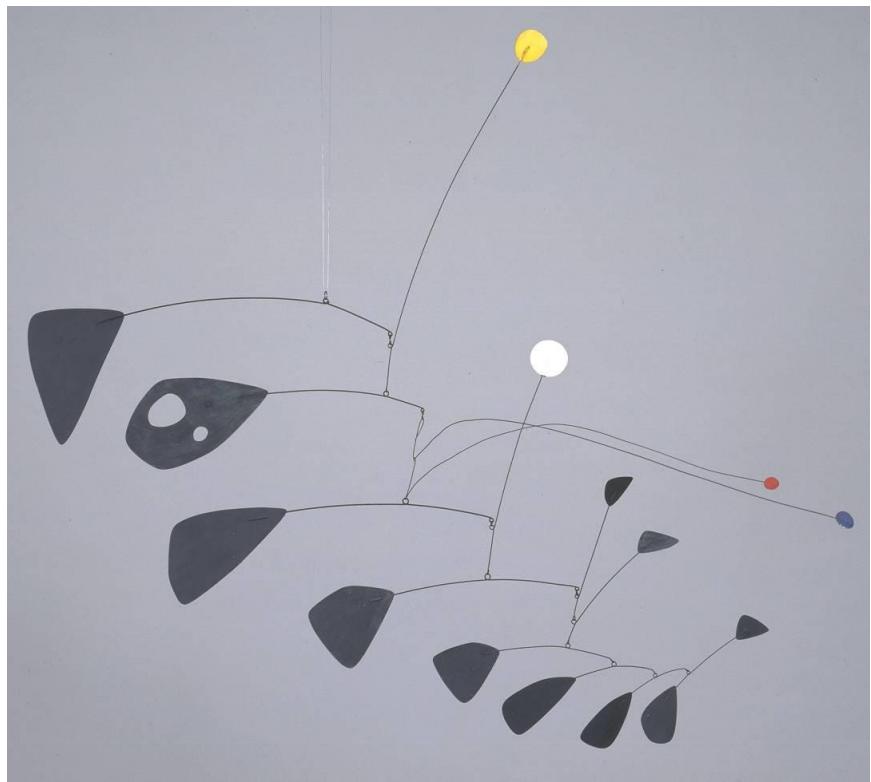


THIAMINE



Left: Peggy Guggenheim, Black and White Photograph, Man Ray 1924.

Right above: "Azure Day", oil on canvas, 1937, Yves Tanguy Tate Gallery. Right below: "Antennae with Red and Blue Dots" Sheet metal and wire, Alexander Calder, 1960 Tate Gallery.

"Peggy threw the best Art parties the New York Art world ever had", exclaimed Ethel Baziotes, the widow of the painter William Baziotes. "She had a genius for people. She was a catalyst. She would bring so many interesting people together". And Sidney Janis remembered that the guests were "rarely under a hundred people. People came and went, artists, collectors, parties went on and on". There was a great cross over from other worlds. Peggy even had a lot of baseball players at one party. The painter Theodoros Stamos noted that "in the forties the Art world also involved theater people - there was lots of sex going on - that sort of sex", he said with a knowing seesaw of the hand, "actors, actresses...."

...Bare breasts, strange costumes were taken for granted...Peggy too presented herself in an extremely exaggerated fashion. Her hair got blacker and blacker, her lips redder and redder. At her ears dangled her trademark oversize, bizarre earrings made of brass, steel, silver or glass. She affected a jaunty, challenging stance, resting her hands on her hips, and sported shocking clothes - transparent or with well placed rips to reveal she was wearing nothing underneath. Hedda Stern described Peggy at one of her big parties, "... half the time Peggy would walk around like an Amazon, absentmindedly pulling (her) dress back up, because it kept slipping off - she had nice breasts - self - supporting"...

Peggy circulated among her guests, her eyes vibrant, making sexual allusions or asking personal questions without listening to the answers. She liked nothing better than to make a surprising, shocking statement and drift on to wherever there was new excitement or an argument. At one party she got into a disagreement with Henry McBride, a friend of Gertrude Stein. As Pierre Matisse told it, "perhaps he made some remarks, and they were drinking champagne, and she threw her champagne all over on him a la Surrealist provocateur...she liked to be provoked and she liked to provoke and she liked to fight".

If Peggy had a disingenuousness, spirited quality that made her fun, she also had "the disconcerting habit, where you'd be sitting talking to her", said Rupert Barneby, "and suddenly, she would say something under breath intensely disagreeable, dropped just as an aside in a play, directed toward the person. For example, "Why is this man boring me so!" It was like a dagger to the heart...

