

# Role of Low Calorie Sweetener in Satisfying Sweet Taste: *Global Perspective*

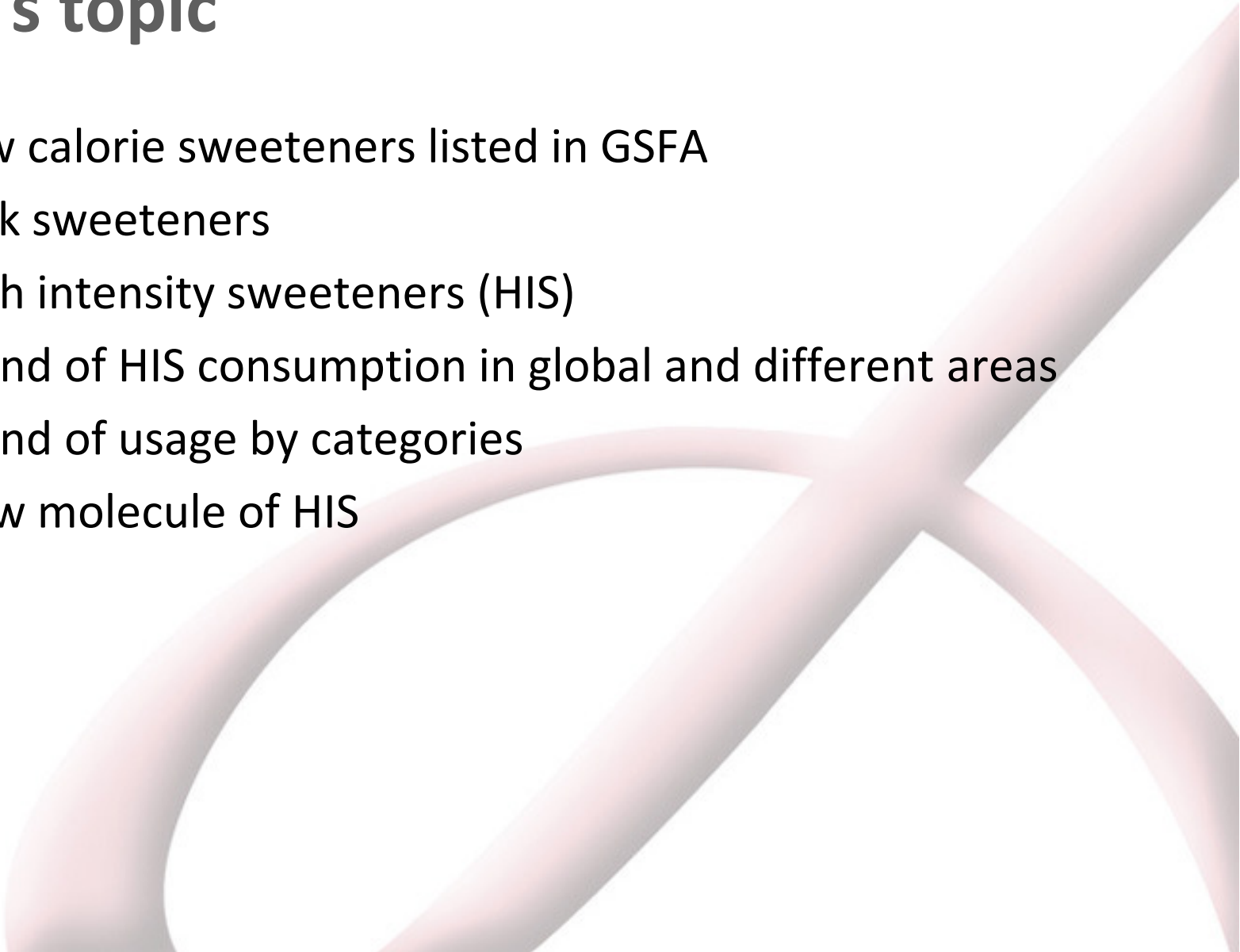
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Conference on Sweetness: Role of Sugar & Low Calorie Sweeteners

20<sup>th</sup> September 2017, New Delhi

# Today's topic

1. Low calorie sweeteners listed in GSFA
  2. Bulk sweeteners
  3. High intensity sweeteners (HIS)
  4. Trend of HIS consumption in global and different areas
  5. Trend of usage by categories
  6. New molecule of HIS
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# 1. Low calorie sweeteners listed in GSFA

