AK and the Histamine Problem

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Abstract

One of the most important screening tests in Applied Kinesiology (AK) since the mid-eighties has been the testing with histamine 12X or the actual amino acid histidine to identify the “Histamine Allergy” (Schmitt;1, 2, 3 Lebowitz4). This screening has been very successfully used in the nineties in the German speaking AK world as well as other European AK chapters and was expanded by this author by using not only one, but five different homeopathic ampoules for testing and by implementing the work of Prof. Jarisch from Vienna into AK (Jarisch,5 Gerz6). Jarisch et al point out that – in addition to the histamine produced by the patient himself in the classic allergic reactions – much higher quantities of histamine can be consumed with a lot of popular foods and drinks. Diaminoxidase (DAO) is the main enzyme for histamine break down. It can be enhanced by a number of orthomolecular substances – and negatively influenced by certain prescription drugs and even foods and drinks.

“Histamine Allergy“ is not a perfect term to describe the importance of the problem for a huge percentage of chronic patients. “Histamine Hypersensitivity,” “Histamine Intolerance” or “Immunological Dysfunction with Histamine as Primary Mediator Substance” would be more precise.

This paper offers a summary of this development, including a brief description of Jarisch’s findings as well as the recommended AK procedures and strategy.

Key words

Applied Kinesiology (AK) – Histamine – Histamine Intolerance – Allergy – Diaminoxidase (DAO) – Biogenic Amines – Mediator Substances

1. Histamine Physiology

1.1 Production and Functions

Histamine is a biogenic amine, actively produced by all mammals and derived from the amino acid histidine. It is stored in a variety of cells, esp. basophiles and mast cells, from where it may be released instantly.

Histamine is very stable against cold and heat and therefore – once formed – cannot be destroyed by cooking (including microwave), frying or baking, nor by deep frosting.

In the human body, it regulates the following physiological functions:

- Contraction of smooth muscles (uterus, intestines, lung...)
- Dilation of blood vessels
- Stomach acid secretion
- Cellular growth and differentiation
- Mediator substance in practically all allergic reactions
- Mediator substance in practically all pain reactions
... and many more
Histamine is also produced in massive amounts by bacterial degradation. In moderate amounts, this is called ripening – thus many ripened foods like cheese, wine, beer, sauerkraut, smoked fish and meats etc. may have very high amounts of histamine and that amount of histamine actually is an indicator for the quality of the production process. Very large amounts of histamine are a sign of decay or rotten foods and may be life threatening for humans.

For example, fresh or immediately frozen fish hardly contains any histamine. On the other hand, older or stale fish which has been bacterially contaminated or just stored too long may contain extremely high amounts of histamine. Fresh cheese or cottage cheese, which has only ripened for a few days has remarkably less histamine than older types of cheeses. Also slightly contaminated yeast cultures (like those being used in the production of beer and wine) favour the production of histamine.

All this explains the huge variances in the histamine content of various foods:

<table>
<thead>
<tr>
<th>Food</th>
<th>Histamine Content (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountain cheese</td>
<td>&lt; 10 – 1200</td>
</tr>
<tr>
<td>Fish</td>
<td>0 – 13000</td>
</tr>
<tr>
<td>Salami</td>
<td>&lt; 10 – 280</td>
</tr>
</tbody>
</table>

(in mg of histamine per kg of food, acc. to Jarisch)

Besides the uptake from external sources and the internal production of histamine, there are a number of other factors which may increase its levels in the body:

- **Consumption of histamine liberators**
  These are substances that mediate the release of histamine non-specifically (see Table 2A)

- **Foods with high contents of other biogenic amines**
  These compete for the same enzyme DAO (see Table 2B) and may thereby increase histamine levels indirectly

- **Drugs increasing the allergen specific histamine release** (see Table 3B)

### 1.2 Other Biogenic Amines

There is a whole variety of biogenic amines. Some are formed in bacterial degradation and are highly toxic, even carcinogenic or co-carcinogenic. Others are created by the body and act as physiological mediator substances, being most important hormones or neurotransmitters:

**Toxic:** Cadaverine, Putrescine, Spermidine, Spermine

**Physiological:**
- **Phenylethylamine:** amphetamine-like substance, derived from DL-Phenylalanin, naturally occurring in the brain, effects mood and libido etc; also occurring in chocolate!
- **Serotonin:** central nervous system neurotransmitter involved in regulating appetite, mood, sleep, and sexuality.
- **Tyramine:** found in many common foods, associated with high blood pressure and headaches.
- **The three catecholamine neurotransmitters:**
  - **Adrenaline:** adrenal stress hormone, present at lower levels in the brain.
  - **Dopamine:** involved in motivation, reward, addiction, behavioural reinforcement, and coordination of bodily movement.
  - **Noradrenalin:** adrenal stress hormone regulating the sympathetic nervous system, also involved in sleep and wakefulness, attention and feeding behaviour.

It is interesting to check and compare Table 2B for these different biogenic amines. The amounts of neurotransmitters and even toxic amines in certain foods – like banana! – is almost shocking!
1.3 Histamine breakdown

Normally, any excess of histamine – from the body's own production or by an increased uptake from foods and drinks – is rapidly metabolised primarily by the enzyme diaminoxidase (＝ DAO). When this enzyme is deficient or blocked, a great variety of intolerance reactions may occur, depending upon the amount of histamine present and the patient’s individual disposition.

DAO is not the only enzyme which is able to break down histamine and other biogenic amines. Another one is monoaminooxidase (MAO) – known in conjunction with a variety of psychiatric drugs, but not directly important for histamine breakdown.

Methyltransferase is another enzyme for histamine breakdown, but it primarily reduces the histamine that the body produces itself. It occurs primarily in the liver, but also in the stomach wall. It is very important that methyltransferase is being blocked by histamine degradation by-products (like N-methylimidazolacetaldehyde and methylimidazolacetic acid), if there is insufficient DAO!

Vitamin C is the third and very important way: it breaks down histamine by oxidation and acts independently from DAO and Methyltransferase.

1.4 The importance of Diaminoxidase (DAO)

The leading role of DAO is especially due to the fact that it is being produced abundantly by the enterocytes of the gut wall, thereby reducing the enteral absorption of histamine and other biogenic amines that have been taken up orally! Scavenger animals produce enormous amounts of DAO in their intestines, which enables them to cope even with cadaver meat that would be deadly for any human simply from the biogenic amines it contains. DAO can also be found in the liver, kidneys and leucocytes – and in the placenta: during pregnancy, the DAO content of the blood increases by three to five fold!

So, DAO plays the key role in histamine metabolism:
• Protection from excessive histamine being absorbed through the intestinal wall
• Internal histamine breakdown
• DAO deficiency reduces the second breakdown pathway via methyltransferase

Of interest are Jarisch’s observations that Vitamins C and B6 and copper are primary co-factors in lowering histamine levels:
• Vitamin C as independent breakdown pathway
• Vitamin B6 and copper as the most important vitamin and trace element for DAO

Foods with high contents of other biogenic amines compete for DAO and may thereby increase histamine levels indirectly (see Table 2)

A number of drugs may interfere with DAO metabolism – and some of them are even given to allergy patients on a routine basis by allopathic practitioners! (see Table 3A)

It is obvious that the factors which influence DAO are absolutely critical in every patient suffering from histamine associated symptoms.
1.5 Histamine-associated symptoms:
- headaches
- hot flashes
- reddening
- itching
- urticaria
- rhinitis
- asthma
- vertigo
- low blood pressure
- high blood pressure
- arrhythmias
- digestive complaints (wide variety)
- rheumatoid pain syndromes
- psychological problems (Pfeiffer)
- neurological abnormalities (esp. children)
- dysmenorrhoea and other disturbances associated with the female cycle
- ... and many others!

Of course, some of these symptoms are straight forward and “simply” allergy related. But: very sensitive persons may experience symptoms also from extremely small amounts of histamine which comes from external sources! In addition, alcohol and certain other drinks, foods and drugs may block DAO and thereby worsen the symptoms, whenever histamine is involved – no matter where it comes from!

From now on, the word “food” is being used for anything (solid or liquid) that the patient may consume!

