happen when a drug or metabolites or changes in physiological state affect biomarker or test values. Knowledge regarding the existence of drug interference is significant for clinicians, as we know that it can directly impact laboratory data analysis and therefore patient management. For instance, some drugs' effects may be either elevation or suppression of certain biomarker, in absence of any disease pathology, which may fuel the risks of over diagnosis, and wrong treatment interventions.[3] There are many forms of interferences can take. Drugs have the ability to bind with reagents employed in the laboratory tests thereby generating inaccurate results. Other drugs may induce or inhibit the activities of the enzyme and hence the rate of metabolism of biomarkers and their concentration in the blood. A person on certain drugs like corticosteroid or diuretic will have his or her electrolyte levels or immune system affected making the laboratory results even harder to decipher. Over the counter medications and natural products can also cause interference with diagnostic tests, the importance of patient medication reconciliation.[4] Mitigating of the risks resulting from drug interference is performed by healthcare professionals such as nurses and laboratory technicians. Patients' medication histories should be well documented by nurses so that laboratory workers may consider related interferences accordingly. Laboratory professionals should always sample and/or know the potential interferences and therefore, ways of dealing with them, which include, avoiding the specific drug-test interaction, switching to a different assay or opting for additional confirmation tests. Effective communication between both clinical and diagnostic groups remains critical to avoid or control diagnostic mishaps and enhance patient care. New editions of reference tools that are also used to raise awareness on current trends in drug interference with laboratory tests are also applicable in education healthcare providers.[5]

Transition from Bridging of Faculty Clinical Practice and Diagnostic Accuracy

A Clinical Reasoning Connection between the Provision of Care and the Correct identification of Disease States Interconnecting practical experience and accurate diagnostics is one of the rationales of a present-day healthcare system that requires high and credible diagnostic information to manage patients' treatment. The choice of interventions and clinical strategies is directly connected to laboratory biomarkers and test outcomes, as the results provide data for diagnostic and monitoring approaches. However, acquiring this alignment involves a lot of intervention from all clinicians, nurses, and the laboratory professionals since the framework suggests that there should be reduced difference and improved diagnostic reliability among the clinicians and nurses.[6]This is a crucial factor of the bridge through which the coordination between the stakeholders is facilitated. Clinicians depend on laboratory results to monitor patient status, make diagnosis or adjust the treatment plan: the

laboratory findings need to be interpreted in light of the patient's clinical picture. For instance, lab report of high liver enzymes may imply hepatotoxicity, but the implication will be different when the patient is on drugs which cause a transient rise in enzymes. Some of the vital co-reporting by nurses and laboratory staff are a) Relevant prescription and/or patient's history b) Pre-analytical factors like inadequate sample collection and handling. This, in effect, assist in guaranteeing that the data given is in line with clinical practice and therefore minimizes misinterpretation, and or even clinical errors.[7] Such findings however have been made possible by the flexibility offered by technology and improvements in education systems. Combined with digitalized EHRs, they enable sharing of information in real time, and thus laboratory professionals have a possibility to obtain important clinical data that may affect the selection and interpretation of the tests. Moreover, constant education of caregivers about the strengths and weaknesses of the laboratory gives an idea of the proper use of diagnostic methods. For example, knowing that hemolysis in the blood samples or fasting can interfere with results can help a clinician to make requests that will be useful. [9]

It therefore entails the cultivation of the culture of accountability and improvement of quality in the so identified lags. Interdisciplinary conferences with an emphasis on DSM and ICD criteria, case presentations with subsequent discussion of the results, and adherence to practice guidelines guarantee that the laboratory and clinical work are closely interrelated. Alike, patient safety is enhanced since lab testing or interpretation mistakes often result in the wrong treatments or missed diagnoses. When collaboration is targeted towards healthcare education, integration of clinical and diagnostic practice, all the necessary bridges between practice and accuracy are built which is beneficial for patients.[10,11,12]