INS	Name	Sweetness*	Calories (kcal/g)
420	Sorbitol	0.6	2.6
421	Mannitol	0.6 – 0.7	1.6
950	Acesulfame K	130 – 200	0
951	Aspartame	200	4
952	Cyclamate	30 – 50	0
953	Isomalt	0.45	2
954	Saccharin	300 – 500	0
955	Sucralose	600	0
956	Alitame	2000	1.4
957	Thaumatococin	2000 – 3000	4
960	Steviol glycosides	200 – 300	0
961	Neotame	8000	0
964	Polyglycitol syrup	0.4 – 0.9	3
965	Maltitol	0.8	2.1
967	Xylitol	1	2.4
966	Lactitol	0.3 – 0.4	2
968	Erythritol	0.75	0

\* Comparative value when sweetness of sucrose is 1.

Source: Food and Sweeteners (Korin Book, 2008); Sweeteners facts (Calorie Control Council);  
Alternative sweeteners (Lyn O'Brien Nabors, 2001)

## 2. Bulk Sweeteners

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\* Comparative value when sweetness of sucrose is 1.

- Sweetness: generally lower than sucrose (60 – 70 %)
- Calories: 40 – 75% of sucrose
- Have physical properties that contribute to the structural and sensory characteristics of food

## 2. Bulk Sweeteners

- Food categories for which bulk sweeteners are most commonly used are Bakery, Snacks, Deserts & Ice cream, sugar & gum confectionery and Chocolate confectionery.
- Considering percentage of food and drink containing bulk sweetener launched from 2011 to 2016, sorbitol is most commonly used bulk sweeteners. Followed by Maltitol and Xylitol.

### 3. High intensity sweeteners (HIS)

INS	Name	Sweetness*	Calories (kcal/g)
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951	Aspartame	200	4
952	Cyclamate	30 – 50	0
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960	Steviol glycosides	200 – 300	0
961	Neotame	8000	0

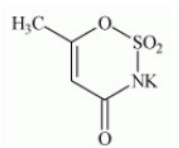
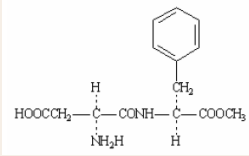
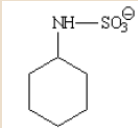
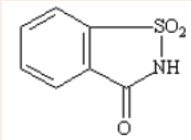
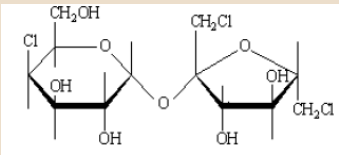
\* Comparative value when sweetness of sucrose is 1.

- Sweetness: many times sweeter than sucrose (30 to 8000)
- Calories: practically no calorie
- Have properties that contribute to sensory characteristics of food

Source: Food and Sweeteners (Korin Book, 2008); Sweeteners facts (Calorie Control Council); Alternative sweeteners (Lyn O'Brien Nabors, 2001)

# 3. High intensity sweeteners (HIS)

## <Commonly used high intensity sweeteners>

		Sweetness*	Acceptable Daily Intake by JECFA	Approval status
Acesulfame K		130 – 200	15 mg/kg b.w. (1990)	Approved in more than 100 countries
Aspartame		200	40 mg/kg b.w. (1981)	Approved in more than 100 countries
Cyclamate		30 – 50	11 mg/kg b.w. (1982)	Approved in more than 50 countries
Saccharin		300 – 500	5 mg/kg b.w. (1993)	Approved in more than 90 countries
Sucralose		600	15 mg/kg b.w. (1990)	Approved in more than 80 countries