On opening night, women wearing Chinese robes and dangling giant sculptural bracelets and men jabbering in French, drinks in hand swerved to avoid paintings jutting out into the room or suspended in mid-air. Peggy greeted her guests, who each payed one dollar to get in, in a white dress her eyes bright, her hair solid black, her lips a smudge of scarlet. From one ear dangled the tiny pink oval desert landscape Tanguy had made for her, and on the other, a huge wire mobile by Alexander Calder, to represent, she liked to say, her impartiality between Abstract and Surrealist Art".

*Jacqueline Bograd Weld
"Peggy, The Wayward Guggenheim", 1986.*

Peggy Guggenheim was the greatest modern Art patron of New York City during the years of the Second World War - an age when American Art was only very small business, the domain only of the very elite. New York City at the time was jammed packed full of refugees from the war in Europe, and among these were the very cutting edge of

avant-garde Art, the European Surrealists, which included such names as Max Ernst, Andre Breton and Salvador Dali. The Americans held the European Artists in deferential awe - not daring to believe they themselves could possibly offer anything more to the world of Art. Galleries only displayed European Art, collectors only bought European Art - rarely if ever - American. Peggy being Jewish was also a refugee from Europe. Though an American she had spent most of her life living in Paris, a wealthy heiress. She had dreams of opening her own Art Gallery in Europe but the War changed all of that. She open her gallery instead in New York City. "Art of this Century", her gallery was a complete novelty and a stunning success. At first Peggy was only interested in showing European Art, mostly Surrealist, but on the prompting of Pierre Mondrian she began to take notice of a fledgling altogether new and uniquely American ouvre - Abstract Art. Peggy's personality was so outrageous and scandalous she quickly gained the media spotlight attention of New York City. She was known to throw the biggest and best parties in the whole of the city. People came to her gallery just to see what all of the fuss was about! Over the course of her time in New York City she developed a passion for the new Abstract Art and began to show it in her gallery. Gradually - much to the astonished surprise of the arrogant Europeans, the new Abstract movement seemed to gain ground in popularity - at the expense of their own Surrealist works! In 1945 the war ended, and many of the Europeans returned to Europe, fleeing, as they saw it, a barbaric cultural wasteland. But they returned to a devastated Europe. The world they had known before the war had completely vanished. They were greeted by a new young generation who had never even heard of Surrealism - all things American had become the latest vogue - and this increasingly included their astonishing Abstract Art! Paris would no longer be the center of the Art world - its place had been overtaken by New York City!

Although Peggy herself also returned to Europe to live in Venice after the war, she had fully embraced the new American Art form, even actively promoting little know American Artists - such as Jackson Pollock and William Baziotes. Although no artist herself Peggy's greatest abilities lay in her outrageous and engaging personality - everyone wanted to be seen with her, or to be invited to one of her parties. She was the catalyst that saw the birth of a modern Art movement in America - one that would eventually overtake Paris itself. She oversaw the transition from Surrealism to Abstract Art and all its bewildering variations and forms. One of her most famous trademarks was her positively scandalous earrings! In a spirit of promotion of all Art, she would in one ear wear a work of Surrealism, in the form of a Tanguy landscape - symbol of the European ouvre, while in the other hung a symbol of the new American Abstract Art, an enormous dangling mobile by Alexander Calder.

The complex processes of human interactions so critically rely on those rare personalities that can attract all types and unite even the most disparate personalities. In the world of Art, Peggy, the "wayward Guggenheim" was just such a personality. A fascinating persona that brought disparate people together and catalysed the evolution of one world to another.

In the biochemistry of life at the cellular level we see the extreme importance of the "catalyst", just as we see it on the largest scale of the complex social interactions of human beings. In regard the critical interactions and transitions of the disparate molecules of the glycolytic pathways and the Krebs cycle, our "Peggy Guggenheim" comes to us in the form of vitamin B1 - thiamine!

THIAMINE

Introduction

Thiamine (or vitamin B1) is one of the water soluble B group vitamins.

Because there is very little thiamine stored in the body, depletion can occur quickly, within 14 days.

Alcoholics and those with starvation or malabsorption are the patients most at risk from thiamine deficiency.

Wernicke's encephalopathy and **Beriberi** are the most serious manifestation of thiamine deficiency and urgent and aggressive treatment with thiamine is essential in these conditions.