2. Consequences for the AK Practice

2.1 The Histamine Patient

The book of Jarisch has been available since 1999 and underlines the appropriateness of current AK procedures – but also teaches us that we must be more comprehensive and progress further in our investigations, adding on the information he presents. The book should be essential reading for every practitioner. In the future, the diagnosis “Histamine Intolerance” may be used for all those patients in which the case history fits and who test for any homeopathic potency (ies) of histamine and/or to the amino acid histidine. But: there remain the millions of patients who have real allergies – like for example hay fever – and most of them will also readily show an AK test reaction to the same test samples of homeopathic histamine and/or histidine and/or calcium/copper/B6/C. Our way out has been to simply not care all that much about which diagnostic term is being used – unless we have to deal with old fashioned conventional medical people. Whether somebody has a real allergy or a pseudo-allergy or a hypersensitivity or an intolerance or a combination of two or more of the above – we call all of them “Histamine Patients”!

The simple and most important reason is that the vast majority of all these patients actually do have these combinations – and more or less all of them can be helped with a combined, “bio-logical” therapeutic regime based on the physiology of histamine. This requires always avoidance or strong reduction of histamine foods and removal of disturbances for DAO function (see Tables 1–3).

Naturally, the importance of a well-performed AK test for food allergies and other environmental allergies (from house dust to the tooth paste and from perfumes to moulds and yeasts etc.) remains critically important and must always be one of the first steps.
2.2. Foods to Avoid or be Careful with
All histamine patients should be counselled to understand the basics of histamine. Use the information in Table 1 carefully and always remember the basics:

Alcohol: May cause problems for most histamine patients as most types not only contain histamine in µg-amounts, but because alcohol is rapidly absorbed and promotes a leaky gut – which then again favours the uptake of histamine from foods. Alcohol and its breakdown products (aldehydes) also hamper the histamine breakdown via DAO. They are also likely to liberate histamine from basophiles and mast cells – and alcohol certainly is vasodilating and thereby increasing histamine symptoms.

Sparkling wine has the highest content of histamine; beer the lowest and is therefore usually tolerated in small amounts by most histamine sensitive patients. Industrially produced wines like those from Australia, USA and South Africa, often show lower histamine levels than traditionally produced or homemade types of wine. The histamine content of various wines and sparkling wines differs so greatly, however, that we recommend avoiding these types of alcohol as much as possible or sticking to those types which have been well tolerated before. The histamine content is also dependent upon vintage and vineyard.

Cheese: Fresh cheeses like cottage cheese; quark etc. should be well tolerated. Also small amounts of soft cheese should not cause problems.

Chocolate: Contains tyramine and phenylethylamine, which may also trigger headaches and migraines and should therefore be avoided or greatly reduced.

REMEMBER: Red Wine + Cheese + Chocolate = Most Common Migraine Triggers!

Fish: Fresh or deep frozen fish is usually well tolerated; tinned fish or fish that has only been cooled (not frozen) may be dangerous! Seafood may contain extremely high amounts of histamine depending upon how fresh they are.

Meat, sausages and ham: All smoked animal products are high in histamine and should be avoided.

2.3. Orthomolecular and Other Therapeutic Consequences

2.3.1 Vitamins
Lab values for Vitamin C are usually in the low range of normal or below – so it is always worth a therapeutic trial which in severe cases is best done intravenously with high dosages; up to 25 g/day in addition to oral supplementation. Patients who benefit from Vitamin C notice the effect within a day or two! Vitamin B6 is being used up by any form of nutrition which is too high in either protein or carbohydrates. Jarisch' provides a list with the B6/protein quotient of foods, but we have not found this useful considering the broadness of the histamine problem. We supplement B6 in the form of P-5-P (50 mg) from PE usually only 1–2 cps daily. For more information on Vitamin B6 in the clinical practice, the orthomolecular literature or this author’s paper (Gerz7) is recommended. Most likely all other vitamins supporting liver function will also benefit histamine patients, but Jarisch does not give any specific research findings.

