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Review into experimental parameters of anti-oxidant potential

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Abstract. Anti-oxidant potential is a scientific term used for a type of biological activity. It is important in order to understanding ways which plant and animal cells interact with the environment. However anti-oxidant potential measurements are influenced by three constituents in cells. It is the physical constraints on compounds that profoundly affect anti-oxidant potential, yet, the biological constraints affect physical and chemical constraints. To tailor design new drugs, potential gradients need to be known so that efficiency in drug commercialisation is achieved. This paper provides insight into anti-oxidant potentials in plant and eukaryote (animal/human) cells.

Keywords: Anti-oxidant; Oxidant; Scavengers; Constraints, Free radical; Global warming.

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What is anti-oxidant potential?

Anti-oxidant potential is the ability of a cell to act against stress caused by compounds or free oxygen radicals (Sies, 1997; Choi et al., 2002). It's a process that contributes to the well-being of animal and human life by removing harmful compounds (or substances) from within them. Anti-oxidant potential is therefore an activity which cells ought to have or which could be triggered if desired, however, its extent differs amongst cells and between compounds (Alscher et al., 1997; Balaban et al., 2015). As a result, anti-oxidant potential can be represented as stable and fluctuating readings. Often an anti-oxidant potential is a numeric obtained in triplicate that indicates if a given compound, or chemical, had been successful in promoting cell division since anti-oxidant potential measures similar outcomes as other biological tests, but, a difference is that the success is a measure of colour changes that are indicative of complete or partial biochemical reactions (Singh, 2017). It is evident that one meaning of anti-oxidant potential isn't sufficient to incorporate its perplexity. Therefore the views on a defined answer for anti-oxidant potential validates its process in a cell, but not necessarily the series of reactions that lead up to a result. Anti-oxidant potential is thus a measure to which a compound passes cell membranes to eliminate free radicals, allowing mitosis.

The basis for measuring anti-oxidant potential

In order to measure anti-oxidant potential successfully three experimental parameters are necessary. First the cell must either be susceptible or resistant minimally to a compound. Second, compounds must be able to activate reactive oxygen scavenger molecules, and third, cells must have active cell suicide mechanisms (Singh, 2017). Completing an anti-oxidant potential study relies on the 3 above points, however, the first requires compound preparation protocols that are optimum. This is an essential because the essence of anti-oxidant potential tests, depend on cellular integrity and how compounds are made (Antolovich et al., 2002; Choi et al., 2002; Zeeier and Talukder, 2006; Krishnaiah et al., 2011). Optimum compounds are important for anti-oxidant potential tests, particularly, since, solvents impact greatly on result outcomes. Therefore the basis for measuring anti-oxidant potential are having compounds of optimum solvent rations enter mammalian cells and trigger a reaction.

Of what significance is anti-oxidant potential measurements in today’s world?

The fact that all cells respire indicate the significance of anti-oxidant potential measurements. Global warming being a major indicator of greenhouse (ozone) gases that deplete the ozone layer (Mina et al., 2005) suggest that anti-oxidant measurements enable poisonous gas emission control by farmers, gardeners and researchers. Often this fact isn’t reported because its viewed as a minor contributor to knowledge, yet, its impact to gardeners, farmers and researchers are great.

Anti-oxidant potential measurements enable selected compounds to be tailor designed to activate oxygen scavengers in cells (Singh, 2017), as well as so that other mechanisms necessary for division are capacitated to trigger related proteins, viz, proteins for given functions (Scandalios, 2005). This in fact is one way in which crop wastage can be minimised. The anti-oxidant measurements ensure that a certain amount of information pertaining to tonoplast and cytoplasm solvent concentration is obtained. This contributes to a researchers understanding on osmosis, homeostasis, diffusion, and gradients involving gases and solutes. Therefore anti-oxidant potential measurements are an estimate of cell viability in healthy hosts. Without this, all respiring cells would be regarded as viable, and information deduced on mitochondrion harmful emissions would be factual. This indicates that anti-oxidant potential measurements are important to know and study the chemistry of drugs (Hallwell, 2007). With this in mind, all can be said is that without anti-oxidant potential measurements, cellular physical requirement, viz pH, anionic and cationic states of proteins, would always be lauded as optimum drug tests. With this information other biological assays can be performed with ease knowing that a cell provided with optimum conditions produce meaningful results.

