

"Tea tempers the spirit and harmonize the mind, Dispels lassitude and relieves fatigue, Awakens thought and prevent drowsiness, Lightens up or refreshes the body, And clears the perceptive faculties."

#### Confucius









Tea and human health is closely linked with each other and they are indissoluble. If you take a look at the Chinese character 'TEA', you will find out that is composed by the Chinese words of '20' & '88', meaning that if you take tea regularly you are bound to live on until the age of 108 years old. So 'TEA' represent 'longevity'.





### A MYTH: TEA A SWEET POISON:

Tea is more harmful than alcohol:

---- Dr O.D.Ned

 Drinking tea does not finish tiredness instead it increases it.

-----Dr Reeves. CambridgeUniversity.

 Tea has caused loss of appetite among thousands men and women

----- Mahatma Gandhi

Brain gets damaged by Tea & Coffee.

-----Maharsi Dayanand Saraswati.





#### **ORIGINS OF TEA & HEALTH**

**BUT** 

- Health benefits have been associated with tea from the beginning of time
- Modern day science is verifying what has always been known intuitively
- Range of health benefits an impressive
- Tea has always enjoyed a positive health perception

THUS

- Is not it just a bit ironic that a product that owes its very existence to health benefits, took the industry nearly 5000 years to rediscover!
- Better late than never





#### SOME OF PAPER CLIPPINGS

#### Tea improves memory

New Delhi: Drinking tea regularly could help improve memory, a new research by British scientists from the University of Newcastle upon Tyne suggests.

Newcastle upon Tyne suggests.

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which are associated with mean orx orx.

The findings, which are published in the journal, Phytocherapy Research, may lead to the development of a new treatment for Alzheimer's disease, a form of dementia which affects an esoftened wide. For the life of people worldwide. For the life of people worldwide worldwide

#### Tea clips cancer risk

London, Dec. 13: Women who drink two cups

London, Dec. 13: Women who drink two cups of tea per day are significantly less likely to get ovarian cancer than non tea-drinkers, according to research published on Monday.

Those who drank two or more cups of black or green tea were found to be almost 50 per cent less likely to get the disease, according to a report published in the American journal Archives of International Monday and a supersisting the property of the pro an cancer rates

A group of over 61,000 women from central Sweden, aged 40 to 76, were asked to record how often they consumed 67 food and drink items between 1987 and 1990.

The researchers examined ovarian cancer incidence in the group in December 2004 and

Just over two thirds, 68 per cent, reported drinking tea, mainly black tea.

Women who drank less than one cup of tea per day on average were 18 per cent less likely to get make a cancer than those who did not drinkes.

One cup per day reduced the risk by 24 per One cup per day reduced the risk by 24 per cent and drinkling two or more cups of tea per day was associated with a 46 per cent reduced risk of getting the disease.

The researchers found no link between coffee consumption and the risk of ovarian

cancer.
The research was carried out by Susanna Larsson and Prof. Alicja Wolk, from the National Institute of Environmental Medicine at the Karolinska Institute in Stockholm.

THE DAILY TELEGRAPH

Telegraph 5 Decos

#### Coffee, tea good for liver

washington, Dec. 4 (Reuters): Coffee and tea may reduce the risk of serious liver damage in people who drink too much alcohol, are overweight or have too much iron in the bloom of the risk of serious liver damage in people who drink too much alcohol, are overweight or have too much iron in the bloom of the risk of th

#### **Healing Power of TEA**

Hot or cold, green or black, this ancient beverage is steeped in health benefits

HAT WOULD the world do without tea?" the writer Sydney Smith asked over 150 years ago.
It's no idle question. Tea is the

world's most popular drink, after water. And it provides protection against several health threats.

Heart Helper In a Dutch study last year of 4807 people, those who drank at least two cups daily had half the heart attack risk of non-tea drinkers. Last year, researchers in Boston found that heart patients who drank two or more cups daily were 44% less likely to die over the next four years.

