

Câmara dos Deputados
Comissão de Seguridade Social e Família - CSSF

***Cerumenograma:
uma nova fronteira no
diagnóstico clínico do câncer***

Prof. Dr. Nelson Roberto Antoniosi Filho
Instituto de Química
Universidade Federal de Goiás

Viver mais e melhor!



Galileia: 33 d.C.

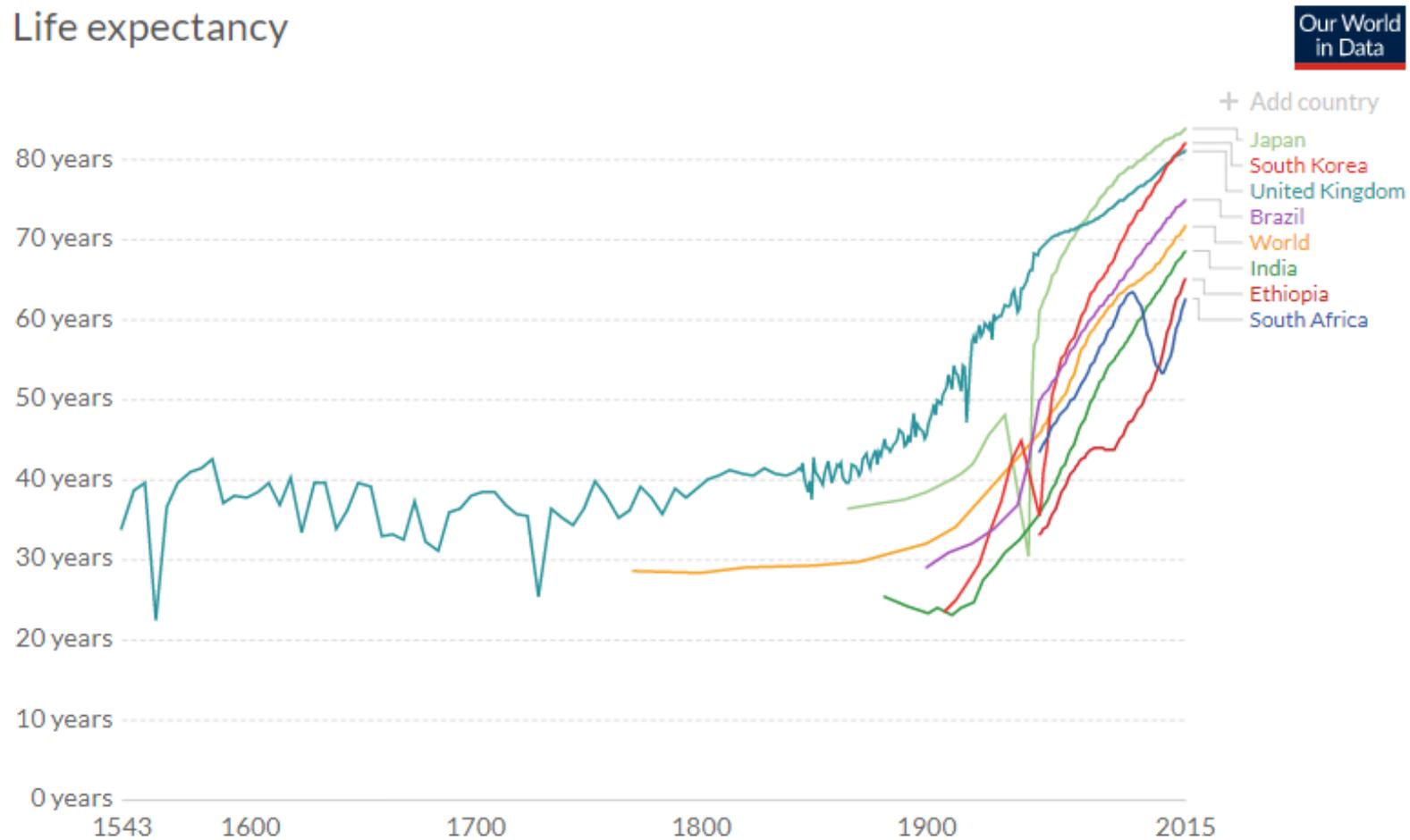


China: 33 d.C. – ano 2730



Expectativa de vida humana ao longo da História

Life expectancy



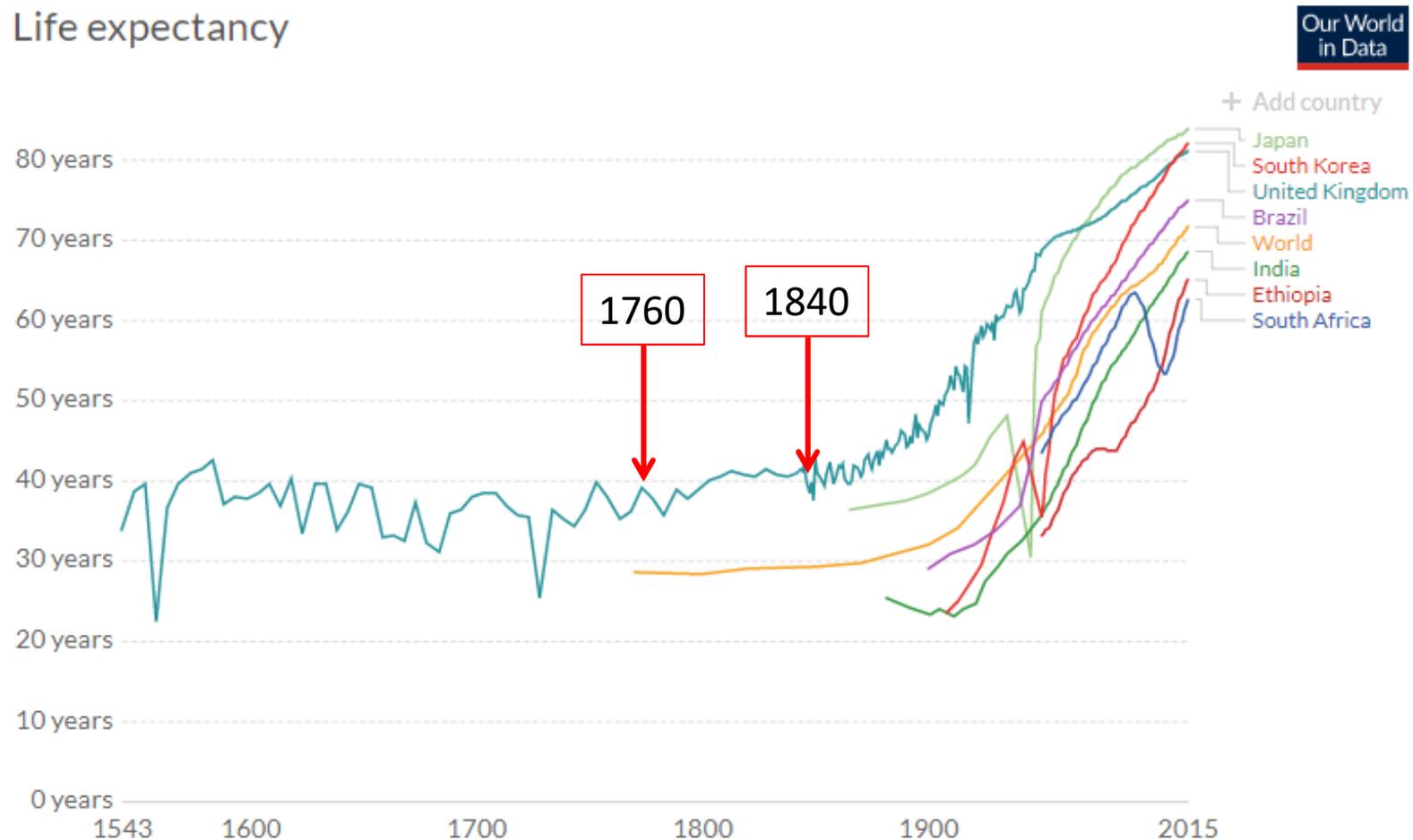
Source: Riley (2005), Clío Infra (2015), and UN Population Division (2019)

Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

CC BY

Expectativa de vida humana ao longo da História

Life expectancy



Source: Riley (2005), Clío Infra (2015), and UN Population Division (2019)

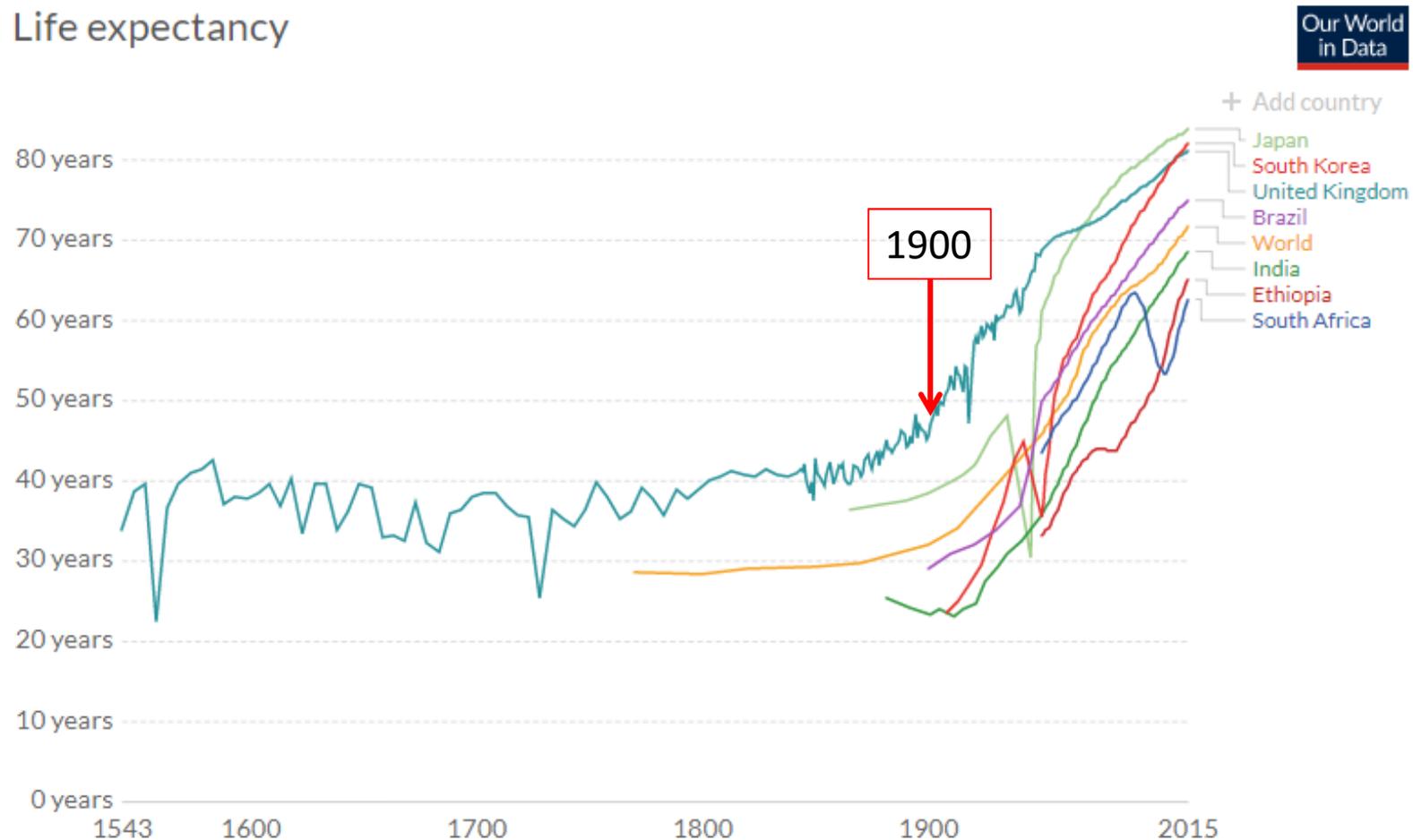
Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

CC BY

1760–1820/1840: Revolução Industrial: Marco de desenvolvimento C&T, com melhoria da qualidade de vida e adoção de práticas de higiene.