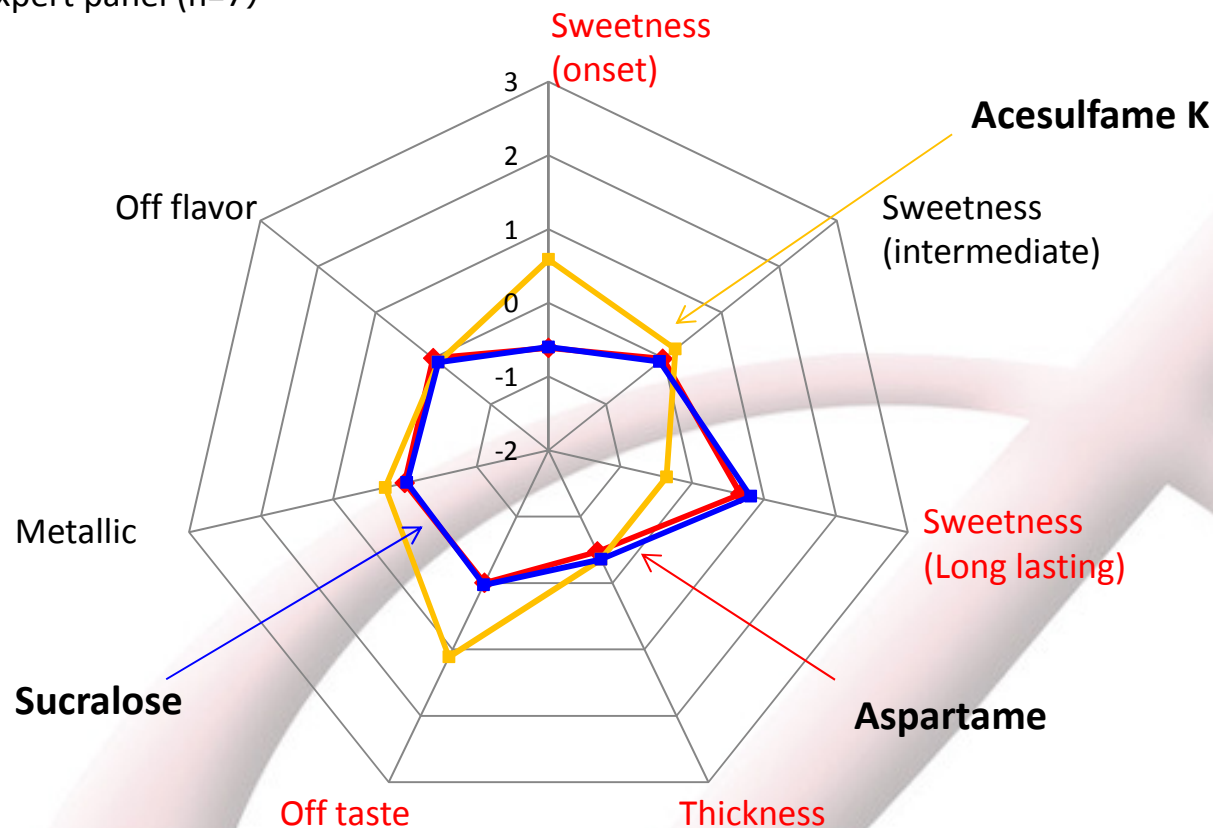
\* Comparative value when sweetness of sucrose is 1.

Source: Food and Sweeteners (Korin Book, 2008); Fact Sheet (International Sweeteners Association)

# 3. High intensity sweeteners (HIS)

## <Taste profile of Acesulfame K, Aspartame and Sucralose>

- Test solution : Sweeteners solution with the same sweetness as 8% sucrose solution
- Control : 8% sucrose solution
- Rating : 3 ; very strong 2 ; strong 1 ; slightly strong 0 ; same as control -1 ; slightly weak -2 ; weak -3 ; very weak
- method : Pair comparison
- Panel : Internal expert panel (n=7)



High intensity sweeteners have a different profile of taste from sucrose.



# 4. Trend of HIS consumption in global and different areas

<The Global Sweetener Market to 2018>

- HIS market is estimated to grow up to 2018.
- Saccharin is the most commonly used HIS in terms of consumption level with sugar equivalent.

## 4. Trend of HIS consumption in global and different areas

<The Global Sweetener Market to 2018 (by areas)>

- When the trend is checked by areas, only Asia-Pacific is the area HIS market is growing.
- HIS market of United States, EU and South America is flat.

## 4. Trend of HIS consumption in global and different areas

<The Global Sweetener Market in 2018 (Share of HIS)>

- Saccharin is most commonly used HIS as sugar equivalent in global. Similar trend of the share is confirmed in Asia-pacific, EU and SA.
- In the United States, sucralose is most used HIS as sugar equivalent.

## 5. Trend of usage by categories

### <The Global Sweetener Market to 2018 (by food category)>

- When looking the trend of usage by food category, beverage is major category for HIS.
- Usage in food is the most growing category.
- The same as global, beverage is major category in Asia-Pacific, United States, EU and South America.
- However, in Asia-Pacific, food category is comparable to beverage.

## 5. Trend of usage by categories

<Share of HIS by categories in 2018 (Global)>

- Aspartame is most used HIS in beverage.
- Sucralose is major for food.
- In global, saccharin is still most used HIS for table top. However, major category for saccharin is pharmaceutical. 50% of saccharin is used for pharmaceutical.