A recent US study showed that tea can lower bad choles-terol levels by an average of 10%. In cases where dangerous cholesterol has already stuck to artery walls, flavonoids, the antioxidants in tea, are thought to prevent it from damaging the inner

lining.

Cancer Fighter In Japan, a 1998 investigation found that drinking ten or more cups of green tea every day delayed the onset of cancer by almost nine years in women and about three in men. And a Canadian study from 1998 suggests another benefit for males: Men who drank three cups a day were 30% less likely to develop prostate

cancer.

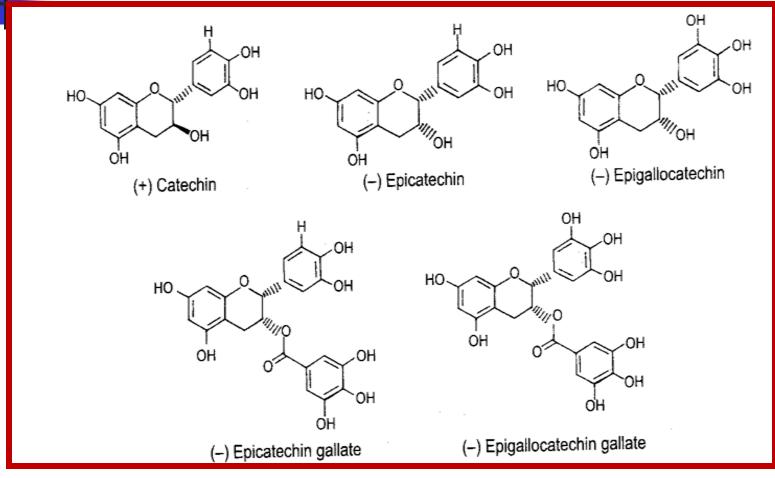
Bone Builder Flavonoids in tea seem to protect bones. Tea also contains fluoride and substances that stop bacteria from sticking to teeth, which together help fight cavities.

Green and black tea are probably equally protective, says Jeffrey Blumberg, a US nutrition re-



searcher. Even iced tea is beneficial, though it's usually more diluted. Since flavonoids break down over time, making your own tea is better than buying any kind of bottled or tetrapacked tea. (The health benefits of herbal teas are not well estab-lished.) "If you don't drink tea now, having just one cup a day is likely to keep you healthier," says Blumberg.
"Drinking four cups is probably even better. I love tea, so I say drink as much as you like."