A Practical Resource for Managing Medication Effects on Lab Results

A reference guide, therefore, is a very handy tool, which all healthcare workers need to have in their arsenal as they grapple with issues of drug effects on laboratory parameters. Drugs, whether oral or parenteral, whether legal or those purchased from the "harbinger" over the counter chemist, and even homeopathic remedies have a potentially profound impact on the reliability, and therefore on the interpretation, of a myriad of routine as well as specialized laboratory assays, thus altering clinical management and patient outcomes. With advancing understanding of pharmacological therapies, the number of different drugs and approaches to treatment growing and according to the popularity of genetic testing, the likelihood of drug-laboratory test interaction also rises. Thus, it is critical that clinicians together with the nurses and laboratory professionals should have an easy to read as well as concentrate reference work that can help them understand and come to terms with the existence of the said effects.[13] This would be a unique resource consisting of lists of the drugs most frequently ordered and their impact on various laboratory biomarkers together with advice on how to manage or mitigate interference. It would give healthcare professionals ready references of how particular drugs affect the results of the tests based on enzyme changes, effect on metabolic pathways, or interaction with the reagents used in the test. For example, the effect of coagulations such as warfarin or

heparin on coagulation assays while the effects of antibiotics or other drugs on liver function tests. Some reasons encompass hyperkalemia, hypokalemia, QT prolongation, and midazolam like narcotic effects; appreciation of these outcome give discernment in the ethers prescription regime so as to avoid further diagnostic procedures or maldeseminating conditions.[13,14]

A practical source of information should include information on how these effects can be avoided Consequently, the present paper aims to provide drug-specific information on some of these effects as well as how they can be avoided. This may involve advice regarding the timing of the sample preparation and medication administration, use of other methods which are less susceptible to interference or understanding when more testing is required or when confirmatory results should be obtained. For instance, if the patient is on a drug that influences glucose metabolism for example corticosteroid, the FBS results may need to be interpreted with a view to the effect of this drug. In addition, the resource should explain the policies of recording the administration of drugs in order that laboratory personnel are fully aware of the medication history of a patient to understand any tests results.[15]

The purpose of this project is to improve collaboration between nursing and laboratory teams

Fostering 'communication between nursing and laboratory employees is a crucial practice area since both are central to diagnosis. Nurses are usually assigned the roles of initial contact with patients and in delivering pertinent clinical data, dispensing medications and observing patients' responses. On the other hand, the laboratory teams are expected to conduct tests that offer vital information in determining the health state of a client. Improving relationships between these two groups is aimed at benefiting patients treated in healthcare organizations, at decreasing the number of diagnostic mistakes, and at making sure treatments are provided with the help of accurate test results.[16] The first step in ascertaining collaboration is understanding the other employee's roles, functions, expectations and difficulties. Nurses should be informed of the possible implication of medications or other factors that may affect laboratory test results relative to sample handling, timing and pre analytical condition. Concomitantly, laboratory professionals should be able to understand clinical flow, for example, the medications that may be given to patients, because they affect the tests. For instance, a nurse knows that a patient has corticosteroids few hours ago, they should be able to pass that information to the laboratory team in order that they can give the right perspective concerning biomarkers that are usually associated with immune or metabolic changes. On the other hand, if laboratory staff is aware of clinical implication of some tests they can better communicate with the nurse regarding which test should be performed first or repeated when the patient is in certain condition. Effective communication plays the vital role in improving communication, which facilitates effective communication between them. For example, one may conjugate a nursing/medical staff gathering with a laboratory staff conference so one group is made aware of changes in procedures, policies, new drugs, and trends in the interpretation of results. It also assists in clearing any misunderstanding or differences that may occur over laboratory findings. More questions and doubts concerning the lab tests should be permitted to be

asked by the nurses, at the same time, laboratory practitioners should educate the nurses on matters concerning the procedures and results in a manner that can easily be understood and applied. The above two-way communication helps in developing trust with one another and guarantees conformity to the correct approach to handling patients.[17] However, promoting team responsibility and collaboration is something more significant. Nursing and laboratory teams should be aware that both are working for the same objective of aiming at the best outcome for the patient. It is crucial in this respect to foster cross-training and thus develop interdisciplinary views to the kind of activities teammates experience and the kind of cognition they possess. For instance, getting nurses involved in the laboratory orientation programs or permitting the laboratory technicians to accompany the nurses when the latter is making rounds with their patient brings knowledge gap closure and improved working relationship into serious perspectives.[18,19]