## 5. Trend of usage by categories

### <Trend of HIS usage by categories (Global) >

Area	Trend
Global	<ul style="list-style-type: none"><li>- Usage of sucralose in beverage and food is growing.</li><li>- Beverage is major category for acesulfame K, aspartame and sucralose.</li></ul>
Asia- Pacific	<ul style="list-style-type: none"><li>- Usage of acesulfame K, aspartame and sucralose is growing.</li><li>- Usage of HIS in food is comparable to beverage.</li></ul>
United States	<ul style="list-style-type: none"><li>- Usage of sucralose is growing.</li><li>- Major HIS for beverage is aspartame and sucralose.</li><li>- Sucralose is also used for food and table top categories.</li></ul>
EU	<ul style="list-style-type: none"><li>- Usage of sucralose is growing.</li><li>- Usage of aspartame and sucralose in all categories is almost comparable.</li></ul>
South America	<ul style="list-style-type: none"><li>- Usage of sucralose is growing.</li><li>- Major HIS for beverage is aspartame and sucralose.</li><li>- Sucralose is also used for food and table top categories.</li></ul>

## 5. Trend of usage by categories

### <HIS usage in India (2018)>

- HIS usage in India (2018) is 8% of Asia-Pacific.
- 70% of HIS is used for pharmaceutical. Usage for beverage, food and table top is small.

## Trend of HIS consumption summary

- HIS market is estimated to grow up to 2018 due to growing in Asia-Pacific area.
- Saccharin is the most dominant in terms of consumption level with sugar equivalent, but main category is for pharmaceutical use.
- Usage of sucralose is growing in all area. Aspartame and acesulfame K are also growing in Asia-Pacific.
- Beverage is common category for HIS in all area.
- Usage of HIS in food category is growing in Asia-Pacific and almost comparable to Beverage use.



## 6. New molecule of HIS

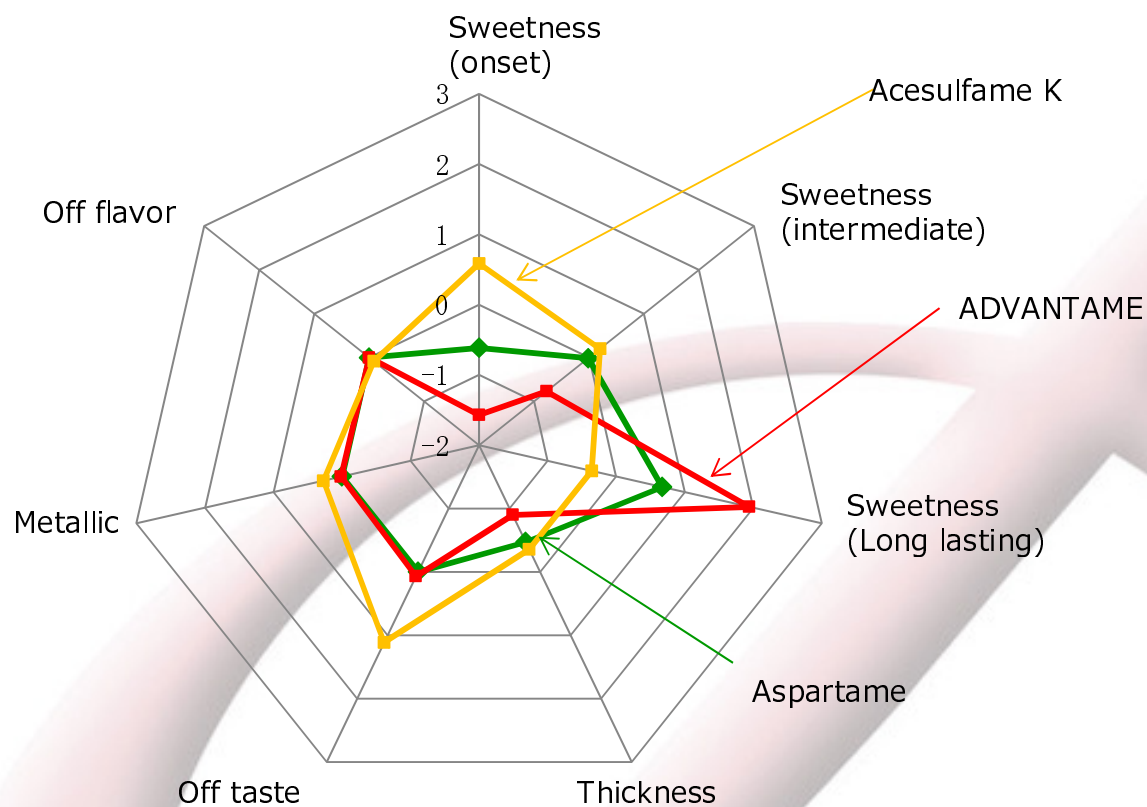
	Sweetness*	Acceptable Daily Intake by JECFA	Approval status
<p>Neotame (INS:961)</p> <p>The chemical structure of Neotame (INS:961) is shown. It features a central amide bond connecting a 2,2,4,4-tetramethylbutylamine group to a 2-phenylpropanoate group. The amide nitrogen is also bonded to a 2-hydroxypropanoate group. The structure is drawn with stereochemistry: the amide hydrogen is on a wedge, the hydroxyl group is on a dash, and the phenyl group is on a wedge.</p>	8000	2 mg/kg b.w. (2003)	Approved in more than 60 countries
<p>Advantame (INS:969)</p> <p>The chemical structure of Advantame (INS:969) is shown. It consists of a 2-phenylpropanoate group linked via an amide bond to a 2-(4-hydroxy-3-methoxyphenyl)propanoate group. The amide nitrogen is also bonded to a 2-hydroxypropanoate group. The structure is drawn with stereochemistry: the amide hydrogen is on a wedge, the hydroxyl group is on a dash, and the phenyl group is on a wedge. A water molecule (H<sub>2</sub>O) is indicated as a byproduct.</p>	30000	5 mg/kg b.w. (2013)	Approved in more than 10 countries