# STRUCTURE OF THE CATECHIN MONOMERS

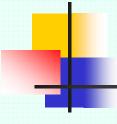






## **Theaflavin**



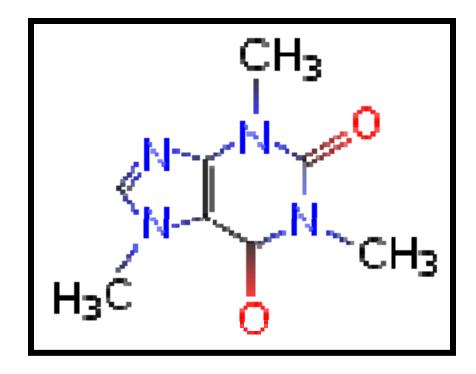


## Theaflavin 3' gallate

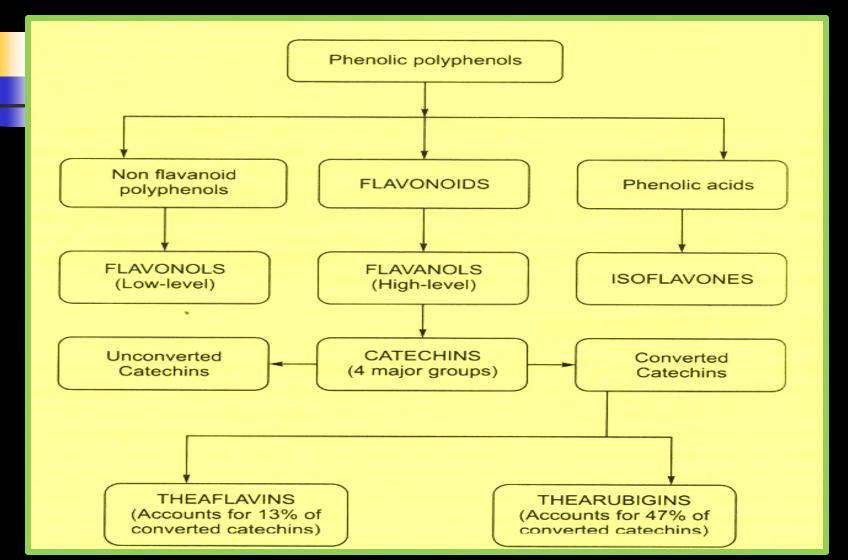




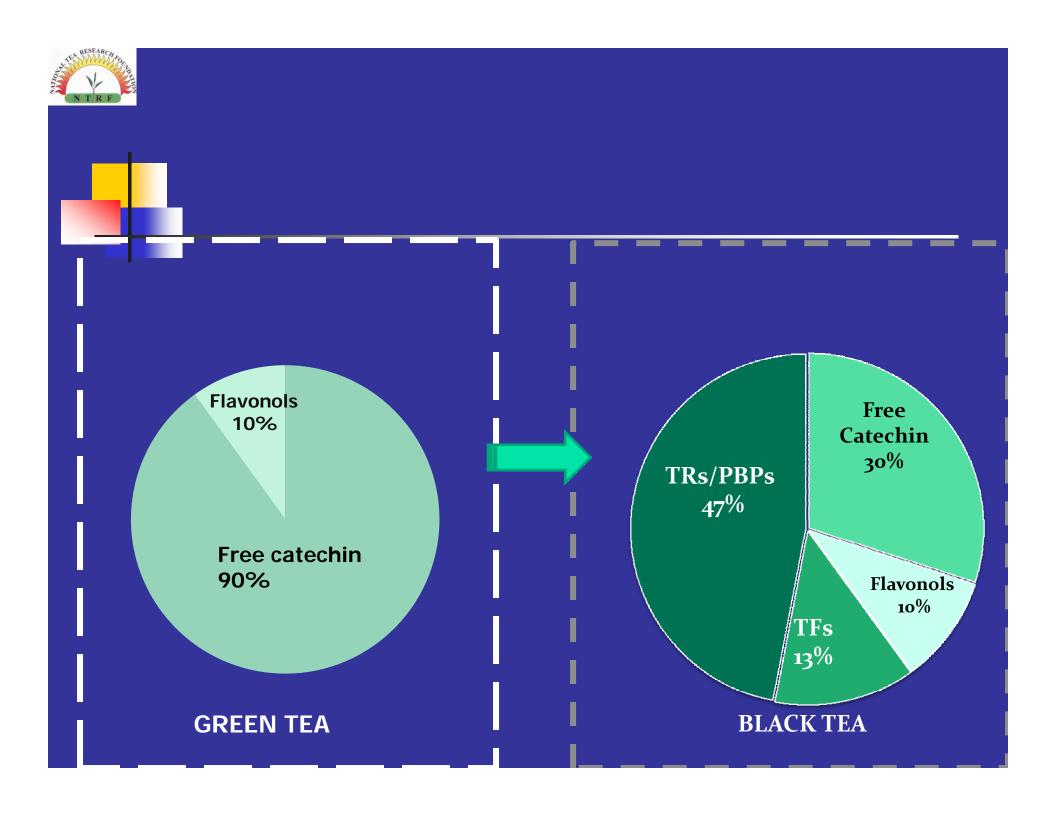
## Caffeine



• Systematic (<u>IUPAC</u>) name1,3,7-trimethyl-1*H*-purine-2,6(3*H*,7*H*)-dione 3,7-dihydro-1,3,7-trimethyl-1H-purine-2,6-dione





