

BIOTRANSFORMATION OF AMA IN YAKRUT

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ABSTRACT

Ama is undigested, non transformable and non eliminative compound. But *Ama* turns in to a toxic combining with body tissues and produces different diseases. The Liver has a capacity to undergo bio transformation of a toxic element to less toxic element and excrete from the body. Similarly *Ama* has to be bio transformed in to *Nirama* state and then excreted outside the body by means of *shodhana* (purificatory) therapies. The following article explains the stages of bio transformation and role of *Panchakarma* in removing *Ama* outside the body.

Keywords: *Ama*, Xenobiotics, Biotransformation, Detoxification

INTRODUCTION

Ama is abnormal, improper and incompletely digested macro or micro element that stays in the body to produce health hazards. Stasis of *Ama* in body causes *shukthatwa* or fermentation of *ama* products and can also get transformed upto *Amavisha* that leads to acute symptoms. The *Ama* is not only troublesome due to its stasis in the body, but the another hard part of it is that *Ama* does not get excreted from the body. For the proper elimination of *Ama* there is a need of transformation of *Samaavastha* to *Niramaavastha* by Agni deepana, Amapachana. This is followed with proper *snehana*, *swedana* and finally after appropriate *shodhana*, the *Ama* gets out of the body. This state of transformation of *Sama* to *Nirama avastha* can be explained elaborately with the concept of biotransforma-

tion of Xenobiotics that predominantly happen in *Yakrut*.

Xenobiotic is a foreign chemical substance found within the organism that is not normally naturally produced by or expected to be present within that organism.

Biotransformation is the chemical alteration of chemicals such as nutrients, aminomacids, toxins and drugs in the body. Xenobiotics are thus biotransformed via several different pathways to less toxic and more polar products which are detoxified by liver and excreted by kidney and other ways. The primary site of metabolism for above mechanism is in Liver which is equipped with enzyme machinery. The mechanism involves Oxidation, Reduction, Hydrolysis and Conjugation after which the element gets excreted.

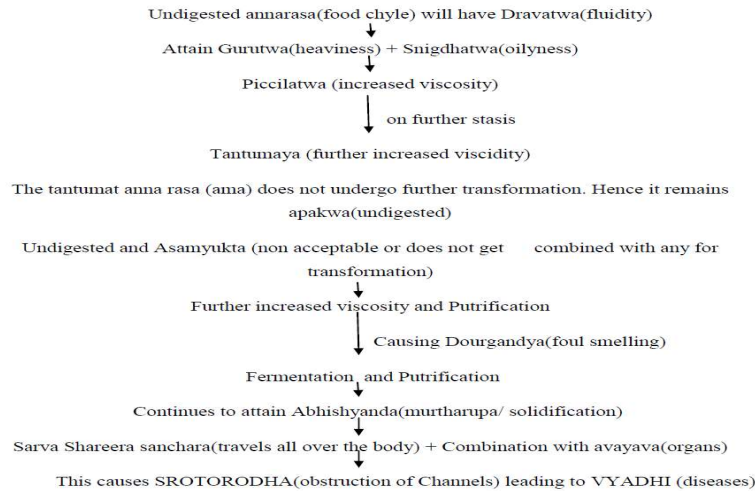
CONTENT

Digestion is nothing but the process of transformation. During the process of transformation the qualities of ingested food should turn homologous with *shareera gunas* (qualities human body) and turn as part of shareera bhavas (components of human body). This happens only if the ingested food is not having *viruddha gunas* (quality of food opposite to human body). If they are *viruddha* to *shareera gunas* then they act against *dhatu*s (body tissues) during the process of transformation. If this transformation fails, gets interrupted, or doesn't attain finality then it attains a state of incompleteness called as *AMA*. *Ama* stays in body which does not get further transformation or further excretion. *Ama* gets stuck in the body and interacts with healthy tissues of body. *Ama* spoils the quality of human body tissues, organs and disturbs normal function of different systems of body. This leads to formation of various diseases. *Ama* neither

getting excreted out of the body, nor transforming into absorbable form then attains toxicity. This toxin destroys health and functioning of all cells of body and kills an individual.

Therefore *ama* has to be excreted out of the body through a special way of intervention because physiologically *ama* does not get eliminated on its own. The Liver is the only organ that has capacity to convert *Ama* from toxic form to non toxic form and then eliminate it out from the body through urine or feces. One should kindle or intensify the efficiency of Liver to transform *Ama* (toxic form/non absorbable form/non removable form) into *Nirama* form (non toxic form that can be eliminated outside the body). Medicines that increase digestive fire, secretion of enzymes for reduction, oxidation will make *ama* into *nirama* form. This process is called as bio transformation where a toxin is converted to non toxin and then eliminated from the body.