Biomarker Variations Caused by Drugs: Clinical Perspective

Drug-caused alterations to biomarkers reflect differences in laboratory values due to medications and they bear important implications for clinical management. These variations can occur at the time when drugs interact with target biomarker and change its amount or activity level, and thus lead to erroneous results of a test. It is important for healthcare workers in general to appreciate these differences as it will help them in reviewing the patients' laboratories data with an eye on the correct clinical perspective to avoid misdiagnosis in addition to assuring proper managements. Small molecules, from over-the-counter drugs to complicated biologics, may have an impact on many biomarkers from enzymes to hormones, electrolytes, and metabolites each of which remains a key factor in assessing the patient state.[20] A relative traditional example of drug-induced biomarker variation is seen in the alteration of liver enzymes by statins. Currently, the anticholesterol medications, which are called statins, produce a small rise in serum liver enzymes, including ALT and AST. These elevations are usually asymptomatic and in the absence of liver disease are generally mild and resolve on withdrawal of the drug. Nonetheless, if they do not attribute these changes to statin effects, they may perceive these concern enzyme levels to reflect liver injury, thus subsequently subjecting the patient to further tests, or the incorrect cessation of treatment. Likewise, drugs like diuretics and ACE inhibitors can give changes in the renal profile: serum creatinine and blood urea nitrogen (BUN) even where there is no renal disease. Pharmacokinetics and pharmacodynamics assist the clinicians to differentiate between true disease states and the effects of these drugs on laboratory values.[20] They can also regulate biomarkers through the changes in the functioning of physiological activities. For example, a group of medications known as corticosteroids, taken often for their anti-inflammatory properties, have negative impacts on metabolism of glucose, resulting in hyperglycemia. This gives a wrong picture of the diabetic state in patients who are on steroids for their therapy. In the same way that warfarin interferes with coagulant testing in situations that require PT and INR, other interfering substances cause false high and low reporting of results.**(Figure 1)**Clinicians should be aware of these potential variations that may be due to drugs to prevent doing unnecessary actions such as changing the dosage of a drug or adding some treatment based on abnormal test values.[21,22]

Pharmacological effects on biomarkers may not be easily anticipated since clinical factors such as ethnicity, diseases, and other medications may to some extent affect the way in which a drug influences biomarkers. For instance, some genetic variations affect drug handling in the human body implying that some patients are likely to develop changes in the biomarkers in response to drugs more than others. In today's developing personal medicine field, comprehending patient genetic profiles with their medication will play significant roles in explaining biomarkers. Moreover, drugs that affect the immune system or exert various other immunomodulatory actions, immunosuppressive agents or biologic products, often cause relatively small to moderate yet still profound alterations in biomarkers of immune status, inflammation, or various organs and systems that may not be generally easy to decipher from the changes without knowing the complete clinical context.[22]