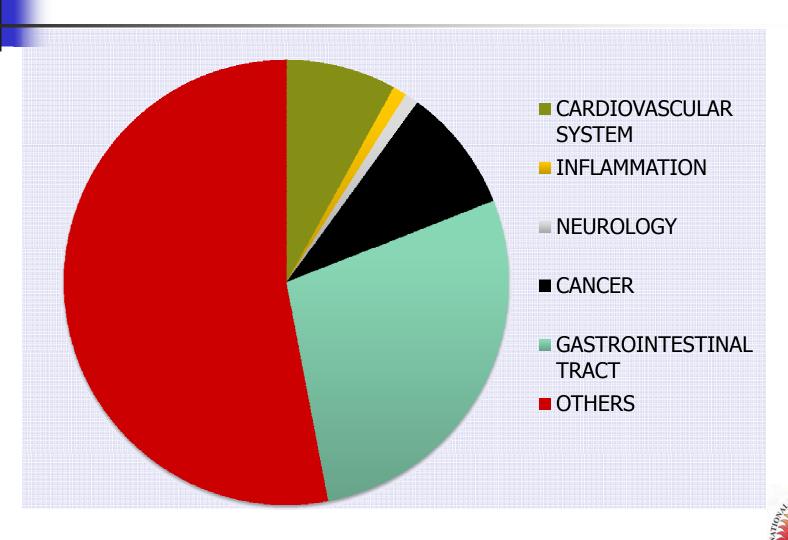




# TEA & HEALTH

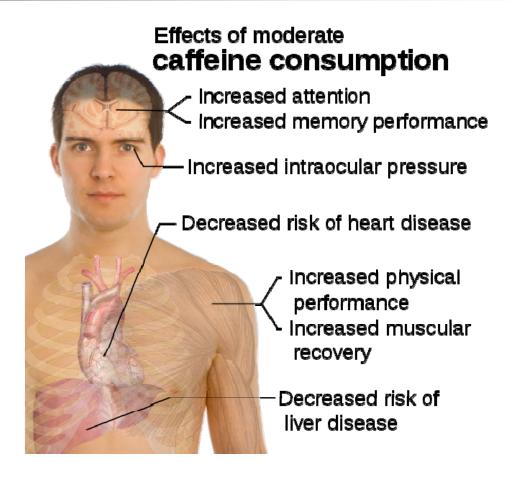


## PHARMACOLOGICAL AVENUES EXPLORED FOR ACTIVITIES OF BLACK TEA EXTRACT SINCE 1966





#### **Health & Caffeine**



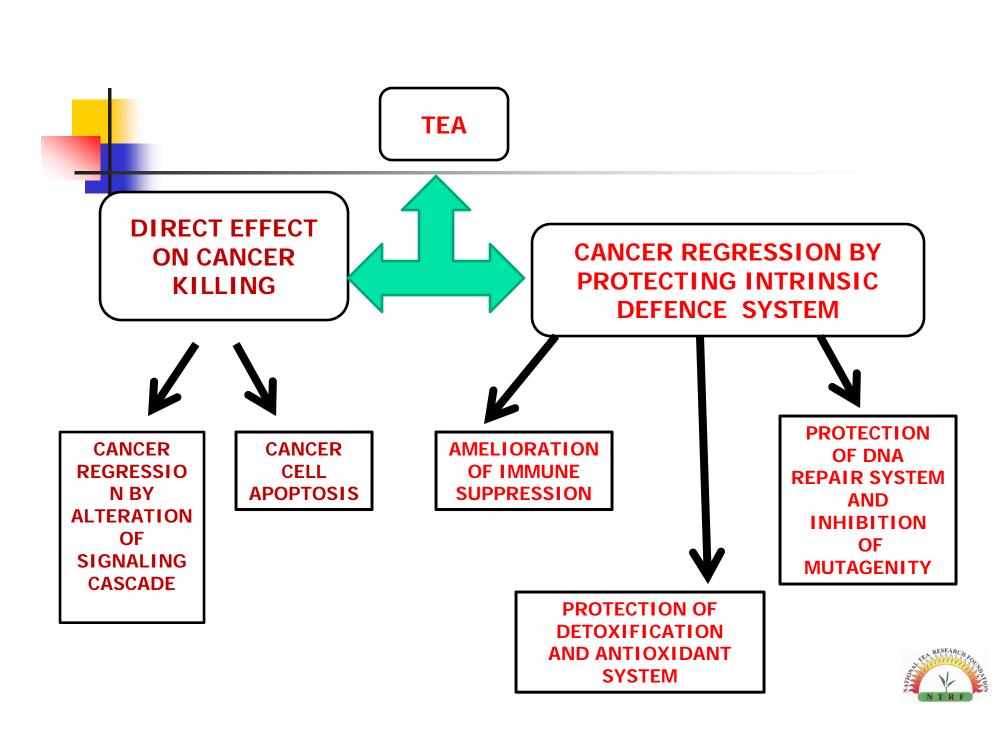




#### **TEA & CANCER**

Identification of effective chemo preventive diets for human use is of much interest today. Tea is one of the known food substance having high polyphenolic constituents. Tea as cancer chemo preventive agent results in cell cycle arrest, thereby reducing the growth and proliferation of cancerous cells through apoptosis.







#### List of Theaflavins with health benefits

- Theaflavin-3'-monogallate (TFMG, TF-2)
   causes <u>apoptosis</u> in <u>colon cancer</u> cells.
- Theaflavin-3,3'-digallate (TFDG, TF3) binds to gp41 of HIV as well as inhibit 3CLPro of severe acute respiratory syndrome (SARS).
- 3-Isotheaflavin-3-gallate (TF2B) inhibits
   3CLPro of SARS.





# Monoamine oxidase inhibitor, Alzheimer Disease

(+)-Catechin and (-)-epicatechin are also selective monoamine oxidase inhibitors
 (MAOIs) of type MAO-B. They could be used as part of the treatment of Parkinson's and Alzheimer's patients





# Protection of the mouse brain after a stroke

Ninety minutes after feeding mice a single modest dose of epicatechin, the scientists induced an ischemic stroke by, in essence, cutting off blood supply to the animals' brains. They found that the animals that had preventively ingested the epicatechin suffered significantly less brain damage than the ones that had not been given the compound. While most treatments against stroke in humans have to be given within a two- to three-hour time window to be effective, epicatechin appeared to limit further neuronal damage when given to mice 3.5 hours after a stroke. Given six hours after a stroke, however, the compound offered no protection to brain cells.