2.3.2 Minerals and Trace Elements
Calcium has strong antihistaminic properties – and magnesium and zinc to a lesser extent. Therefore, optimizing these three minerals should be basic in all histamine patients. With regards to calcium, the new physiology of vitamin D should not be forgotten (Gerz2)! Through the book of Jarisch, copper has moved to the foreground, being the key element of DAO. Regarding copper metabolism and AK, I refer to my 2002 paper (Gerz7) The therapeutic range is between 0.5–6 mg elemental copper daily, with stomach sensitivity being the biggest problem in about 10–20% of the patients. Therefore copper should never be taken on an
empty stomach, but always in the middle of a meal. In difficult cases it has to be dissolved in some fluid until nothing can be tasted any more. **Very often it is those with the highest sensitivity that have the biggest deficiencies of copper!** As copper is primarily a liver trace element, a broad based liver support is usually helpful – which certainly helps improve methyltransferase and other metabolic pathways.

### 2.3.3 Estradiol

Estradiol increases histamine in the uterus and around ovulation an increased excretion of histamine metabolites in the urine can be measured.

Suddenly a few observations can be looked at from a different viewpoint:
- Strange dietary habits of many females in the days before menstruation
- Different allergic sensitivity during various phases of the monthly cycle
- Dysmenorrhea especially in women with excess estrogen
- Increased problems of many histamine patients in the first weeks of pregnancy: estrogens increase immediately, whereas DAO reaches its maximum not before the third month!

### 2.3.4 Therapy of Dysbiosis – Candida – Parasites

Infections and anything which increases permeability of the intestinal wall will increase histamine in the body (Jarisch). This means that – therapeutically – not only probiotics and long term dietary modification may be necessary, but probably more often than we thought up to now more severe and allopathic therapy against candida, helicobacter pylori and other pathogens like clostridia, yersinia and various parasites may be necessary (Fonk).

Most AK practitioners do test for candida already. The connection between histamine and candida is a classic and it cannot be over-emphasized that this always has to be ruled out first. One point which may be a little difficult for the non-M.D. professions is that Nystatin and even Amphotericin, when given in a pure and well tolerated form, are often more efficient and better tolerated when properly tested with AK then all the various herbal anti-candida remedies. Nystatin and Amphotericin are hardly absorbed at all (maximum 3–4%) and we have hardly had any negative reactions at all to them after they tested well in the original AK test. However, the herbal remedies have the great advantage of giving energetic support not only for the digestive tract, but also for the lower and middle section of the triple heater meridian. In this respect, A.C. Formula (PE) is our number one, and we have many patients who continue taking it long term because of these positive energetic effects.

To go more in depth of the testing for candida, parasites and dysbioses is beyond the scope of this paper, but the author welcomes any questions regarding it.

### 2.3.5 Further Connections and Thoughts

Jarisch cites a French study in which 33,000 patients were questioned for food intolerances. The results point towards an incidence of a histamine intolerance in the total population of 1%, with 80% being female with a peak around age 40. My personal experience is different: I would estimate about 10% of the population!

Considering the numerous interactions between histamine metabolism and copper, but also other bio-logical correlations, there are suddenly new questions with far reaching consequences:

- Conventional HRT and the pill? Yes, because these decrease copper and a decline of copper in the liver reduces DAO and thereby increases histamine!
• Heavy metal intoxication like amalgam etc.? ⚫ Yes, as there is a competitive antagonism between copper, zinc and calcium with mercury, tin, lead etc. as well as the directly caused increase of allergic sensitivity by mercury!

• Increased industrialized food production? ⚫ Yes, because histamine increases during storage and heating – with a decrease of most vitamins, esp. C! In addition, all the necessary stabilizers (the famous E-substances like sorbit etc.) are all DAO inhibitors!

• Increasingly worse dietary habits ⚫ Yes, see above, but also specific increase of “histamine foods” like tomatoes, citrus fruits, sausages, tinned and smoked foods etc.!

• Increased chronic acidity of many patients? ⚫ Yes, as this leads to a loss of calcium – and every manifestation of an allergy causes more over-acidity! Alkaline therapy helps against allergies!

• Irresponsible allopathic therapy? ⚫ Yes, just look at the list of DAO blocking drugs. It is impressive – but hardly ever taken into consideration!