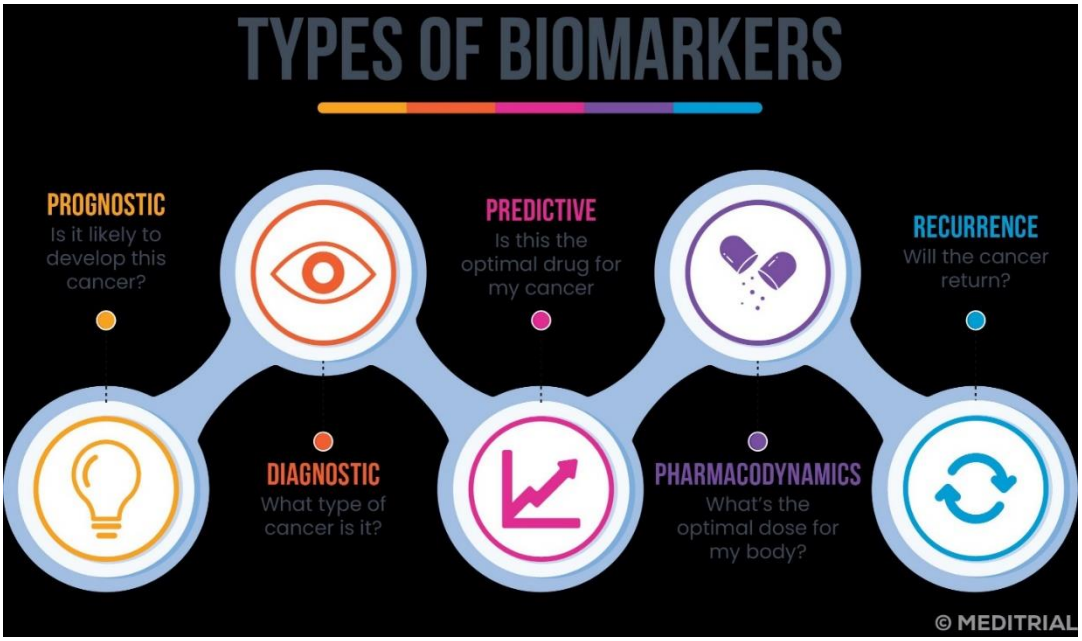

Figure 1: Types of Biomarkers

Addressing diagnostic difficulties experienced due to pharmacological confounding

Reducing the Effects of Drugs on the Process of Diagnosis Thus, minimizing diagnostic problems resulting from pharmacological interferences is considered one of the significant tasks in the present-day healthcare system and in connection with the growing complexity of pharmacotherapy. Compared with placebo, all the medications, whether they are the standard prescription, over the counter or natural remedies, might affect the laboratory tests and causes variations of Biomarkers thus resulting to an erroneous diagnoses, or wrong treatment regimen. Such interference may cause actual positive or negative results, shift in test values or misinterpretation affecting patient outcomes. It is

important for healthcare workers to have methods in handling these problems to averting compromising the accuracy in diagnosing a patient or even recurrent compromise of patient safety.[23]

Among strategies, the most promising one for reducing diagnostic difficulties is considered to be comprehensive medication reconciliation. Nurses and clinicians should record the particulars of all medications, whether prescribed, purchased over the counter or proprietary supplements, vitamins and herbs.[23,24] This is facilitated by a detailed medication history so that expected drug-laboratory test interactions that would otherwise cause diagnostic dilemmas are spotted early enough. In a patient who is admitted to the hospital, or in a new round of testing the doctors need to have information on some medications that affect tests. By making sure that there is an up to date medication list, there is an agreement between the clinicians and the laboratory teams on matters of interference and therefore the right decisions are made on the results to be expected.[24]Besides medication reconciliation improving the knowledge and awareness of health care providers is important in reducing impact of pharmacological interference on diagnostics. Clinicians as well as laboratory practitioners should have adequate knowledge on the pharmacokinetics of most of the medications that are administered and the resultant implications on the laboratory values. In service training and CME on how medications affect biomarkers and other collaborative practice between nursing and laboratory staff can go along way in enhancing the understanding of medication effect on biomarkers. As an example, knowing that some antibiotics may change liver enzymes or that diuretics may skew results of kidney function tests, clinicians are better equipped to approach analytical data. In addition, when laboratory staff has the pharmacological context within which the tests in question are being conducted in mind, the laboratory staff is in a position to point out matters of concern to the clinician with regard to the tests in question on one hand and assist the clinician understand how to accurately interpret the tests on the other hand.[25,26]