### Blood brain barrier

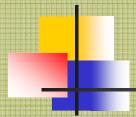
Theaflavins and <u>Thearubigins</u> compounds found in black teas penetrate the <u>blood brain</u> <u>barrier</u>, and have been shown to be effective against dementia in aging as well as <u>AIDS</u> <u>related dementia</u> plaques *in vitro*.





### **HIV** and dementia

Several tea polyphenols, especially those with galloyl moiety, can inhibit HIV-1 replication with multiple mechanisms of action. Theaflavin derivatives have been found to have more potent anti-HIV-1 activity than catechin derivatives in laboratory investigations.



 Some of Salient Findings from National Tea Research
 Foundation (NTRF) Projects on Tea and Health





The findings from Indian Institute of Chemical Biology & Chittaranjan National Cancer Institute Kolkata, Indian Institute of Toxicological Research, Lucknow, & Tata Memorial Centre, Mumbai on tea polyphenols and their polymerized compounds like TF(3-6%) and TR(12-18%) acts on similar fashion to inhibit significantly tumor genesis in mouse skin tumor, oral mucosal cancer and others.



# Immunomodulatory Activity

 Black Tea Extract possess a significant immunomodulatory effect that in turn may be beneficial in several pathophysiological conditions.



## Diabetis & Tea

 Tea improved hyperglycemia and glucose intolerance through stimulating glucose uptake activity accompanied by translocation of glucose transporter(GLUT)4 & insulin resistance.