• Falsely indicated antibiotic therapy? ⚫ Yes, as candida and other pathogens may be a consequence of bacterial disbalance!

• Stress? ⚫ Yes, because stress increases histamine in the body!

3. AK Strategy

3.1 Testing with Homeopathic Ampoules
In addition to the case history (with the sensitivity to classic histamine or other amine carriers like red wine, sparkling wine, cheeses, chocolate, banana, tomatoes etc. as a classical hint) and the testing with the orthomolecular amino acid histidine, the most elegant approach is testing with homeopathic potencies of histamine. This was – originally – mainly done with the 12X potency of histamine. Around the year 2000 Dr. Eugen Burtscher from Austria recommended to add the 6X potency into routine testing. With Eugen’s recommendation in mind and the book of Jarisch, we then routinely screened patients not only with the 6X and 12X potencies, but actually with the 6X, 12X, 15X, 30X and 200X and also the so-called KUF series of ampoules from Staufen Pharma (one box containing 10 different potencies of histamine in single vials). As one might have expected, we actually found many more positive histamine patients than with only using the 12X – and all possible variations were found.

The different possibilities can best be studied in patients with clinically proven and “school medicine diagnosed” allergies – like the following typical example:
44-year-old female patient with many years of allergies to house dust, mites, animal hair, various molds and water from her shower!!!
Obvious symptomatic improvement with allopathic asthma sprays and antihistamines.
AK test: GHT (generalized hypertonicity) (Rectus f., Teres minor, PMS, Piriformis bilateral)
Ø = no reaction: histamine 12X !!!
SC (Superchallenge): KUF series of histamine and histamine 6X
NC (Normotonic Challenge): histamine 30X.
This case history with the continuous and successful use of sprays and antihistamines forces one to expect a reaction to one or more potencies of histamine – which does not supply any additional diagnostic information as the patient already knows about the allergies and is helped by antihistamines.

On the other hand: histamine 30X creates perfect normotonicity – which makes the rest of the AK testing much easier. The testing of histamine 12X alone would not have shown any result at all!!

Many hundreds more cases in our office have shown NC with histamine potencies of 200X, 6X and 15X – with decreasing percentages in this sequence – with the 12X still being the most common NC potency!!

However: patients may also weaken to one or more single potencies of histamine or even the whole little box of the five potencies which we call “Histamin-Mini-KUF” – but there will usually be one potency out of the five that creates perfect normotonicity.

Attention: do not test homeopathics orally, as they are not a chemical Challenge and the effect may occur immediately and be long lasting as soon as the remedy is insalivated!

3.2 Testing with Orthomolecular Substances
As an alternative and when no reaction to the homeopathic ampoules is found, although the case history strongly points towards histamine: test the most important “DAO Supporters” and bio-logical antihistamines: Copper (we have five different ones in the test kit), P-5-P, Calcium, Vitamin C, NaHCO3.
This sequence is from my personal experience from thousands of tests – and you will find one that will test as NC (Normotonic CH) in almost 100% of the cases!

The disadvantage with vitamins and minerals is that – once you find the one that is NC – and you want to continue to test from normotonicity, you always have to have enough of the substance in the mouth.
If you do a proper food test and you find a food that is not tolerated, you have to rinse the mouth – but then also need to re-apply the NC testing substance. So, the homeopathic is the most elegant solution!

A big problem is due to the fact that histamine patients are usually intolerant to citrus fruits (see Table 2A) – and therefore also to the citrate forms of minerals and trace elements. Again, we have observed this in hundreds of cases and therefore all citrates have become last in line to test on histamine patients!

3.3 Testing with Herbal Remedies
A lot of herbal remedies are offered for “allergy relief.” When you test these products orally and leave them in for 30 and often 60 seconds – just to make sure – then very often intolerances can be found.
In my opinion, this is due to the fact that the majority of histamine patients have some “real allergies” – versus only a “real intolerance” – and therefore will react to any herb that belongs to the same allergy family as their “real” leading or primary allergen. To test yourself: just look up the family of the mugwort = wormwood = Artemisia family of allergens!

See also 2.3.4 above!