Another good strategy is changes regarding the timing of laboratory tests in relation to certain medications. The impact of drugs on biomarkers may be seen as early as the time the medication was taken, or not until later. For example, corticosteroids may increase blood glucose level after a few hours, whereas the effect of warfarin on coagulation profile may not be seen for a few days. Thus, healthcare professionals should avoid timing laboratory tests at the identical time with taking medications in order to reduce their influence on outcomes. Sometimes, it is required to postpone the tests or to call for other confirmative tests to avoid the interference of the results of these tests by the recent use of drugs. Technology also supports the elimination of diagnostic problems due to pharmacological interference. Health information exchange (HIE) connecting EHRs and LIS can facilitate identification of possible drug-test interactions in real time ensuring clinicians and laboratory specialists about possible pharmacological impact on test outcomes. These systems can also make a reminder for the doctor ad other healthcare providers about the need for follow testing or modification of treatment regimes due to interferences by IMS. In addition, the technologies integrated in EHR can offer best practice advice, how best to modify drug dosages or to recheck patients due to drug interactions. These

technologies assist in efficient flow of communication between the clinical and laboratory departments so that any concerns are corrected in advance.[27]

From Prescription to Lab Report: Navigating Biomarker Changes

The conversion of an insightful prescription into a laboratory report is a critical relay in current practice because the motion of medications alters biomarkers, which can have profound implications in patient care. It was found that both, prescribed and over the counter drugs may significantly alter the levels of biomarkers; parameters frequently used to assess disease severity, treatment effectiveness and patient's condition in general. It is crucial for clinicians as well ad laboratory workers to understand how these medications affect biomarkers in order to prevent diagnostic misinterpretation. This process implicates a good collaboration between prescribers or other physicians, nurses, laboratory personnel, and most importantly; the patient to ensure that these biomarker changes, due to medications, are well understood and well addressed. So, the process of journey starts from prescribing the medicine. Prescribing clinician needs to know about effects of the medications they intend on the biomarkers. For example, a drug such as warfarin that is used in controlling blood clotting can affect laboratory values like the INR – an indication of how well blood clots. If levels of INR are high, the result could mean efficacy of warfarin therapy but without appropriate background could point to increased risk of bleeding or impaired liver function. In like manner, drugs, including statins, modify liver enzyme elevations, including ALT and AST, and may thus mislead clinicians into diagnosing a liver injury that is, in reality, not present. It is important to understand how prescriptions relate with variations in biomarkers at the point that prescriptions are made in order to make appropriate interpretations in subsequent laboratory tests.[28,29}

Because the process of prescribing a medication involves a number of individuals in a healthcare team, the prescription information has to be communicated across the team. Nurses are involved in giving the medication and also are in touch with the patient to remark on any side effects experienced. Staff members need to know the association between these medications and biomarkers in order to report alterations in laboratory findings. For instance, if a nurse knows that a patient has been administered with corticosteroid, they can expect that the patient's blood glucose levels rise and may distort the outcome of test such as fasting blood sugar or hemoglobin A1c. There is need to ensure that the nurses, physicians and the laboratory service personnel discuss certain findings so that when the results of a particular test are being interpreted, there is understanding with regard to the use of certain medication. Analysis of biomarkers and production of lab reports is an essential part of diagnosis process where laboratory is of strategic importance. However, before running the tests, members of the laboratory must know what medications the patient is currently on as such substances can affect the tests results. For instance, diuretics like furosemide has something to do with electrolyte that results into changes in potassium, sodium, or chloride, which are significant screening parameter in determining the functionality of kidneys as well as their ability to balance fluids. It is worth noticing that in situations where clinicians have concerns that a particular drug may have altered these biomarkers, laboratory staff need to engage the clinicians

to provide an understanding of those results in the context of drug effects. For example, a laboratory technician who is analyzing the result of a patient's blood test may well note that the patient is on an ACE inhibitor and has a potassium level that is higher than normal; they may then annotate this in case it is relevant to the drug effect in which they will discuss this with the rest of the clinical team to determine whether the result should be of concern.[30}

