OPINION

Examining the immune environment of cutaneous T-cell lymphoma lesions using a skin liquid biopsy technique

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ABSTRACT

The background concentration of metals and other environmental contaminants has risen recently. Because of genetic or epigenetic changes, early-life exposure to pollutants may determine a person's susceptibility to chronic diseases as they mature. This review's goal was to find a connection between exposure to Potentially Toxic Metals (PTMs) during pregnancy and in the first few months after birth and harmful effects on the offspring's genetic make-up. Infertility and miscarriage, obstetric outcomes like preterm delivery and low birth weight, neurodevelopmental delay like autism and attention deficit hyperactivity disorder, and adult and children cancer are the main effects of toxic exposures connected to reproductive and developmental health. As, Cd, and Pb were the most frequently tested PTMs. Telomere length, gene or protein expression, mitochondrial DNA content, metabolomics, DNA damage, and epigenetic modifications were the main genetic changes in neonates related with prenatal PTM exposure. Numerous of these impacts were sex-specific and were more pronounced in boys. Exposures may typically be divided into the following categories, not withstanding the fact that there is much overlap in the kind of exposure and the related health outcomes: exposures to hazardous substances, air pollution, and climate change-related hazards. When a hazardous exposure is found, obstetric care doctors do not need to be experts in environmental health science to advise patients and, if necessary, send them to qualified specialists. Obstetrician-gynecologists and other obstetric care clinicians should learn about the toxic environmental exposures that are common in their particular geographic regions, such as local water safety warnings (for example, lead-contaminated water), regional air quality standards, and patients' proximity to power plants and fracking sites. Although all populations are exposed to hazardous environmental agents, many environmental conditions that are detrimental to reproductive health disproportionately impact underprivileged communities and are covered by environmental justice concerns. Clinical contacts provide a chance to screen and educate patients about ways to lower harmful environmental health exposures during the pre-pregnancy and prenatal periods, especially those who are disproportionately affected. This Committee Opinion has been updated to incorporate more recent research on lowering exposure to harmful environments during pregnancy and in utero.

Key Words: *Genetic material; Metals; Newborns; Prenatal exposure*

INTRODUCTION

Skin illness is significantly influenced by the tissue environment around skin lesions. Because tissue breakdown results in significant cell and protein loss, cell harvesting from lesions can be time-consuming and difficult. Multiphoton excitation microscopy, dermal open-flow microperfusion, and immersion of skin samples in a medium to extract cells are some of the methods used to examine skin lesion cells and the surrounding environment. However, the cell separation procedures necessary for these techniques could result in the loss of vital data. For instance, although skin tissue obtained from punch biopsy can be used to identify lymphocytes, the small amount of tissue has insufficient cell density and hence offers little information.

As an alternative, lesional blood samples could, without enzyme treatment, reveal important details about the environment, such as the concentrations and types of cytokines and inflammatory cells. In fact, a prior study successfully evaluated the skin lesion environment using sera from peripheral blood and blood drawn from psoriasis

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lesions. As a result, serum and cellular components from skin lesions may be effectively isolated and examined using liquid biopsy. To diagnose and evaluate the effectiveness of treatment for cutaneous T-cell lymphoma, skin biopsies are frequently performed (CTCL). However, it can be challenging to diagnose CTCL, and there are no proven effective treatments at this time. To facilitate diagnosis and create effective treatments, more efficient techniques that enable rapid isolation and analysis of resident and systemic pathogenic T cells and effector T cells are required. The most typical CTCL, Mycosis fungoides (MF), is regarded as a low-grade T-cell lymphoma. The premycotic and mycotic phases can last for years, but they can also sometimes progress very quickly. Many patients seek dermatologic consultation for the first time when their ailment has already advanced to the mycotic or tumour stage due to the relatively low knowledge of MF and the diagnostic challenges associated with it. Within a few months, this delayed diagnosis could result in tumour development, ulceration, leukemic change, visceral invasion, and mortality. The stage of the disease affects the histologic results. Epidermal hyperplasia, lymphoid exocytosis, and band-like lymphoid infiltration in the superficial dermis are distinguishing hallmarks of the erythema stage (stage I). It's common to see Pautrier's microabscesses during the plaque stage (stage II). During the third stage of the tumour, necrosis caused by the proliferation of tumour cells in the nodular lesions necessitates the development of ulcers within the tumorous lesions. Memory T-helper cells infiltrate MF lesions and exhibit this characteristic. T-cell markers may disappear in an advanced tumour stage, and a T-cytotoxic phenotype is seen. Multiple MF lesions biopsies taken from the same patient over a short period of time may exhibit various morphologies. Uncertainty persists regarding the effector cells that invade MF lesions, though. For the purpose of learning more specifically about the phenotypic and immunological milieu in MF, a skin liquid biopsy approach might be helpful. In order to identify the types of T cells induced in MF while also examining RNA expression, we performed a skin liquid biopsy in the current study. This involved collecting a small amount of blood from the lesion site during the skin lesion biopsy. Additionally, we were able to accurately ascertain the roles played by the T cells that were infiltrating. The creation of an efficient skin liquid biopsy technique may also be helpful for assessing the effectiveness of treatments for other inflammatory skin conditions, such as psoriasis and atopic dermatitis.

CONCLUSION

The results of the current study showed that lesional blood has a different composition from peripheral blood and that, in MF patients, lesional blood may be an indicator of the health of the skin's immune system in lesional areas. The cells and tissue surroundings of skin lesions are analysed using a variety of techniques, and the skin liquid biopsy method is a practical way for determining the extent of the lesion. Due to the various outcomes, the skin liquid biopsy procedure would not completely eliminate the necessity for skin biopsies, but analysis of lesional blood may reveal important details regarding invasive cells and the separated serum. In order to identify a distinct pattern of cell populations and chemokines in the lesional blood, we assume that lesional blood would contain cells from capillary vessels, cells from lesional resident cells, and blood overflowing from capillary vessels.