3.4 What to consider in AK allergy testing
A detailed description of how an AK allergy test has to be carried out and what has to be considered in difficult cases would be beyond the scope of this paper.
The following recommendations, however, should always be kept in mind:

- Only oral or nasal exposure, no testing of foods etc. in the hand or on the belly
- Those foods that the patient likes and commonly consumes are most important
- Switching must be ruled out before starting the test – but may occur with every single item that you test! So always watch out, based on a careful case history, common sense and a basic knowledge of food families (Leaf12).
- Always check the nightshade family – and watch out for switching esp. here! In my experience, the typical case history of a “nightshade patient” is that they love one or two of them – most often tomatoe – but dislike or even hate the others and sometimes even get a headache or migraine from yet another (most commonly tobacco!).
- Do not test sugar, coloured and flavoured drinks, chocolate, mixed foods etc.
- These are mostly not tolerated anyway and should be avoided already from the “histamine viewpoint” alone. Sugar is toxic and should be avoided anyway.
- Switching is always to be ruled out when you do test these foods and they seem to be okay!
- As a consequence, any foods not tolerated should be avoided for at least four weeks – then maybe tested again!

Conclusion

The time proven concept of screening for histamine related health problems has to be expanded with new knowledge that has been published recently, especially by Jarisch. If we apply this new knowledge with solid AK based on a careful case history, many patients with seemingly “untreatable” chronic conditions can be helped. The symptoms may range from the usual allergy symptoms to migraines, headaches or rheumatoid type syndromes etc. I recommend testing with various potencies of histamine for all serious AK practitioners. As the classic KUF series are no longer available from Staufen Pharma, I recommend the use of a “Mini-KUF-Series” a small box with five different potencies of histamine: 6X, 12X, 15X, 30X, 200X and – separately – the amino acid histidine. Please note that the German homeopathic nomenclature is D6, D12, D15, D30 and D200 instead of the 6X, 12X and so on!

If time is short but the case history is clear, it often pays to just give the “anti-histamine recommendations” to the patient without any AK testing. A huge percentage of cases will improve without any testing!

The biological treatment regime for histamine patients may be summarized like this:

- Reduce histamine uptake
- Reduce histamine release
- Remove or reduce anything that hampers DAO and methyltransferase
- Try to identify anything the patient does not tolerate and recommend to stay away from it as much as possible – at least until definite improvement is achieved!
- Supplement anything that promotes histamine breakdown (Vitamin C + whatever is missing for DAO)

I would love to have many more AK colleagues re-evaluate their AK testing after studying the book of Jarisch and the suggestions above – and that they share their experiences and criticism with me and us in the ICAK.

Remember George Goodheart:
““In AK, we should be the first to take up the New and the last to forget the Old!””

The content of all Tables 1–3 is according to Jarisch R:, Histamin-Intoleranz.
### Table 1 Histamine Intolerance

<table>
<thead>
<tr>
<th></th>
<th>Negative High in Histamine</th>
<th>Positive Low in Histamine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meat</strong></td>
<td>Smoked meat, salami, ham, stale meat, venison</td>
<td>Fresh meat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cooled meat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frozen meat</td>
</tr>
<tr>
<td><strong>Most fish products from</strong></td>
<td>Herring, sardines, tuna, mackerel, anchovy</td>
<td>Fresh fish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh seafood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deep frozen: cod, pollack, plaice, sea pike</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td>Bananas, red plums, pears, oranges, kiwifruit, strawberries</td>
<td>Fresh: Cherries, blueberries, lemons, apricots, blackcurrant, apples</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td>Sauerkraut, tomatoes, spinach, avocado, aubergine</td>
<td>Green salad, rapunzel, pumpkin, different types of cabbages, various types of beans, radish, onion, red beet, porree, paprika, carrots</td>
</tr>
<tr>
<td><strong>Milk products</strong></td>
<td>Cheddar, Swiss-cheeses, camembert, gouda, aged cheeses, parmesan</td>
<td>Butter, sour cream butter, milk, fresh cheese, kefir, quark, buttermilk, quark cheese, yoghurt, sour milk cheese</td>
</tr>
<tr>
<td><strong>Drinks</strong></td>
<td>Red wine, liqueurs, beer, champagne, sparkling Wine, Black tea</td>
<td>Spirits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry white wine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coffee, malt coffee, herb tea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All non-citrus fruit juices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All vegetable juices (except sauerkraut)</td>
</tr>
<tr>
<td><strong>Various</strong></td>
<td>Peanuts, chocolate, liqueur pralines, rum chocolate, nougat, walnut products, snacks, cocoa, vinegar, baker's yeast, yeast-containing spices and spreads</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2.A Histamine Liberators