There are always issues of timing when it comes to dealing with biomarker changes. This means that medications may affect biomarkers acutely or it may take time before significant changes are seen; therefore, timing of such tests cannot be overemphasized. For instance, suppose a patient is to be given intravenous infusion of corticosteroids; in that case, the attributable biomarkers such as white blood cell count or blood glucose level are likely to be affected. In these circumstances, it may time be necessary to alter the schedule of the test due to the impact of the medicine or to redo the test once the impacts of these medicines are out of the method. The timing aspect of care delivery means that medication administration and lab testing must occur at same approximate time in order to arrive at accurate and actionable results.[31]as biomarker modifications depend on many factors, including age, pathologies, and individual gene profile, patient characteristics must be in consideration while analyzing the results. For example, a patient with renal insufficiency on ACE inhibitor may develop exaggerated physiological changes in flow dependent biomarkers such as creatinine or BUN that are used in the measurement of renal function. In such an instance, knowing the basic physiological state of the particular patient is crucial to prevent excessive importance of the changes of the biomarkers.[32,33]

A simple breakdown and understanding of drug biomarker interactions for all health care providers

Understanding the concomitant relationships of drugs with biomarkers is important for physicians to make accurate diagnosis and treatment plans to enhance clients' health. Biochemical markers or sometimes referred to as biomarkers are defined as substances that are measured in a patients' body fluids and tissues to determine or suggest the presence of a particular disease, its progression or a response to a specific treatment. These biomarkers may be proteins, enzymes, hormones, other molecules in the blood or tissues that represent certain intrabody conditions. However, upon use of some medications, whether prescribed, OTC or herbal, these biomarkers are altered—dysregulated—by them either exacerbating the health conditions or masking them outright. Biomarker alterations by medication may produce erroneous results that allow the wrong diagnosis, therapy, or postponement of intervention. It is, therefore, important for all stakeholders in the health sector and more so healthcare professions, such as physicians, nurses, pathologists, pharmacists and other laboratory personnel to grasp some of the ways in which drugs interfere with biomarkers to enable them correct and effectively read and analyze the clinical tests results and make informed decisions on the care of the patients.[34] As will be discussed, drugs can at times either increase or decrease biomarker levels depending on several aspects. There are drugs which act specifically on the synthesis, metabolism or excretion or a particular biomarker. For instance, some group of antibiotics or antifungal agents may alter liver enzymes including alanine

aminotransferase (ALT) and aspartate aminotransferase (AST), which are widely used to test the liver status. Other drugs, for instance, diuretics alter electrolyte concentrations and Renal Function Tests parameters like potassium, sodium and creatinine.[35]]drugs like anticoagulants or anti-platelet agents can impact coagulation biomarkers, such as prothrombin time (PT) and international normalized ratio (INR), making it crucial for healthcare providers to distinguish between the therapeutic effects of the drug and pathological changes in the patient's condition. Additionally, medications affecting the cardiovascular system, such as beta-blockers, can influence heart rate and blood pressure, which can mask or distort biomarkers used to monitor cardiac health. Healthcare providers need to be vigilant in understanding the pharmacodynamics and pharmacokinetics of commonly prescribed drugs and their potential effects on lab results, as these can have a profound impact on diagnostic accuracy and the management of various conditions.[36]

Managing Drug-Biomarker Interactions in Clinical Practice

Managing drug-biomarker interactions requires a multifaceted approach involving accurate medication history, vigilant monitoring of biomarkers, and effective communication between healthcare teams. One of the first steps in managing potential interactions is obtaining a detailed and up-to-date medication history from patients. This includes not only prescription drugs but also OTC medications, dietary supplements, and herbal remedies, all of which can interact with biomarkers in different ways. Once a comprehensive medication list is compiled, healthcare providers can anticipate potential drug-induced changes in laboratory test results and adjust their diagnostic approach accordingly. Regular monitoring of biomarkers is especially important for patients on long-term medication regimens or those undergoing treatment with drugs known to affect specific biomarkers. For example, patients receiving chemotherapy or immunosuppressive drugs require regular blood work to monitor for changes in white blood cell counts, liver enzymes, or renal function markers, as these medications can significantly alter these biomarkers. Similarly, patients on medications like corticosteroids, which affect glucose metabolism, should have regular glucose monitoring to prevent misinterpretation of diabetes-related biomarkers. Additionally, collaborative efforts among healthcare providers—especially between physicians, nurses, pharmacists, and laboratory professionals—are vital for managing drug-biomarker interactions. Pharmacists can help identify potential interactions between medications and biomarkers and provide guidance on alternative therapies or dose adjustments, while laboratory professionals can flag abnormal test results that may be influenced by drug effects. Through these collaborative efforts and a proactive approach to medication management, healthcare providers can mitigate the diagnostic challenges posed by drug-biomarker interactions and ensure more accurate clinical decision-making.[36,37,38}