Mode of formation and AmaSwaroopa



Xenobiotics and Ama: A Xenobiotic is a compound foreign for the organism. It may be of natural origin or it may be produced by Human. Xenobiotics are rarely eliminated from the body and they are unchanged. Majority of them undergo conversion in the body in various extents. Xenobiotics needs highly efficient mechanism for detoxification and elimination from the body

Biotransformation or Detoxification: It refers to series of biochemical reactions occurring in the body to convert the foreign (often toxic) compounds to non toxic or less toxic and more easily excretable forms. Man is continuously exposed to several foreign compounds such as drugs, pollutants, food activities, cosmetics, pesticides, unwanted compounds produced in large intestine by bacteria, waste materials produced in normal metabolism which are toxic and hence to be

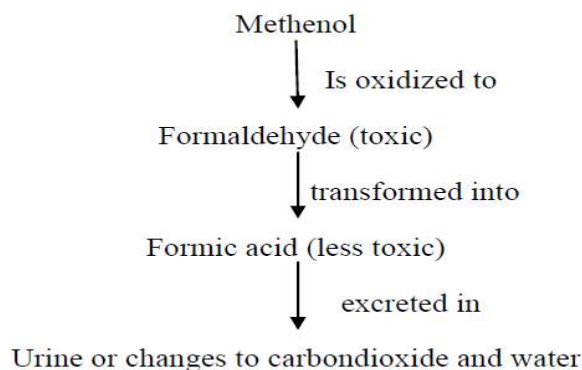
eliminated quickly from the body. Biotransformation of Xenobiotics takes place mainly in Liver which is equipped with enzyme machinery, Kidney and other organs.

Biotransformation reactions normally result in detoxification. Some chemicals may also be enzymatically converted into highly reacting electrophilic metabolites (epoxides, free radicals etc) which may induce cytotoxic, teratogenic, mutagenic or carcinogenic effect through reactions with various cellular constituents.

The initial biotransformation is of less toxic chemical to one or more reactive metabolites by a process

commonly referred as metabolic activation which is essential step for many chemical induced toxicities. Thus in the process the steps that undergo are as follows -

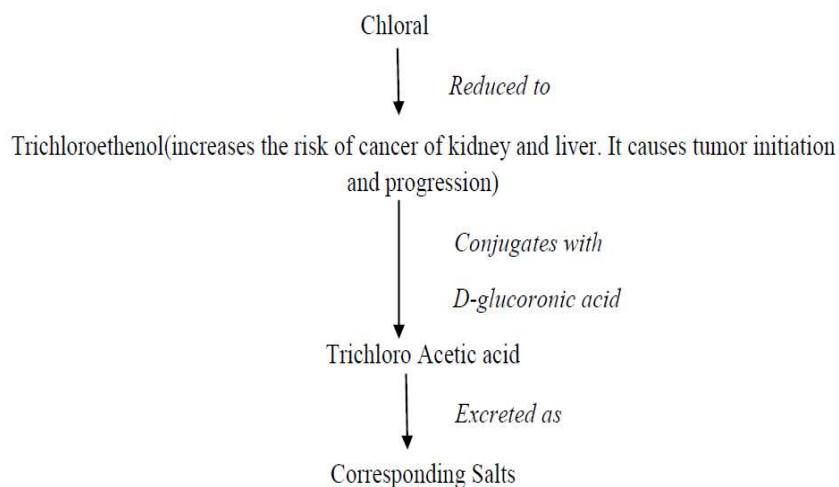
1. Oxidation as *Deepana*: It is gain of oxygen and Loss of electrons during reaction by a molecule, atom or ion. It is the process when oxygen combines with an element changing the appearance of element. Large number of foreign molecules is detoxified by oxidation e.g. Alcohol, aldehydes, amines, aromatic hydrocarbons and Sulphur compounds.



Oxidation is the major process of detoxification involving the microsomal enzyme cytochrome P450 which is an inducible, NADPH dependent hemoprotein. Oxidation can be enhanced by Agni

Deepana as it is lead by enzymatic action where these enzymes are nothing but *dhatwagni*

2. Reduction as *Pachana*: It is the Removal of oxygen and gain of hydrogen, gaining of electron



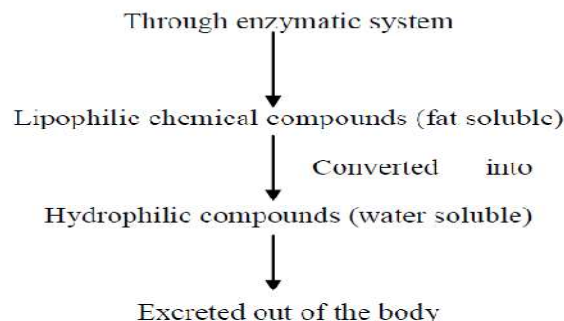
3. Hydrolysis as *Pachana* and *Dosha Paka*: It is water separation, cleavage of chemical bonds by addition of water.