The constraints involving anti-oxidant potential

Chemical, physical and biological are the nature of constraints involving anti-oxidant potential. The ions and molecules comprising compounds are a major physical constraint since they require respiratory chain electron release for triggering action to binding sites (Scandalios, July 2005). The right charge of molecules, and water release, is therefore an essential requirement for active cell suicide mechanisms. For example in many cancer cells this has been demonstrated as the case especially in term of the cis and trans ionic distribution on drugs. However the situation in complicated. A physical constraint, thus, arises due to molecules of compounds being unable to bind precisely to activate cell proteins. Often in anti-oxidant potential tests a depth of colour intensity is indicative of a possible physical constraint, and thus, a chemical constraint (Singh, 2017). The physical constraint however, are not only with compounds, but also involve cells (Zweier and Talukder, 2006). Sometimes for example a protein damage in a cell may cause a proper drug molecule to avoid anti-oxidant reactions (Hess et al., 1981; Zweier and Talukder, 2006). In this situation free oxygen radicals accumulate in cells, preventing mitosis (and/or meiosis, depending on the cell type) from occurring. Physical constraints on drugs with multiple actions in host, often, call for engineered specific compounds to prevent excess accumulation of oxygen radicals. In harmful cells the opposite is true. It is presumed in plant cells that due to the Calvin Benson (also called Krebs) cycle, excess oxygen radicals would accumulate at slower paces with drugs activating cell suicide because of stomata releasing O_2 in healthy plant cells (Alscher et al., 1997). However physical constraints involving anti-oxidant potential in laboratory studied plant cells also occur. The bonding patterns on compounds also affect a compounds anti-oxidant potential.

The chemical constraints is the solvent used in commercialising drugs or compounds. This chemical constraint alters a cell signal transduction ability, and their cell multiplication processes. This means that although chemicals, in the case of commercialised drugs, are not protein altering, it is their pH and thus ionic strength that alters anti-oxidant potential readings. This constraint involving anti-oxidant potential exerts long and short term effects on cells and is highly dependent on concentration factors used. Generally a lower concentrated chemical used in drug commercialisation isn’t exactly related to a cells signal transducing ability in all suicide mechanisms. Chemical constraints are, thus, reliant on whether or not chemicals pass cell membranes across a gradient (Cavallini et al., June 2014). Often this is achieved by ions in compounds and genes regulating membrane pores and channels. This in fact determines if a compound is able to degrade poisonous oxygen molecules by activating macrophages to ward off waste products and oxygen scavenger molecules (Singh, 2017). In plants however, the situation is more controlled since the cell wall requires mechanical rupturing in order for a chemical to cause a concentration gradient by which harmful oxidants exit the cell (Alscher et al., 1997). The internal cell environment is thus a major contributor to what happens to chemicals, and is also a factor of consideration in chemicals of more than one activity because oxygen radicals exiting a cell also depends on cytoplasm concentration (not volume, but, rather solutes dissolved in 90% of water). Chemical constraints involving oxidants would, therefore, be influenced heavily by tonoplast concentration, and obvious, the chromosome aberrations caused by compounds. All in all a chemical constraint must be avoided by submerging cells in media that provide optimum potentials.

Cell arrangement is a biological constraint involving anti-oxidant potential. This constraint is important since no single, one, cell provides an anti-oxidant potential in tests since more than one is involved in a test. Almost always cells are overlapping and their chemical/compounds pass membranes at different paces. Anti-oxidant potential may vary between tests, but, these are slight since compounds indeed enter all cells in, or with, suspension. Tests containing too many cells not necessarily show better anti-oxidant potential for growth chemicals because this relies on chemical constraints.