Expectativa de vida humana ao longo da História

Life expectancy



Source: Riley (2005), Clío Infra (2015), and UN Population Division (2019)

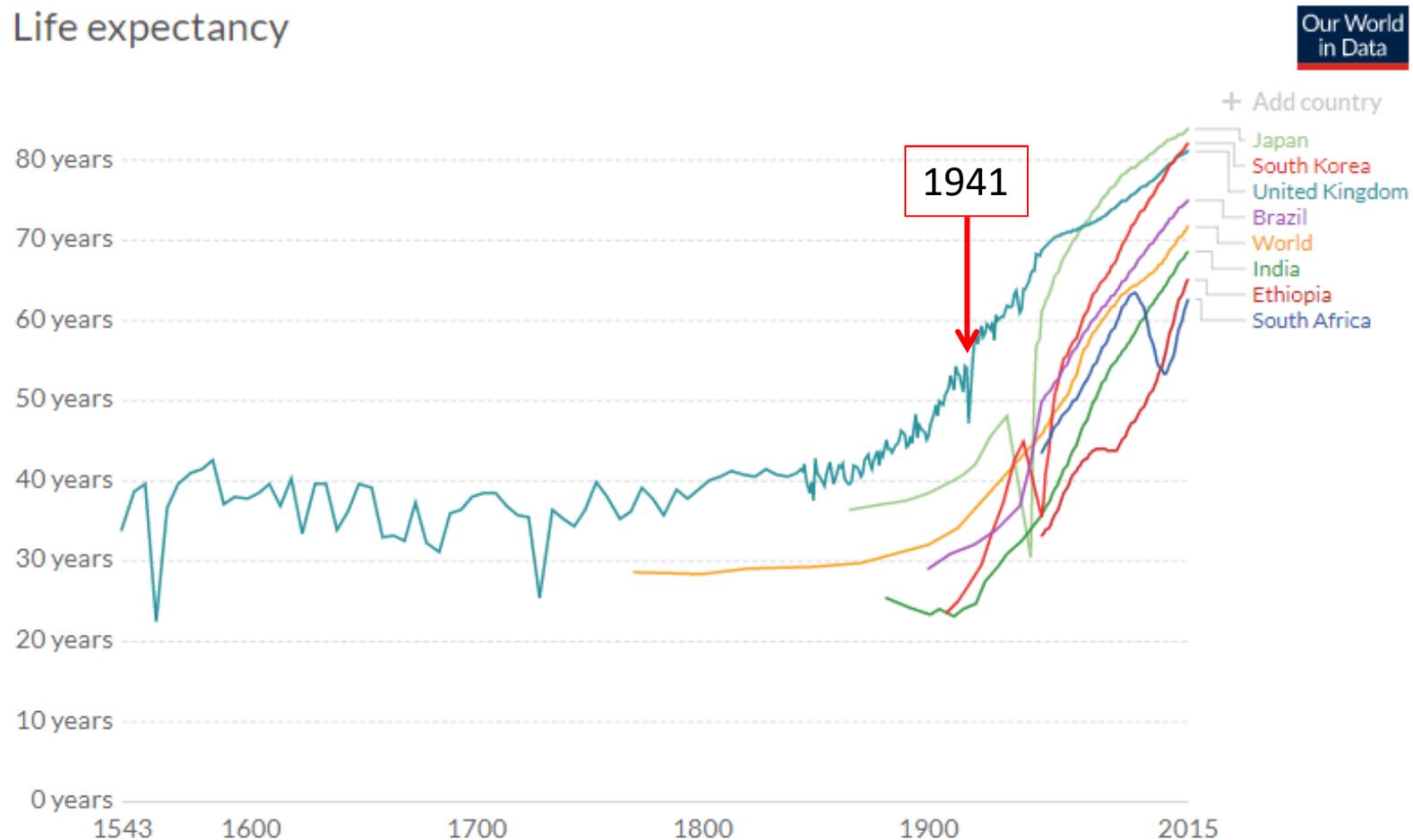
Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

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1900: Início dos campanhas de vacinação em grande escala

Expectativa de vida humana ao longo da História

Life expectancy



Source: Riley (2005), Clío Infra (2015), and UN Population Division (2019)

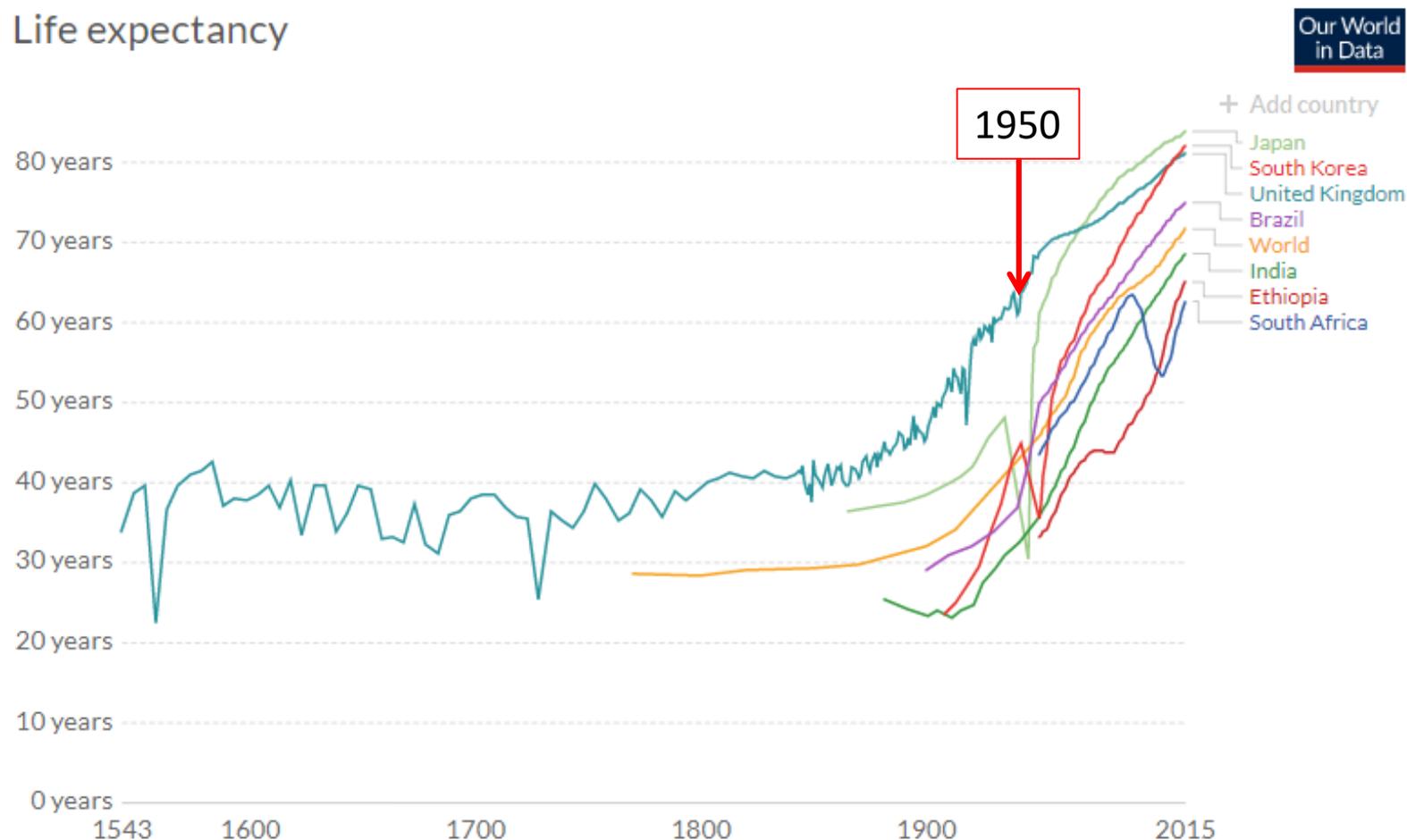
Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