See also separate Documents for:

- **Peripheral Neuropathy, (Neurology Folder)**
- **Wernicke's Encephalopathy, (Neurology Folder)**

Biochemistry

The body cannot produce thiamine and can only store up to 30 mg of it in tissues.

As there is very little thiamine stored in the body, depletion can occur quickly, within 14 days.

Thiamine pyrophosphate is the active form of thiamine.

Its major role is as a coenzyme in carbohydrate metabolism acting in reactions such as the decarboxylation of alpha-keto acids, particularly of pyruvate and alpha-keto-glutarate seen in the Krebs cycle, (see **Appendix 1 below**).

Natural sources:

Rich dietary sources of thiamine include:

- Yeast extract, wheat germ, wheat bran, nuts, fortified breakfast cereals, liver, kidney, lean pork, peas, wholemeal flour, wholemeal breads, sesame seeds.¹
- In industrialized countries, foods made with white rice or white flour are often fortified with thiamine, because most of the naturally occurring thiamine is lost during the refinement process

Preparation

- Tablets 100 mg.

- Ampoules of 100mg in 1ml of solution.
 - ♥ Ampoules must be protected from light.

Pathophysiology

Causes of thiamine deficiency:

- Chronic alcohol ingestion:
 - ♥ Thiamine (vitamin B1) deficiency is a significant problem with excessive alcohol consumption
 - ♥ Patients regularly ingesting > 60 grams of alcohol daily should be assumed to be at increased risk of thiamine deficiency; other features that may indicate increased risk are symptoms or history of alcohol withdrawal.
- Malabsorption states:
 - ♥ e.g. Inflammatory bowel disease.
- Starvation:
 - ♥ This may occasionally include hyperemesis gravidarum
- Occasionally rapid depletion may be seen in association with
 - ♥ Hyperthyroidism, pregnancy, lactation, or fever in general.
- Folic acid deficiency:
 - ♥ If folic acid is deficient in cells, it causes an *indirect* thiamine deficiency, because thiamine is present but cannot be activated in the absence of folate.

Complications of thiamine deficiency:

The consequences of Thiamine deficiency include:

- Peripheral neuropathy:

The mildest and most common manifestation of thiamine deficiency is peripheral neuropathy
- Wernicke's Encephalopathy:
 - ♥ An acute reversible encephalopathy seen mainly in alcoholics

- Korsakoff's Psychosis:
 - ♥ A chronic non-reversible encephalopathy, seen in alcoholics, as a progression of untreated Wernicke's Encephalopathy.
- Beriberi:
 - ♥ Severe chronic deficiency of thiamine can result in Beriberi
 - ♥ It has widespread clinical effects, most notably peripheral neuropathy, Korsakoff's psychosis and cardiac failure.

Pharmacokinetics

Absorption:

- Thiamine can be given orally, IM or IV

It is well absorbed from the gastrointestinal tract

Distribution:

- Thiamine is distributed to most body tissues.
- It is not stored in body tissues to any appreciable extent

Metabolism and excretion:

- Amounts in excess of the body's requirements are excreted in the urine as unchanged thiamine or as the metabolite, pyrimidine.

Indications

The principle indications for thiamine therapy include:

- Supplementation in patients at risk of nutritional deficiency:
 - ♥ Alcoholics
 - ♥ Malabsorption conditions.
 - ♥ Prolonged fasting in intensive care units

In more severe deficiency:

- Wernicke's encephalopathy
- Beriberi

Adverse Reactions

Occasionally allergic reactions may be seen due to components in the ampoule preparation.

Dosing

Thiamine and glucose:

Thiamine must be given *prior* to any IV glucose solutions, as carbohydrate loading in the presence of marginal or depleted thiamine stores may worsen or precipitate a Wernicke's encephalopathy.

The CHO "drives" the Krebs cycle, thus depleting the last stores of thiamine, which is used in the cycle.

*Because of this give thiamine should ideally be given prior to any glucose (or at least with it)*¹

Supplementation in patients at risk of nutritional deficiency:

For prevention and treatment of thiamine deficiency:

- Thiamine 100 mg orally, daily.¹

Alcoholism and Beriberi:

For more acute deficiencies especially in **alcoholics** or cases of Beriberi:¹

- Thiamine 100 to 200 mg IM/ IV, daily for 3 days then thiamine 100 mg orally, daily

Note that oral absorption of thiamine may be impaired in many malnourished or alcoholic patients; and so initial dosing is best given parenterally.

For IM administration, solution may be injected undiluted into a large muscle mass.

For IV injection, administer by direct IV slow injection over 10 minutes into a vein or the side arm of a running infusion.