Membrane selective, or differential, permeability is another biological constraint (Corretti et al., 1991; Zweier and Talukder, 2006; Cavallini et al., June 2014).Poisonous oxygenated free radicals are able to leave both membranes, however, intact ribosome sequences are needed for anti-oxidant tests to be successful. This affects anti-oxidant potential if transfer ribosome sequences are damaged since cell growth need these for mRNA processing. Compounds, thus, wouldn’t produce anti-oxidant potentials representing certain cells if ribosomes are damaged (Singh, 2017). Mitochondrion malfunction is also a constraint involving anti-oxidant potential because free oxygen radicals form due to functional mitochondria (Balaban et al., 2005). Malfunction after and during radical formation lead to irreparable cell suicide (Balaban et al., 2005; Van Breusegem and Dat, 2006). As a consequence, any introduced chemicals exert poor effects on cells. Irrespective of a chemical or physical constraint, mitochondrion malfunction is a huge contributor to poor and irreproducible anti-oxidant potentials. Circumventing this to attain good anti-oxidants from compounds would, thus, require that cell viability tests, that include counting ensures that respiratory electrons and protons in the correct concentration are present to meet a compound's physical and chemical requirements (Hess et al., 1981; Corretti et al., 1991; Scandalios, July 2005).

A combined understanding for anti-oxidant potential

Why are there anti-oxidant potentials in cells?

Oxygen potentials exist in cells due to glycolytic and gluconeogenic sugar processing (Singh, 2017). Both processes require a continuous shuffling of electrons, protons and high energy carriers that require oxygen (Hess et al., 1981). Although oxygen utilisation is obvious, not always would an equal amount of carbon dioxide dissipation occur. Due to toxic waste accumulation, and excess unused oxygen, oxygen potentials exist in cells. The unused oxygen isn't the only attribution to oxygen potentials since the poisons within the cytoplasm, which contain broken oxygen molecules due to incomplete bonds with carbon elements, form cellular oxygen molecules. Also these unbound oxygen elements in the cytosol lack channels in eukaryote membranes to aid their dissipation (Sies, 1997). It is the upset solute concentration between internal and external environments that is a contributor to oxygen potentials in all cells.

Could anti-oxidant potentials in cells be avoided?

It is impossible to avoid anti-oxidant potentials in cells because of the fluctuations a cell experiences in its environment. Whether a cell is in the laboratory or at its natural state, it always undergoes respiratory changes (Scandalios, July 2005; Balaban et al., February 2015), and changes in photosynthetic capacity in plants (Alscher et al., 1997; Van Breusegen and Dat, 2006). The osmotic potential in cells make anti-oxidant potentials impossible to avoid. In viable cells an adequate amount of oxygen is used, however, in test conditions a cell usually preserve/conserve oxygen to survive intolerant conditions (Singh. 2017). Though an oxygen potential is created, reasons an anti-oxidant potential can't be avoided have to do with compounds. In most cases whether a compound activates a cell suicide mechanism or not, it must possess anti-oxidant potential in a cell. Thus an anti-oxidant potential in cells are unavoidable due to physical constraints compounds possess, as well as the electrochemical environment of cells.

Perspectives and conclusions

Anti-oxidant potential is a term therefore that can be studied in relation to mitochondrion activity in cells, particularly, because it not only involves concentration gradients but also optimum nuclear events. The idea is that respiration produces oxygen gradients of varying degrees in plant and animal cells, but, capacities of them to deal with differences are the same. However plant and mammalian cell frameworks differ in complexity and greatly, and, perhaps it is this that make anti-oxidant potential readings differ. It must be acknowledged that although the formation of free oxygen radicals are apparent, or a feature in eukaryote cells since survival mechanisms, viz., oxygenated blood, brain function, organ and systems homeostasis of internal functions, constantly use external oxygen, the situation of oxygen potential also occur in plants. In plants the features of anti-oxidant potential tests involve the thylakoid membranes and stomata, the structures involved in dark and light respiration. The problem is to determine if the situation in all plants, including aloe, are the same plant adaptation doesn't provide enough information to make conclusions. However the electrolyte environment of cells are important since anti-oxidant potentials in plant and eukaryote cells are studied using different compounds. In plants often a drug for specific-based roles are used, while, in eukaryotes a drug (either of natural or synthesised origin) is used to target a specific pathway or mechanism. However these differences are what make anti-oxidant potential so relevant in today's world.

Conflicts of interest

Authors declare that they have no conflict of interests.

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