- Sucrose = Glucose + Fructose by hydrolysis
- Aspirin = Salicylic acid + Acetic acid
- Atropine = Tropic acid + Tropine in liver

All these are then excreted in Urine, Faeces

4. Conjugation – Achieved after *Snehana* (lubrication) and *Swedana* (fomentation): It is the process in which foreign compound combines with a substance produced in the body. It is the turning of substance into hydrophilic (water soluble) state in the body which was hydrophobic form or Fat soluble form.

Biochemical modification of pharmaceutical substance (xenobiotics)



SUMMARY: There are two types of xenobiotics namely Polar and Non Polar Xenobiotics

Polar (Hydrophilic): Xenobiotics are well soluble in water. They get through membranes poorly. They must use channels and transporters in the blood stream they are transported freely and are rapidly eliminated in urine. They do not need transport protein.

Non polar (Lipophilic, Hydrophobic): Xenobiotics that are water insoluble or poorly soluble (***Ama form which is slimy, greasy/oily, thready/sticky***). They may get stuck in membrane (***Sangha or obstruction by Ama due to srotorodha***). In blood stream transport protein is needed.

Thus they are slowly eliminated. Since bound to protein they cannot reach the urine as glomerular membrane does not allow protein. Aim of lipophilic xenobiotics metabolism is to change their molecule to hydrophilic molecule to make elimination easier. (***Ama form to Nirama form and then Shodhana/elimination***)

Liver metabolizes xenobiotics mainly by oxidation and conjugation. But during this process the consequences of metabolism includes oxygen defects (hypoxia in liver), tissue damage, impairments of other metabolic process, cancer formation, interaction between metabolic by products and other cell compo-

nents resulting in formation of more harmful compounds (*AmaVisha*). Thus natural and spontaneous metabolism of Ama in liver may not be sufficient to eliminate. This biotransformation capacity can be enhanced. Unchanged and non-metabolic materials can be made eliminated only by intervention by Ayurveda.

CONCLUSION

Agni deepana (enhancing digestive fire, stimulating the secretion of digestive enzymes) enhances the enzymatic action required for Oxidation. After *Agni deepana* the digestive fire increases and one should start *Pachana* (digestion and catabolism). *Pachana* enhances the Reduction and Hydrolysis. The lipophilic compound can be converted into hydrophilic component (conjugation) by *Snehana* (oleation/consumption of oil or clarified butter) and *swedana* (sudation/fomentation). After taking proper oleation and sweating through sudation the *Ama* that has converted to *nirama* will move from peripheral part and reach the central gut through different channels. The water insoluble materials are not taken to the kidney but taken to the gut (*Ama* brought from *shakha* (periphery) dragged to *koshtagamana* (gut)). From the gut it is eliminated from oral route or anal route.

The elimination of Xenobiotics (*Ama*) finally happens after successful *Vamana* (emesis), *Virechana* (purgation), *Nasya* (nasal elimination), *Raktamokshana* (blood-letting). Further one can also enhance the biotransformation activity in Liver by hepato tonic medicines, *agnivardakadravyas* (digestives and carminatives) and *Rasayana* (rejuvenation and revitalization)

REFERENCES

1. Nisha Kumari, Shetty Gautam, Chaturvedi Ashutosh. Management of dushta prathishyaya: A success story. J Biol Sci Opin 2013; 1(2): 88-90 <http://dx.doi.org/10.7897/2321-6328.01212>
2. Nisha Kumari "A Text Book For Roga Nidana and Vikruthi Vijnana" Vol 2, Edition 2016, Chaukambha Orientalia, ISBN: 978-81-7637-370-8, pp-61
3. Jahagirdar Gururaj, Poornima B, Nisha Kumari, New outlook on concept of Ama: Free radicles or xenobiotics. Int. J. Res . Ayurveda Pharm.2015;6(1):73-79 <http://dx.doi.org/10.7897/2277-4343.06117>
4. U Satyanarayan, U Chakrapani "Biochemistry" Chapter 31, 3rd edition 2011, Books and Allied(P) Ltd, Kolkata pg 638-643
5. Byadagi P. S "Ayurvediya Vikriti –Vijnana and Roga Nidana" Vol 1, Edition 2011, Chaukambha Publications , Varanasi pp191

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