Can be diluted in compatible IV fluid if required, (5% dextrose or 0.9% sodium chloride).

Thiamine for Wernicke's encephalopathy:

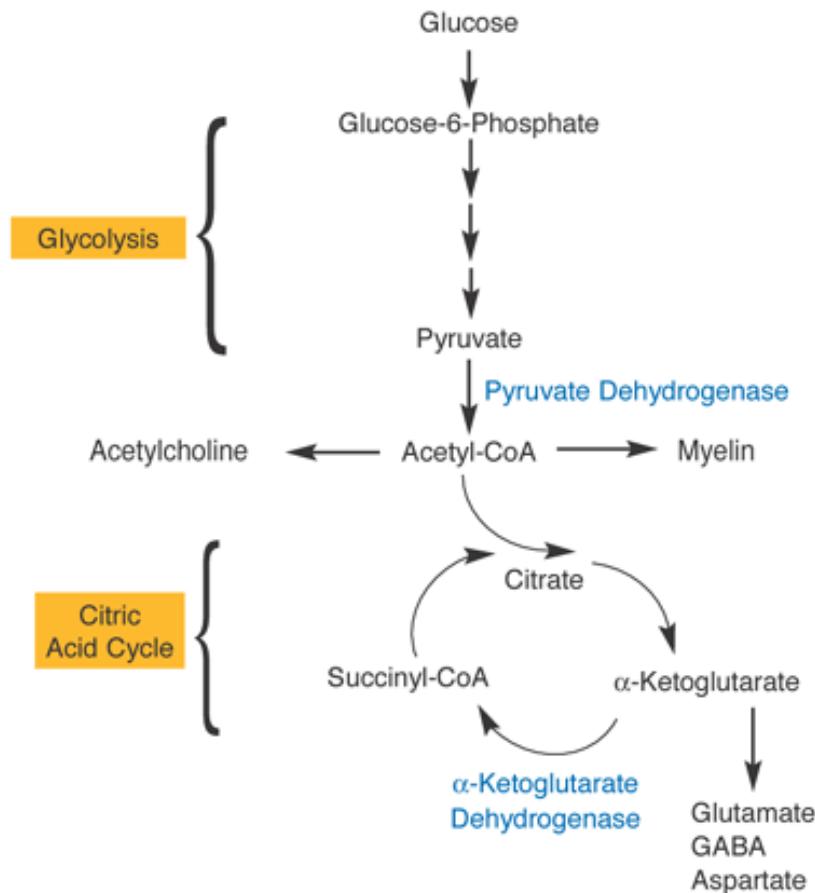
Treatment with thiamine is urgent and aggressive to prevent possible progression to an irreversible Korsakoff's syndrome.

- Thiamine 500 mg IV infusion over 30 minutes, 3 times daily for 2 to 3 days¹

- Then thiamine 250 mg IV or IM, daily for 3 to 5 days or until clinical improvement ceases.¹

Appendix 1

The biochemical role of thiamine:



The thiamine dependent enzymes, in blue, (pyruvate dehydrogenase (PDH) and alpha ketoglutarate dehydrogenase (α KGDH) participate in the metabolism of glucose through two biochemical reactions, glycolysis and the citric acid (or Krebs) cycle.

The main function of these two sets of reactions is to generate adenosine triphosphate (ATP), which provides energy for the cells.

Reduced PDH and α KGDH activity resulting from thiamine deficiency can lead to less ATP synthesis, which in turn can contribute to cell damage and even cell death.

In addition, PDH is needed to produce the neurotransmitter acetylcholine and to generate myelin, a compound that forms a sheath around the extensions (i.e., axons) of many neurons, thereby ensuring proper neuronal functioning.

The citric acid cycle and α KGDH play a role in maintaining the levels of the neurotransmitters glutamate, gamma aminobutyric acid (GABA), and aspartate, as well as in protein synthesis.



Above: A 26 year old Peggy Guggenheim; series of glamour poses, Man Ray, Paris 1924.

Below: A more mature Peggy c.1950, on the balcony of her Venetian Palazzo (now the Guggenheim Museum, Venice). All stills show Peggy's perennial love of earrings. To the right is the first pair of Surrealist earrings produced by Yves Tanguy; (Peggy Guggenheim Museum, Venice).

References

1. e-TG - July 2014.
 - Gastrointestinal Therapeutic Guidelines 5th ed 2011.
2. Thiamine in Australian Medicines Handbook, July 2013.

Dr J. Hayes

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