# **TEA ON PREGNANCY-A Clinical Study**

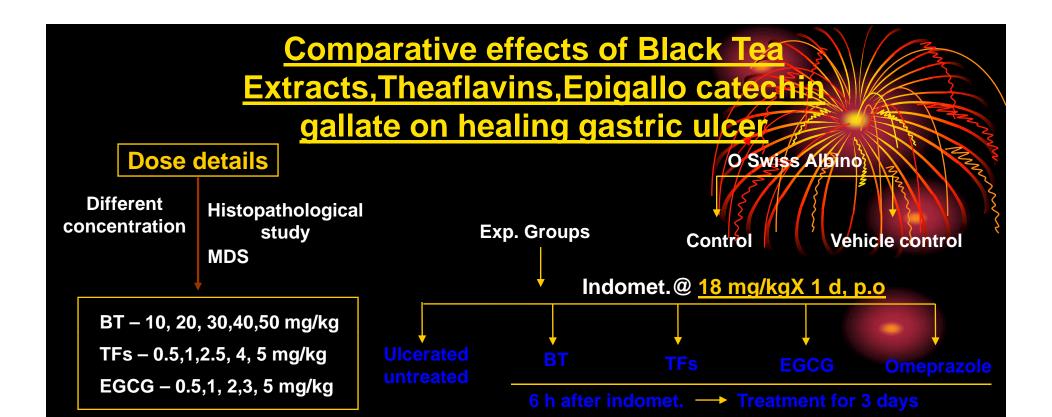
It is interesting that mint when mixed with black tea if drink during pregnancy; it reduces neonatal deaths associated with preeclampsia.

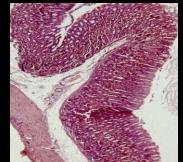


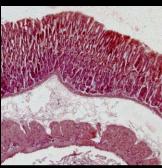


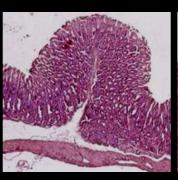
### **TEA & GASTRIC ULCER**

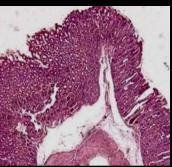
A study conducted at the Inst of Post graduate Medical Education & Research using black on NSAIDs-induced Gastric Ulcer in mice model indicated faster healing effect against acute ulceration caused by NSAID( indomethacin). Test results were marginally better than omeprazole to have healing within three days compared to seven days in case of auto healing. Bioavailability of TF and EGCG were also studied.











BT @ 40 mg/kg bw TFs @ 1 mg/kg bw EGCG @ 2 mg/kg bw Omez @ 3 mg/kg bw

Time point: 3<sup>rd</sup> day





# Does milk blunt the benefits of black tea?

A biochemical and physiological study (both sexes, 40 to 80 years) at the SN Pradhan Institute, Kolkata, reported caseins in milk decreases the efficiency of tea catechins (with 10% addition of milk), the major health benefit compounds in tea, i.e. addition of milk reduces the bioavailability of flavonoids in tea.

However, University of Shizuoka, Japan recently reported that interaction of catechins with milk proteins contributes to stability of catechins against oxidation.



#### EFFECT ON ENDOCRINE

It is commonly believed that tea drinking, both black and green tea, affects the endocrine system (thyroid-gonadal), but studies at the Calcutta university on animal modal reveals that GT and BT has no adverse effect on the alteration of physiology of thyroid and testis in experimental animals at normal dose, upto 10 cups per day(20g).



#### **TEA & HEAVY METALS**



 Protective effect of tea on arsenic induced damage on chromosomes (VIMS, Kolkata).





## STROKE -A Clinical Study

A preliminary report from VIMS, Kolkata, on a clinical trial of tea on suggested that ≥3 cups/day reduces the risk of occurrence of STROKE volume & mortality from stroke.