CC BY

1941: Descoberta em 1928, a penicilina começa a ser produzida em grande escala

Expectativa de vida humana ao longo da História

Life expectancy



Source: Riley (2005), Clío Infra (2015), and UN Population Division (2019)

Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

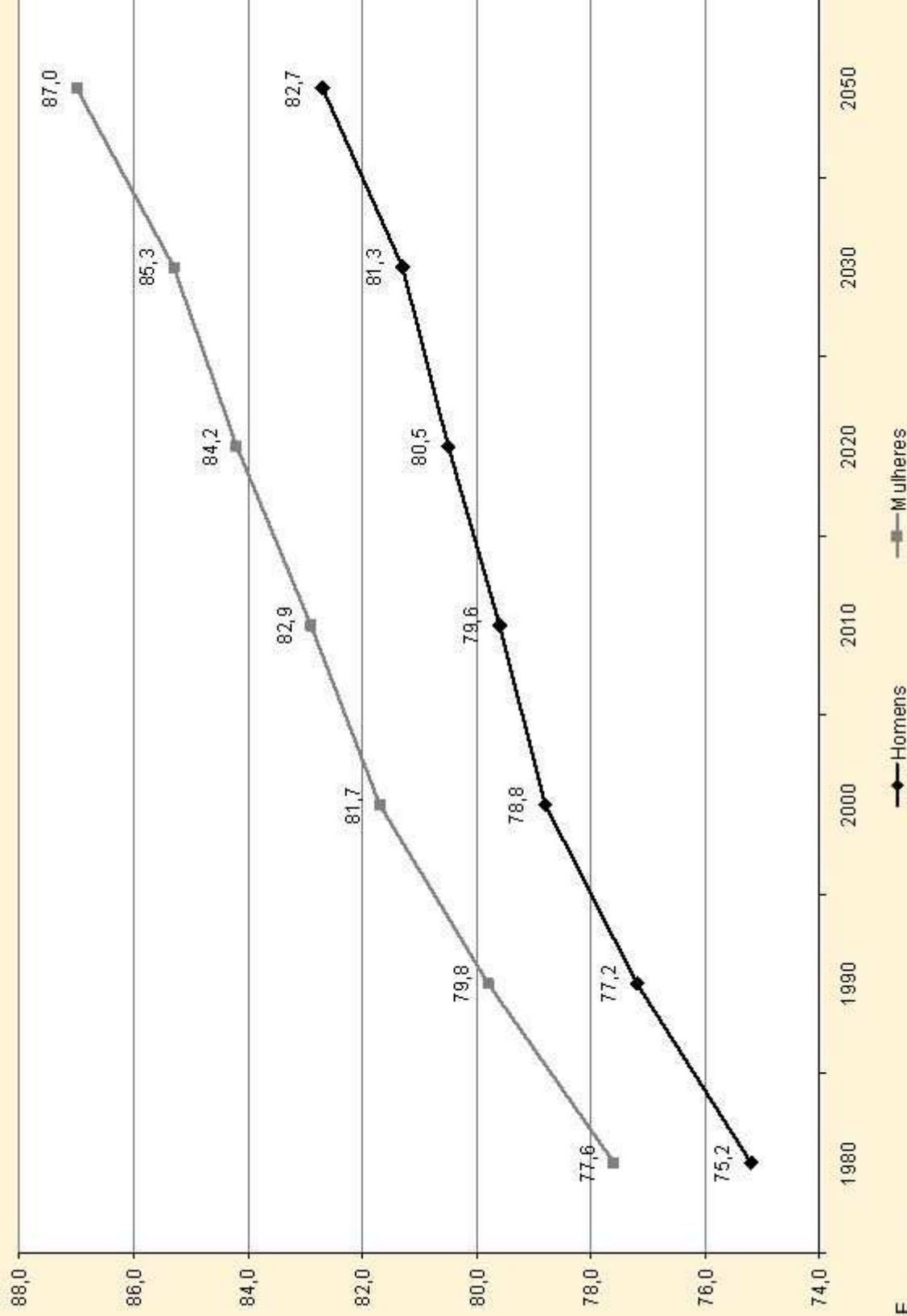
CC BY

1950 - Hoje: Campanhas de pré-natal, aleitamento materno, acesso a alimentos, investimentos em higiene e educação, cirurgias + seguras, transplantes, e diagnósticos clínicos



Aumento da expectativa de vida

Evolução da Expectativa de Vida no Brasil (1980-2050)



Fonte: IBGE.
Elaboração: SPS/IMPS.