- Citrus fruits
- Kiwi fruit?
- Milk?
- Pineapple?
- Seafood
- Strawberry
- Tomatoes

- Food additives like glutamate, benzoate, colourings, sulfite, nitrite and many more E-substances
- Helicobacter pylori!!
- Stress!!
Table 2.B. Fruits, vegetables and nuts with high contents of biogenic amines (in mg/kg)

<table>
<thead>
<tr>
<th>Fruit/Plant</th>
<th>Biogenic Amines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bananas</td>
<td>Putrescine 33, Serotonin 77, Dopamine up to 650, Noradrenalin 100</td>
</tr>
<tr>
<td>Cashew nuts</td>
<td>Spermine 55, Spermidine 38</td>
</tr>
<tr>
<td>Chocolate, Cocoa</td>
<td>Tyramine, Phenylethylamine</td>
</tr>
<tr>
<td>Legumes</td>
<td>Spermine 35–55, Spermidine 50–70</td>
</tr>
<tr>
<td>Oranges</td>
<td>Putrescine 100–120</td>
</tr>
<tr>
<td>Papaya</td>
<td>Serotonin 10–20</td>
</tr>
<tr>
<td>Pears</td>
<td>Spermine 30, Spermidine 50</td>
</tr>
<tr>
<td>Pineapple</td>
<td>Serotonin 20–35</td>
</tr>
<tr>
<td>Papaya</td>
<td>Tyramine 10–90</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>Putrescine 65</td>
</tr>
<tr>
<td>Walnuts</td>
<td>Serotonin</td>
</tr>
</tbody>
</table>

Table 3.A. DAO blocking allopathic drugs

<table>
<thead>
<tr>
<th>Substance</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACETYLCYSTEINE</td>
<td>Aeromuc, Pulmovent</td>
</tr>
<tr>
<td>AMBROXOL</td>
<td>Ambrobene, Ambroxol, Broxol, Mucosolv, Mucospas</td>
</tr>
<tr>
<td>AMINOPHYLLIN</td>
<td>Euphyllin, Mundiphyllin, Myocardon</td>
</tr>
<tr>
<td>AMITRIPYTILIN</td>
<td>Saroten, Tryptizol, Limbritol</td>
</tr>
<tr>
<td>CHLOROQUIN</td>
<td>Resochin</td>
</tr>
<tr>
<td>CLAVULANSÄURE</td>
<td>Augmentin</td>
</tr>
<tr>
<td>ISONIAZID</td>
<td>Myambutol+INH, Rifoldin+INH, Rimactan+INH</td>
</tr>
<tr>
<td>METAMIZOL</td>
<td>Buscopan comp., Inalgon, Novalgin</td>
</tr>
<tr>
<td>METOCLOPRAMID</td>
<td>Ceolat comp., Paspertase, Paspertin</td>
</tr>
<tr>
<td>PROPAFENON</td>
<td>Rhythmomocor, Rytmonorma</td>
</tr>
<tr>
<td>VERAPAMIL</td>
<td>Isoptin</td>
</tr>
</tbody>
</table>

Table 3.B. Anti-inflammatory drugs which increase the allergen-specific histamine release

- Acetylsalicylic acid!!
- Diclofenac!!
- Indometacin!!
- Meclofenaminic acid
- Mefenaminic acid
- Flurbiprofen
- Naproxen
- Ketoprofen

Table 3.C. Anti-inflammatory drugs which hamper the allergen-specific histamine release

- Ibuprofen !!!
- Fenbufen = “Lederfen”
- Levamisol = “Ergamisol”
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