Austin Andrology

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Mini Review

Busulfan and Functions in the Mammalian Spermatogenesis

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Received: November 03, 2016; **Accepted:** November 23, 2016; **Published:** November 25, 2016

Abstract

The number of malignant diseases is increased worldwide and people diagnosed with cancer currently have a high chance of survival as a result of new treatment protocols such as surgery, combination chemotherapy and radiation therapy. Maintenance of health is an important key to profitable farm mammalian reproduction. Therefore, keeping newborns alive and healthy may be the greatest management challenge facing farm owners. Important strategies for meeting these challenges include making sure that the reproduction and fetus are in good condition throughout the pregnancy period. It is clear that cytotoxic therapy such as certain chemotherapy drugs influences spermatogenesis at least temporarily and in some cases permanently.

Busulfan Complex

Busulfan (Bu) is an anti-cancer drug, which has been used against chronic myeloid leukaemia (CML) since 1959 and was conventionally used in a low dose over a long period of time in the palliative treatment of CML. Bu was the leading chemotherapeutic treatment for this malignancy. The US Food and Drug Administration (FDA) approved Busulfan as a treatment for CML in 1999. Bu has a very narrow therapeutic index, and acute toxicity may be related to absorption and disposition of the drug and metabolites [1].

Bu, 1, 4-bis [methanesulfony1-y] butane, is a bi-functional alkylating agent and lipophilic molecule that, as soon as systematic absorption, carbonium ions are rapidly formed, resulting in alkylating DNA and leads to breaks in the DNA molecule, following replication and transcription of RNA.

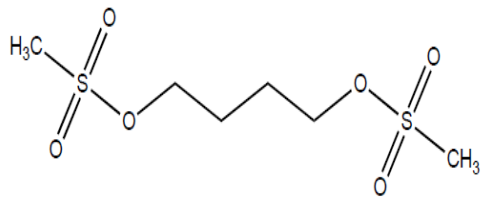

Figure 1: Replication and Transcription of RNA.

Table 1: Busulfan.

Busulfan		
Molecular formula		$C_6 H_{14} O_6 S_2$
Molecular weight		246.3 Dalton
Color		White-crystalline powder
Soluble		Water/alcohol
Terminal half life (h)		2.3-2.6
Storage °C	Tablets	12-25
	Vials	2-8

Busulfan and Reproduction

In general, spermatogenesis is a coordinated course begins with spermatogonial proliferation followed by differentiation, such that production of spermatozoa is continuous. Another method is the administration of Bu; as a DNA-alkylating agent, Bu can act on the G0/G1 phase of the cell cycle and arrest the proliferation of germ cells [2], resulting in apoptosis and a decrease in spermatogenesis [3]. Intraperitoneal injections of busulfan have been used to prepare recipients for the transplantation of spermatogonial stem cells [4] and to prepare azoospermia models [5]. This unique recipient preparation method has been in use for several decades because of its many advantages.

The unpredictable pharmacology of Bu in important: several investigators have reported that following use of Bu impotence or irreversible loss of fertility can occur [6-8] and finally may be accurse delayed pubertal development.

Bu is a potent agent that preferentially kills spermatogonial stem cells of several species; however, it has no effects on DNA synthesis. However, it inhibits the next mitosis when it intoxicates the cells in the G1 phase [3].

Conclusion

In conclusion, Bu consumption for cancer therapy has long-term consequences including reduced fertility and sometimes sterility.

Acknowledgement

The authors wish to acknowledge the excellent work of Gholamali Moghaddam, Behzad Baradaran and Gholamreza Hamidiyan, as well as that of the Immunology Research Center, Tabriz University of Medical Sciences, Iran, that has provided excellent assistance with the preparation of this review.

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Citation: Olfati A and Moradi kor N. Busulfan and Functions in the Mammalian Spermatogenesis. Austin Andrology. 2016; 1(2): 1011.

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