\* Comparative value when sweetness of sucrose is 1.

# 6. New molecule of HIS

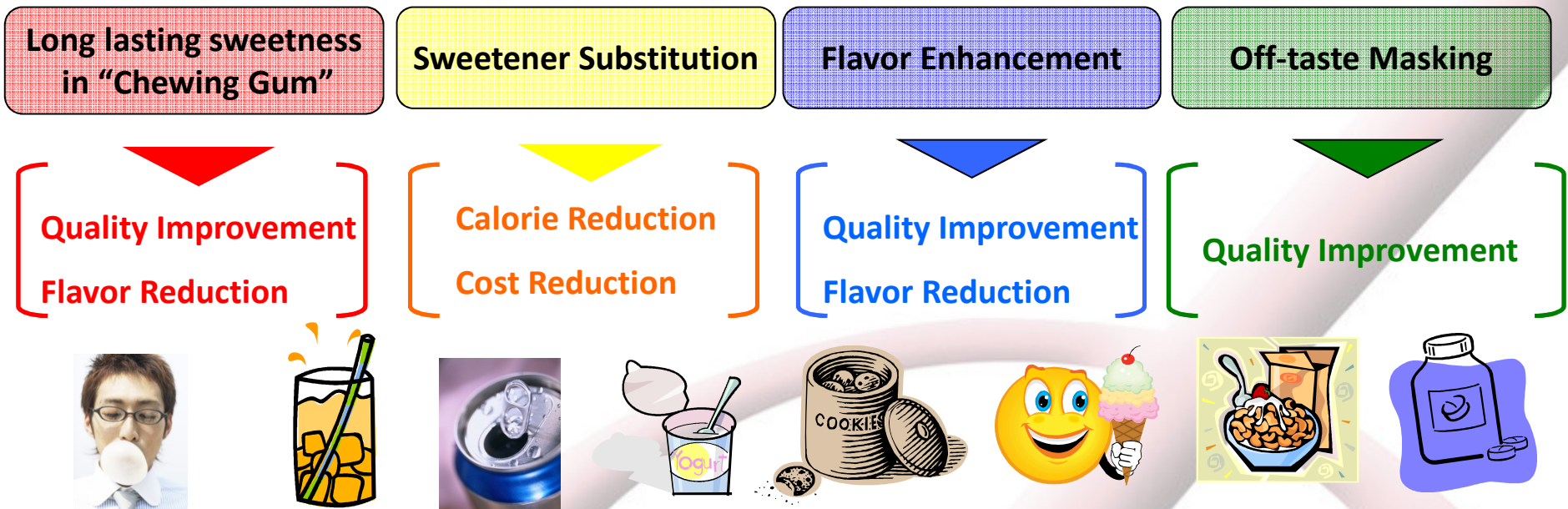
## <Taste profile of Acesulfame K, Aspartame and Advantame>

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# 6. New molecule of HIS

Unique functionalities which provide various effects to food products.



# 6. New molecule of HIS

<Possibility of expansion of food category>



**Thank you**