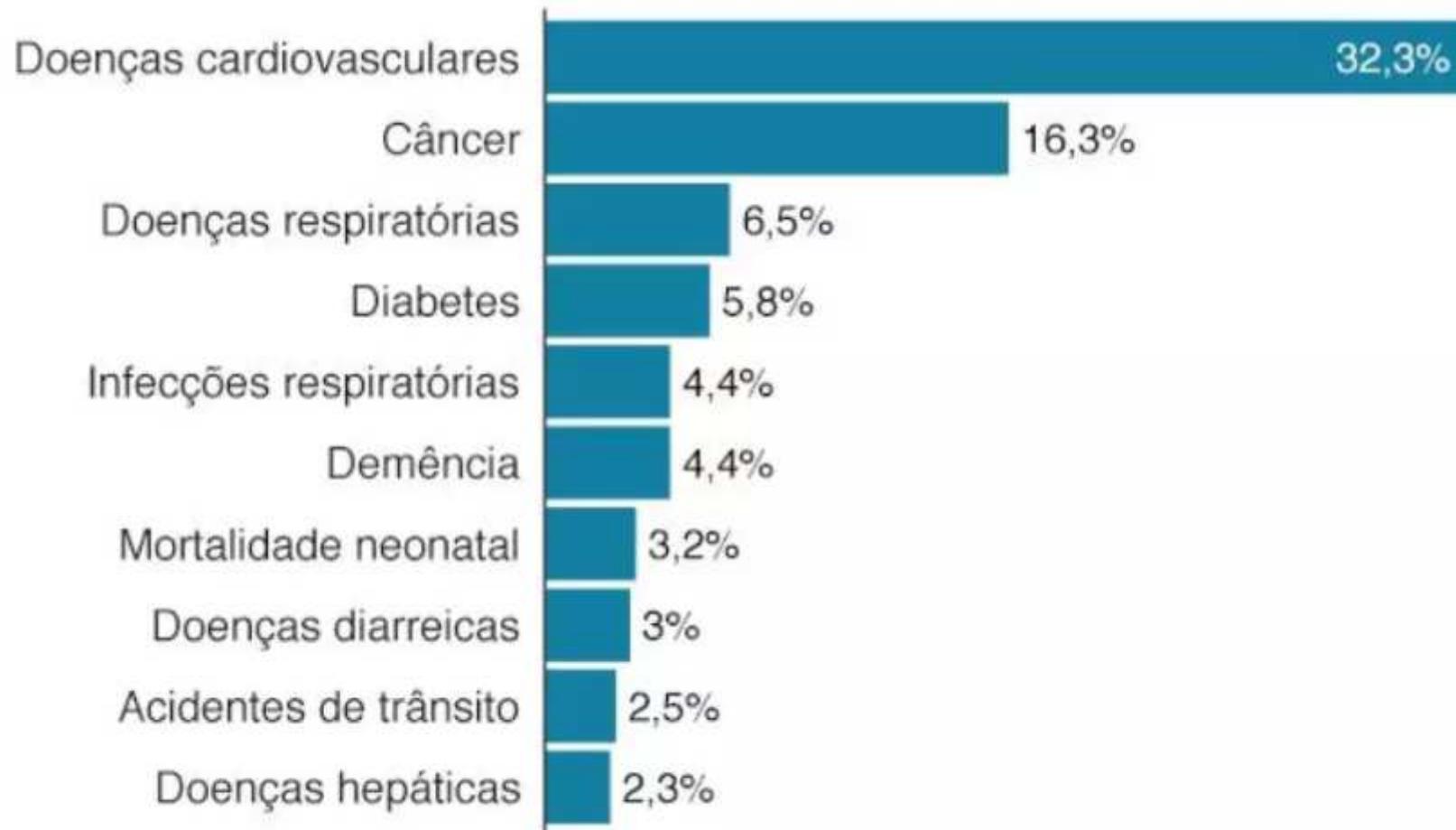
As doenças que mais mataram em 2016

Top 10 – 2016

1. Coração
2. Acidente Vascular Cerebral
3. Alzheimer
4. Câncer de Pulmão, Brônquio e Traqueia
5. Doenças Pulmonares Obstrutivas Crônicas
6. Infecções Respiratórias
7. Câncer de Cólon e Reto
8. Diabetes Mellitus
9. Doenças Renais
10. Câncer de Mama

Fonte: OMS

As maiores causas de mortes em 2016 no Mundo



Fonte: IHME, Global Burden of Disease, Our World in Data



Impactos do Câncer no Brasil em 2018

225 mil mortes por câncer

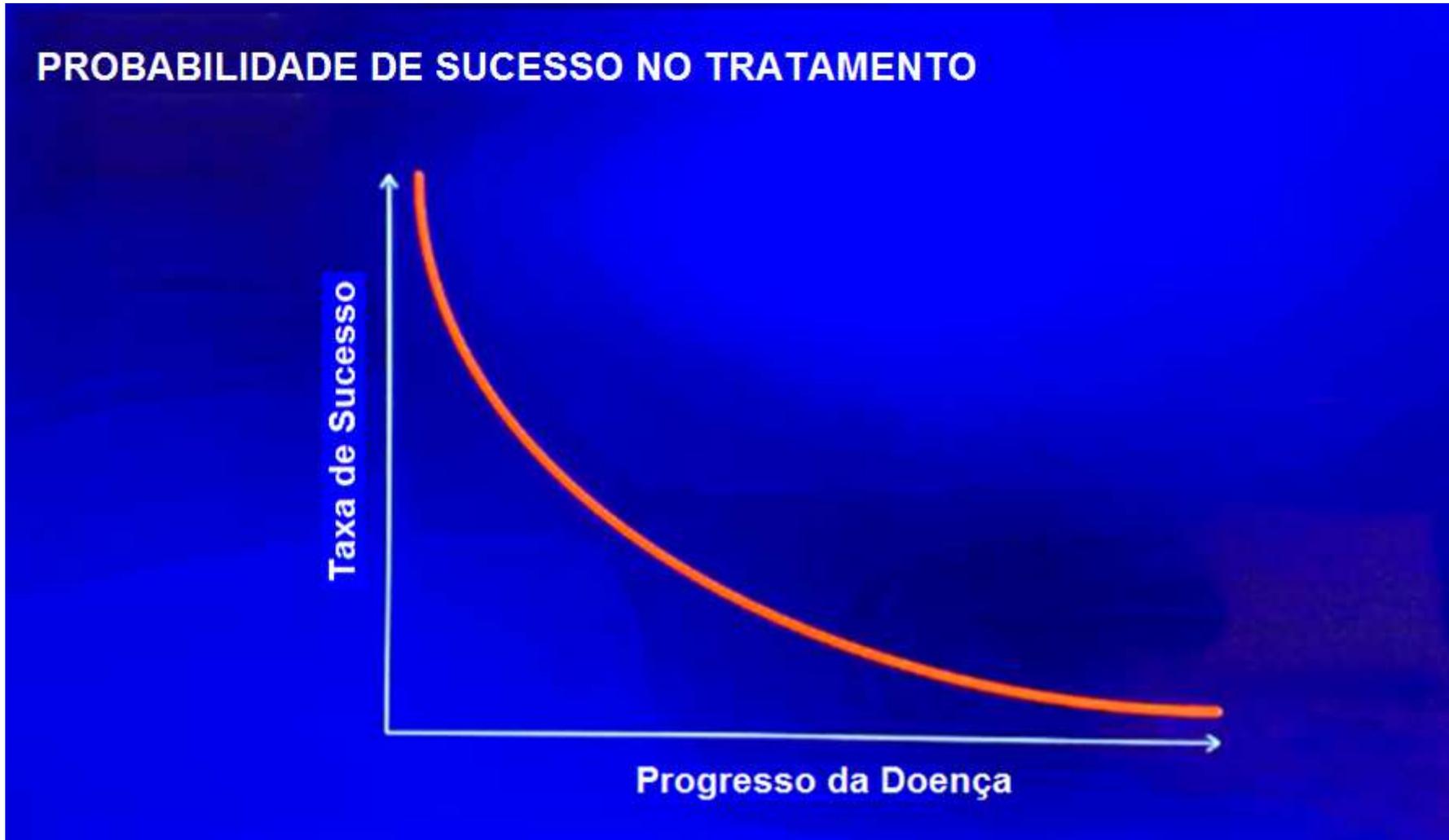
Tumores primários que mais mataram no Brasil

Homens: Traqueia, Brônquios e Pulmões
Próstata

Mulheres: Mama
Traqueia, Brônquios e Pulmões

Custo: R\$ 30 a 50 bilhões

Importância dos Exames Diagnósticos



Fonte: Adaptado de Julian Burschka, TED, 2019

Como aumentar a longevidade e
melhorar a qualidade de vida?