Conclusion

In conclusion, drug-biomarker interactions represent a critical area of concern for healthcare providers, as they directly impact the accuracy of laboratory test results and the effectiveness of clinical decision-making. Medications can alter

biomarker levels through various mechanisms, including changes in metabolism, organ function, and enzyme activity, which can either exaggerate or mask underlying health conditions. A comprehensive understanding of these interactions is essential for clinicians to interpret lab results correctly, avoid misdiagnosis, and tailor treatment strategies appropriately. To mitigate the challenges posed by drug-biomarker interactions, healthcare providers must adopt a proactive approach, including obtaining thorough medication histories, monitoring biomarkers regularly, and fostering interdisciplinary collaboration. By doing so, they can enhance diagnostic accuracy, optimize treatment regimens, and ultimately improve patient care. Recognizing the potential for drug-biomarker interactions and managing them effectively is integral to the delivery of high-quality healthcare in an increasingly complex and medication-driven medical landscape.

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التأثيرات الدوائية على المؤشرات المخبرية: دليل للممرضين والمتخصصين في المختبرات

الملخص

الخلفية: للمؤشرات الحيوية السريرية ذات أهمية كبيرة في تشخيص الأمراض وتقييمها وإدارتها في البيئة المختبرية. ومع ذلك، يمكن أن تتأثر هذه المؤشرات الحيوية بالأدوية، سواء كانت موصوفة من قبل الطبيب، مشتراه من الصيدلية، أو تم الحصول عليها من متاجر الأغذية الصحية، مما يؤدي إلى صعوبة في التفسير الدقيق لنتائج الفحص وزيادة مستوى عدم اليقين.

الهدف: يتمثل الهدف الرئيسي من هذه الدراسة في استعراض العمليات المختلفة التي تتفاعل من خلالها الأدوية مع المؤشرات الحيوية، وتحديد دور العلاقة بين الأدوية والمؤشرات الحيوية في تشخيص الأمراض، وتحليل كيفية إدارة هذه العلاقة لتحسين دقة التشخيص وفعالية العلاج.

الطرق: تم استعراض الأدبيات والتجارب السريرية لتحليل الأدوية الأكثر انتشارًا التي تؤثر على المؤشرات الحيوية بناءً على الأمراض، وتم تضمين مؤشرات وظائف الكبد، وحالة الكلى، ووظائف القلب والأوعية الدموية في هذه الفئة.

النتائج: كشفت الدراسة، من خلال تأثيرات دوائية ديناميكية، أن المؤشرات الحيوية قيد الدراسة يمكن أن تزداد أو تنخفض بفعل مجموعة من الأدوية مثل المضادات الحيوية، ومدرات البول، والستيرويدات، وعلاجات الكيميائي، مما يزيد من تعقيد التشخيص. وشملت التأثيرات مؤشرات إنزيمات الكبد، ومؤشرات وظائف الكلى، ومستويات الجلوكوز، وكانت ذات أهمية كبيرة.

الخاتمة: مسألة التفاعل بين الأدوية والمؤشرات الحيوية معقدة ومستمرة في الممارسات السريرية، يجب على مقدمي الرعاية الصحية أن يكونوا على دراية بهذه التفاعلات واستخدام أدوات مثل مراجعة الأدوية بشكل دوري، وإجراء فحوص دورية، والتعاون بين التخصصات لضمان التحديد الدقيق والعلاج المناسب للحالات، مما يعزز من رفاهية المرضى.

الكلمات المفتاحية: علم الأدوية، التفاعلات بين الأدوية والمؤشرات الحيوية، أداء الفحوص، المؤشرات الحيوية، التداخل الدوائي الحركي، الاستخدام السريري، الأدوية، وصف الأدوية.