### Black tea on Hypertension

 S.N.Pradhan Center of neurosciences, Kolkata, suggested on their clinical trial a beneficial effect of Black tea on Hypertensive patients.





#### **TEA & CIGARETTE SMOKING**

Dr B C Guha Center for Genetic Engineering & Technology, Calcutta University worked on effect of Tea on Cigarette smoking.

There are about 1.25 x 10 <sup>9</sup> smokers in the world. About 15% of them are afflicted with lung disease, particularly emphysema. However, until now there is no effective treatment of emphysema. Concentrated black tea extract or tea polyphenols may be used for the prevention of emphysema in smokers.



### Toxicity study of the test samples



Test compounds@ 100 mg/kg X 1 day, p.o, sacrificed after 1 month

# Serum concentration of liver & kidney enzymes

Parameters	Normal mice	BT-treated mice	TF-treated mice	EGCG-treated mice
SGOT (IU L-1)	173.18 <u>+</u> 12.5	175.27 ± 9.12	167.51 ± 10.7	177.16±14.8
SGPT (IU L-1)	68.67 <u>+</u> 7.88	$72.39 \pm 8.65$	$73.32 \pm 8.5$	66.87±9.92
Urea (mg dL <sup>-1</sup> )	31.25 ± 2.17	$33.18 \pm 2.43$	$34.20 \pm 4.35$	33.79±3.19
Creatinine (mg dL <sup>-1</sup> )	0.41 <u>+</u> 0.08	$0.36 \pm 0.1$	$0.38 \pm 0.11$	0.38±0.06

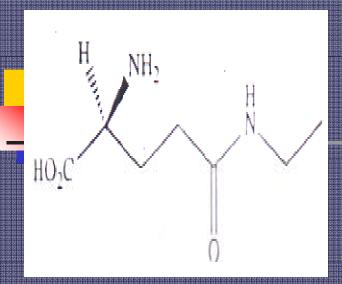
All the test samples are <u>non-toxic</u>