**Efetuar o Diagnóstico
Precoce de Doenças**

Diagnóstico via Volatolômica



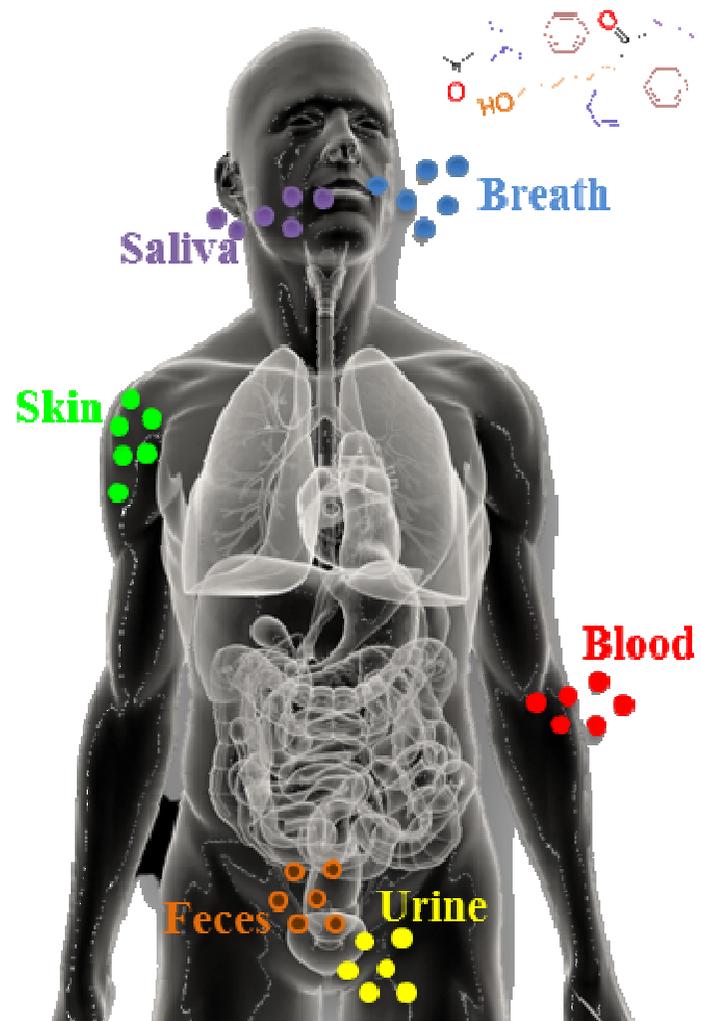
Hálito Cetônico: Diabetes mellitus

Diagnóstico via Volatolômica



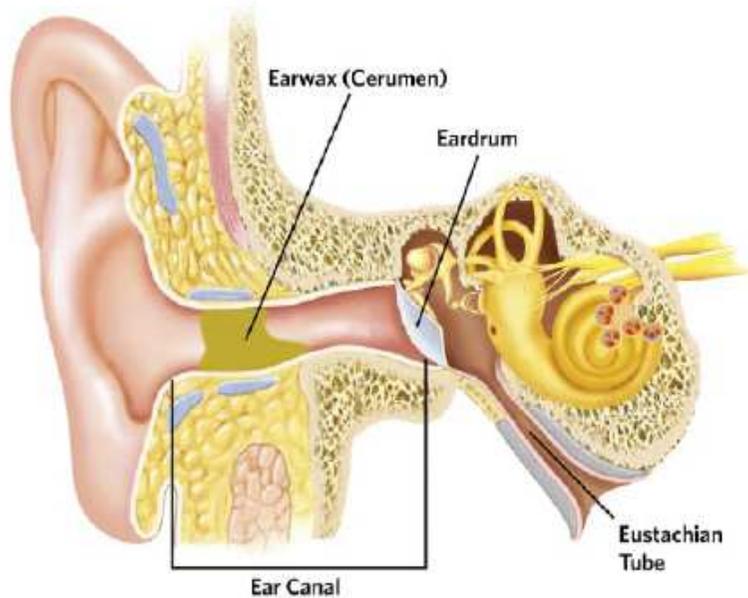
Fonte: Journal Of Urology, 2019

Produtos de Secreção/Excreção Metabólica e Fluidos Biológicos



- Urina
- Suor
- Hálito
- Saliva
- Fezes
- Sangue

Cerúmen



Cerúmen:

- ❑ Mistura de produtos de secreção gerados pelas glândulas ceruminosas, sebáceas e sudoríparas (apócrinas);
- ❑ Volatile Organic Metabolites
VOM

<https://www.acerumen.com/> -
ACERUMEN- Unplug your ears.
Accessed: January, 2019.

Vantagens:

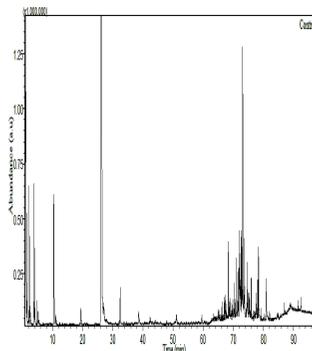
- ✓ Coleta simples e indolor;
- ✓ Pouco susceptível a contaminação externa;
- ✓ Contém Metabólitos Orgânicos Voláteis (VOM) polares e apolares: Hidrocarbonetos, álcoois, ésteres, éteres, aldeídos, cetonas, tiocompostos, amino, aromáticos, nitrilas, etc.

