

# Over Generalized Discussion of Results and Poor Use of the Terminology in Science

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## Abstract

In many articles, a poor use of terminology and inappropriate discussion of the obtained results are seen which mislead the objective of science. In the current opinion article, such an example is discussed with an objective to remove such faults from scientific articles.

**Keywords:** Inappropriate terminology; Oxidative stress; Antioxidants; Reactive oxygen species

## Introduction

In many articles, it is observed that inappropriate or over generalized discussions are made which misleads the readers about the objective and findings of the work. Poor use of terminology in articles in relation to the obtained results in a work are also seen which again mislead the readers. With an objective to remove such faults from scientific articles, a short discussion is made with a suitable example.

In one article [1], emphasis was given on reactive oxygen species (ROS), antioxidant enzyme levels (AEL) and oxidative stress (OS) status in liver of rat pups birthed by mothers those were exposed to the organic pollutant polybrominated diphenyl ethers (BDE-99). Levels of Akt and cytochrome P450 were linked with disruption of thyroid hormone and increase in ROS level in liver of rat pups due to exposure of their mothers to BDE-99. The authors concluded that the increase in ROS levels observed in rat pups in the above experimental conditions was due to the effects of BDE-99 and it was simultaneously resulted in increase of AEL and OS indices. However, the authors neither measured ROS level in the liver tissue nor they observed an increase in OS in the tissue of rat pups with respect BDE-99 treatment.

## Sound knowledge on the topic

ROS such as superoxide radical ( $O_2^-$ ), hydrogen peroxide ( $H_2O_2$ ) and hydroxyl radical (OH) are generated as by-product in normal oxidative metabolism. ROS are usually toxic to cells since they can oxidize lipids, proteins and nucleic acids to produce lipid peroxides (some times measured as TBARS or MDA content), protein carbonyls (PC) and nucleic acid adducts (NA), respectively. About 1-5% of  $O_2$  consumed by mitochondria are incompletely reduced by the electrons that are leaked at complex I and III enzymes of electron transport chain [2]. It leads to produce  $O_2^-$ ,  $H_2O_2$  and the highly reactive  $\cdot OH$  as the 1st, 2nd and 3rd reduction products of  $O_2$ , respectively [3].  $O_2^-$  is dismutated to  $H_2O_2$  by superoxide dismutase (SOD) enzyme.  $H_2O_2$  is catalyzed to  $H_2O$  and  $O_2$  by the enzyme catalase (CAT).  $H_2O_2$  is also enzymatically broken down by glutathione peroxidase (GPx) enzyme. If more ROS (levels of  $O_2^-$ ,  $H_2O_2$  and OH) are accumulated in cells due to the insufficient AEL (levels of SOD, CAT and GPx etc.), it leads to increased levels of TBARS, PC, NA in cells and finally a disorder state called as OS [2]. However, other combinations between ROS and AEL such as low ROS and low AEL, low ROS and high AEL, high ROS and low AEL and high ROS and high AEL can also be expected in cells [2]. Similarly, high level of ROS is always not resulted into high OS state in cells. High ROS with low OS (TBARS) and vice versa can also

be anticipated depending upon the magnitude of polyunsaturated fatty acids (which are susceptible to oxidation by ROS) present in the tissue(s). With existence of such paradoxical relations among ROS, AEL and OS in tissues, one can't conclude that "high ROS was noticed" in tissues due to low AEL or high OS level observed in tissues, until unless all the parameters are measured. Nevertheless, in majority of cases, high ROS are usually observed with low or high AEL which is resulted into high OS level in tissues [2]. So, without measuring ROS level, observing only increase in level of CAT, SOD or GPx in cells can't be sufficient to state that "increase in ROS level was observed".

## Final Remarks

However, in many article, for example in the study of Blanco et al. [1], the authors neither measured ROS level nor they noticed increase in OS (TBARS) level in liver of the rat pup after BDE-99 treatment to their mothers. On the other hand, no consistent increase in AEL level (SOD and CAT) was also observed in liver of rat pups on the basis of which, it could be concluded that ROS level was high in the tissue with respect to BDE-99 treatment. Interestingly, with such insufficient data the authors concluded that ROS level was high in liver of rat pups and they made the conclusive title of the article that ROS were increased in liver of rat pups after BDE-99 treatment to their mothers. Therefore, conclusions made by the authors in relation to ROS level in rat pup livers appear to be not consistent with respect to the observed data in their current study. In fact, it appears that use of the concept of "production of ROS" was over generalized and also it indicates a poor use of the terminology "ROS" in relation to the observed data. Although, discussion in an article is usually written on the basis of the results from both the current and previous studies, the title, and conclusions in discussion and abstract of a paper should be solely written on the results observed in the current study but not on the results previously published by anybody else or by the authors themselves. Perhaps these are the reasons; a miss conclusion about increase in ROS level in the tissue was made in the above published article[1] both at the end of the abstract and discussion as well.

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