# Future Direction of Research on Health Benefits of Black Tea



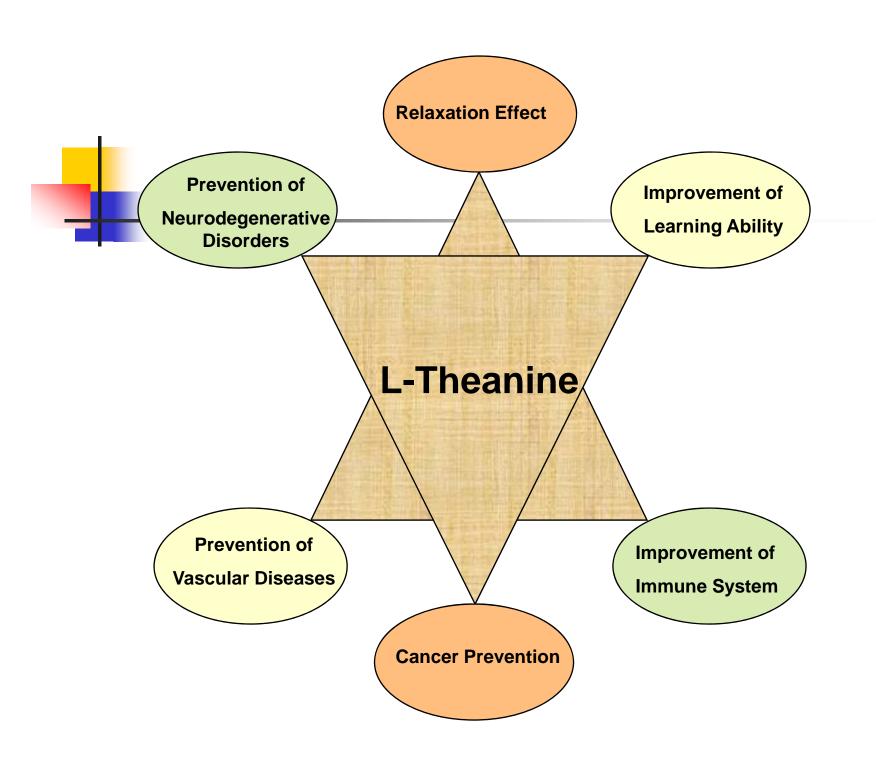
■Molecular Formula Weight: C7H14N2O3

**-**Color: Color less

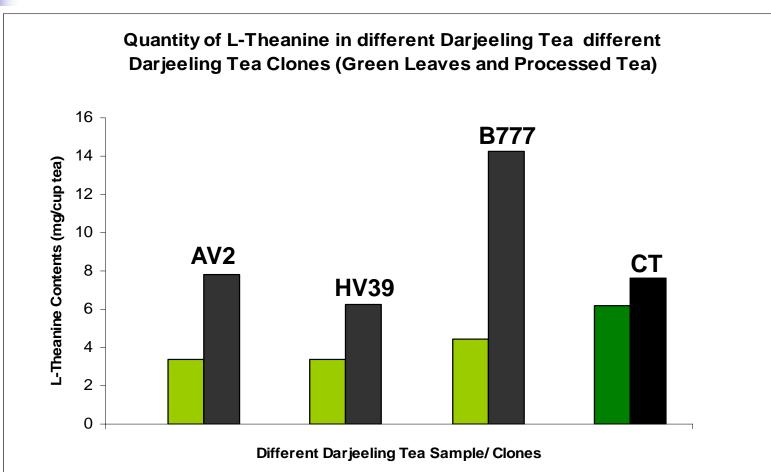
■Molecular Weight: 174.2g/mol

#### L-THEANINE

Theanine is biosynthesized from glutamic acid and ethylamine via enzyme theanine synthetase. It synthesized in the roots of the tea plant from where it is transferred, via the phloem, through the stem to the growing shoots where it subsequently accumulates in the developing leaves.



# **Estimation of L-Theanine from 4 Darjeeling Tea using spectrofluorometric method**







## **Quality & Components**

AV2: Highest flavor components

i.e., ethyl salicylate, geraneol, etc.

L- theanine (+)

HV39: Highest total phenolics

L- theanine (+)

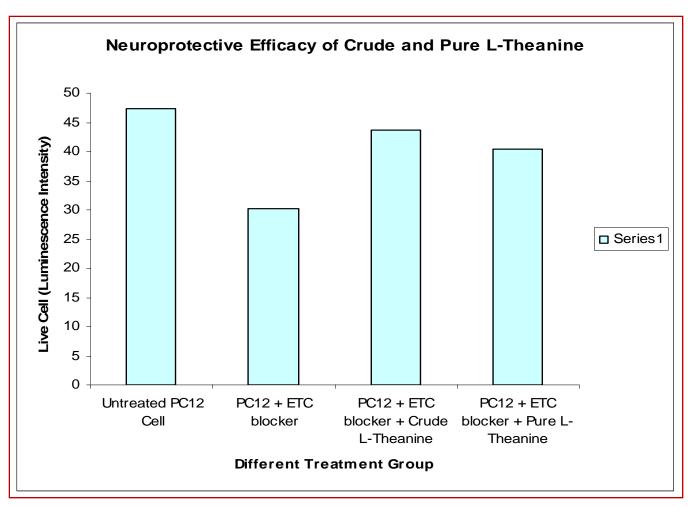
**B777: Highest Theaflavin** 

L- theanine (+++)

As per the planters' view B777 is one better quality tea among these three





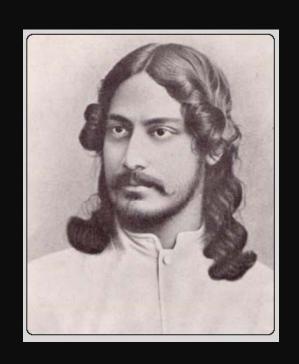








Come oh come,
Ye tea thirsty
Restless ones.
The kettle boils
Bubbles and sings
Musically



Rabindra Tagore