Roteiro de Análise em Volatolômica

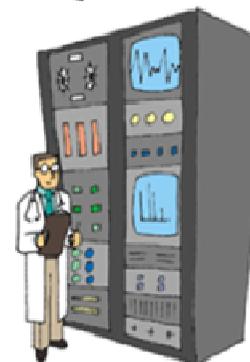
Coleta de Cerúmen



Análise Química



Análise Computacional



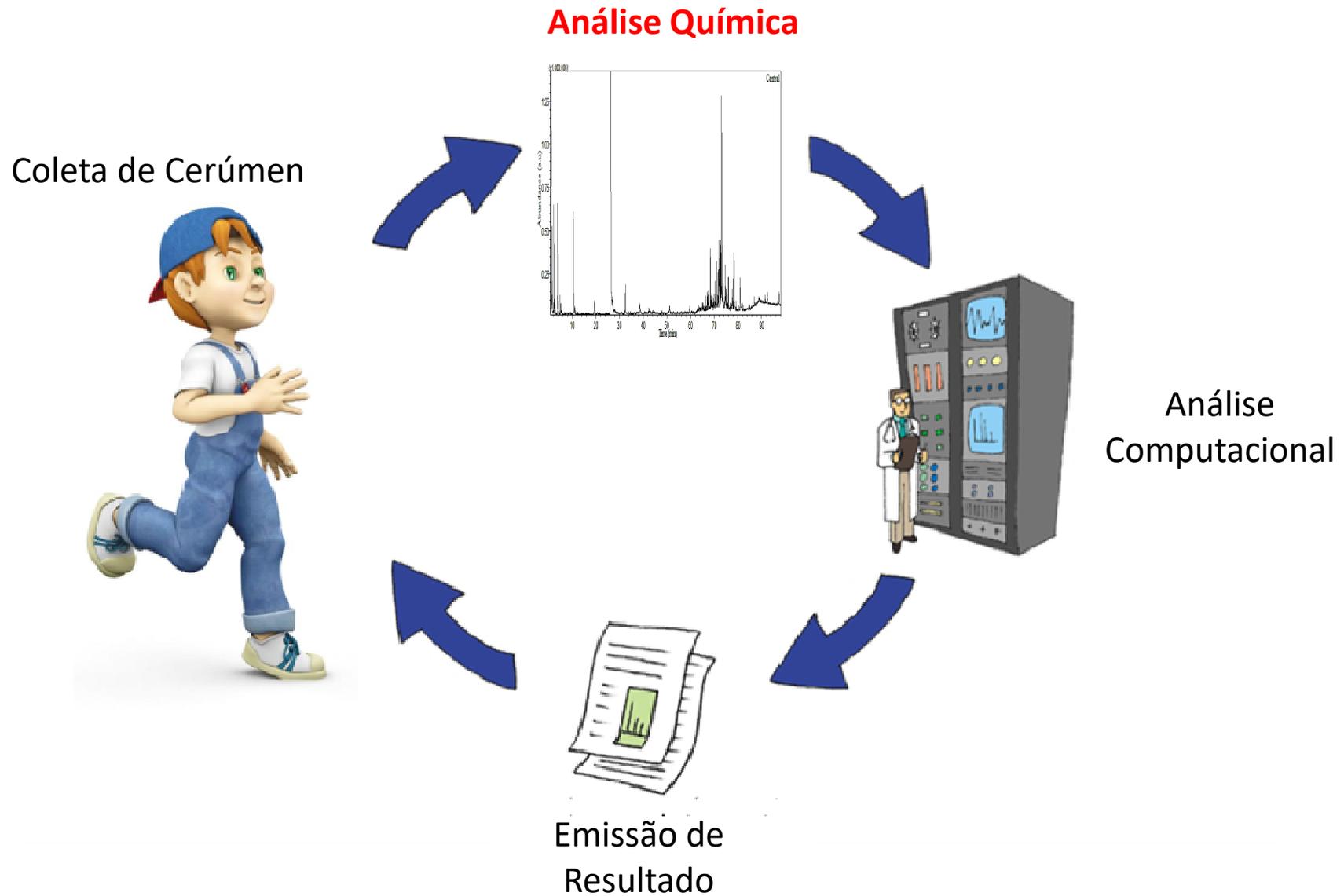
Emissão de Resultado



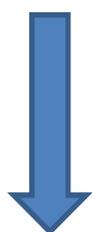
Cerumenograma



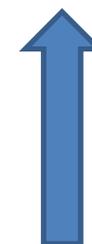
Roteiro de Análise



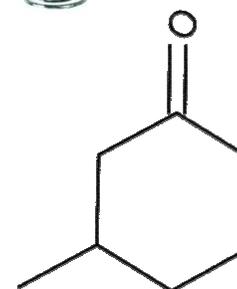
Cerumenograma



20 mg de
Cerumen



0.2 μ L de
3-metilciclohexanona



Cerumenograma

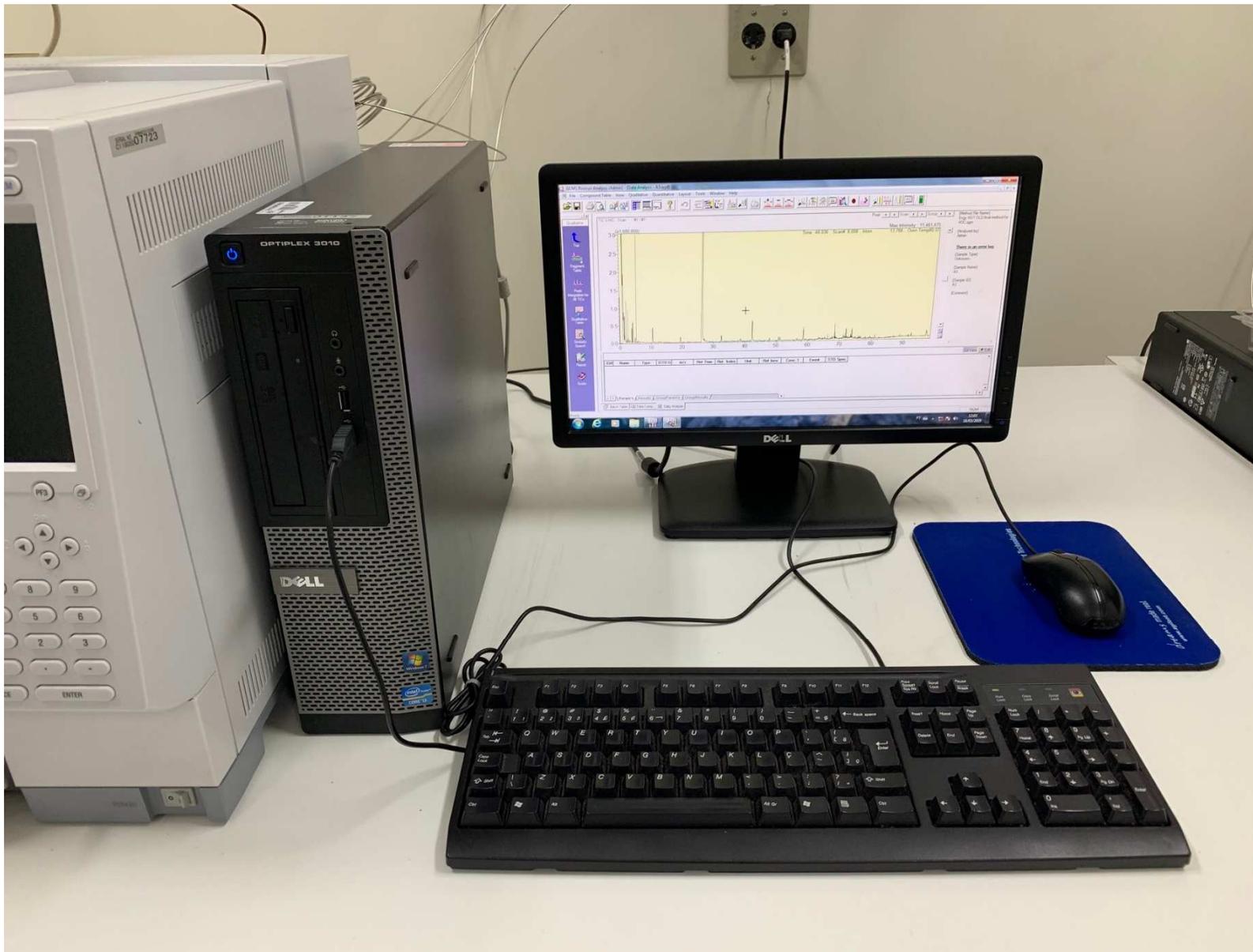


HS/GC-MS

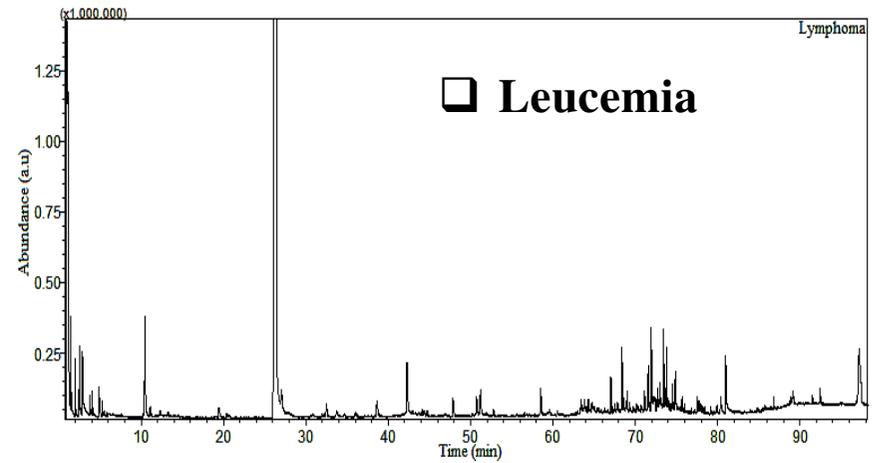
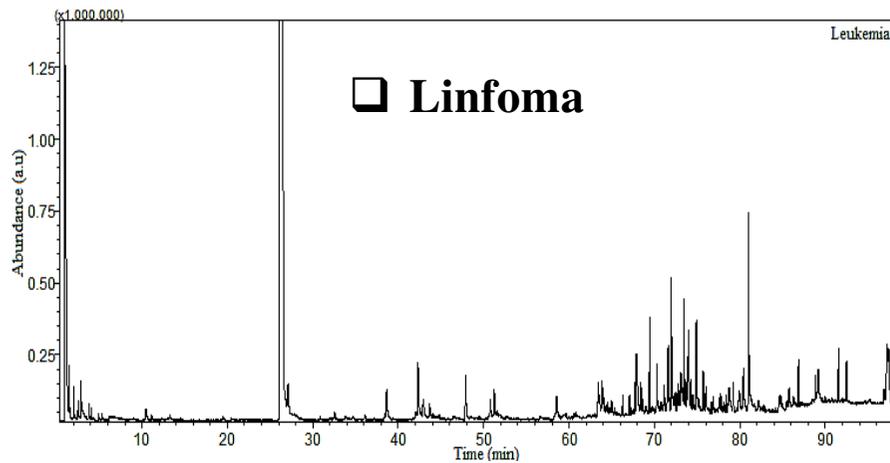
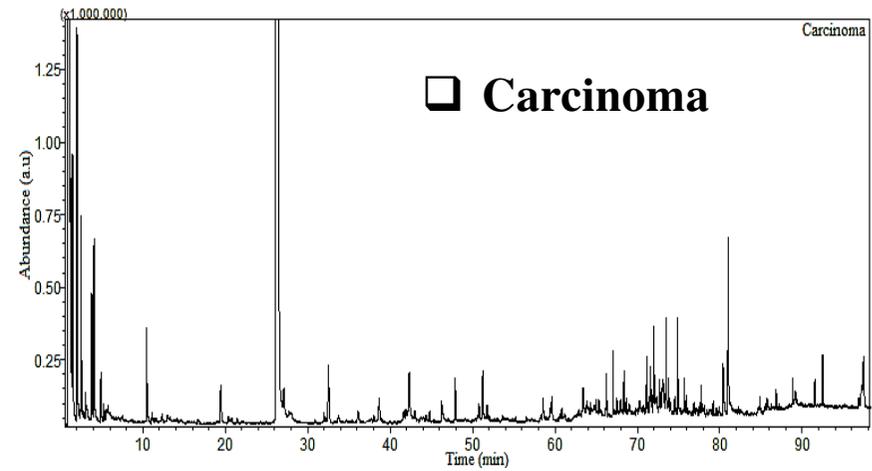
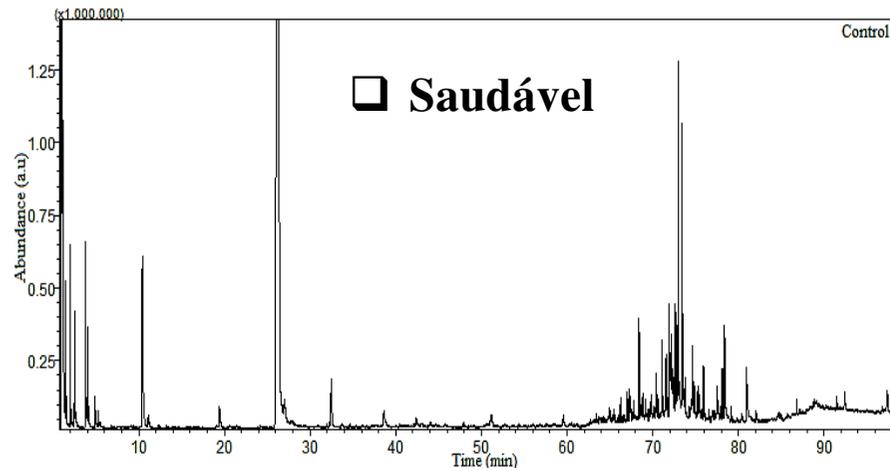
Cerumenograma



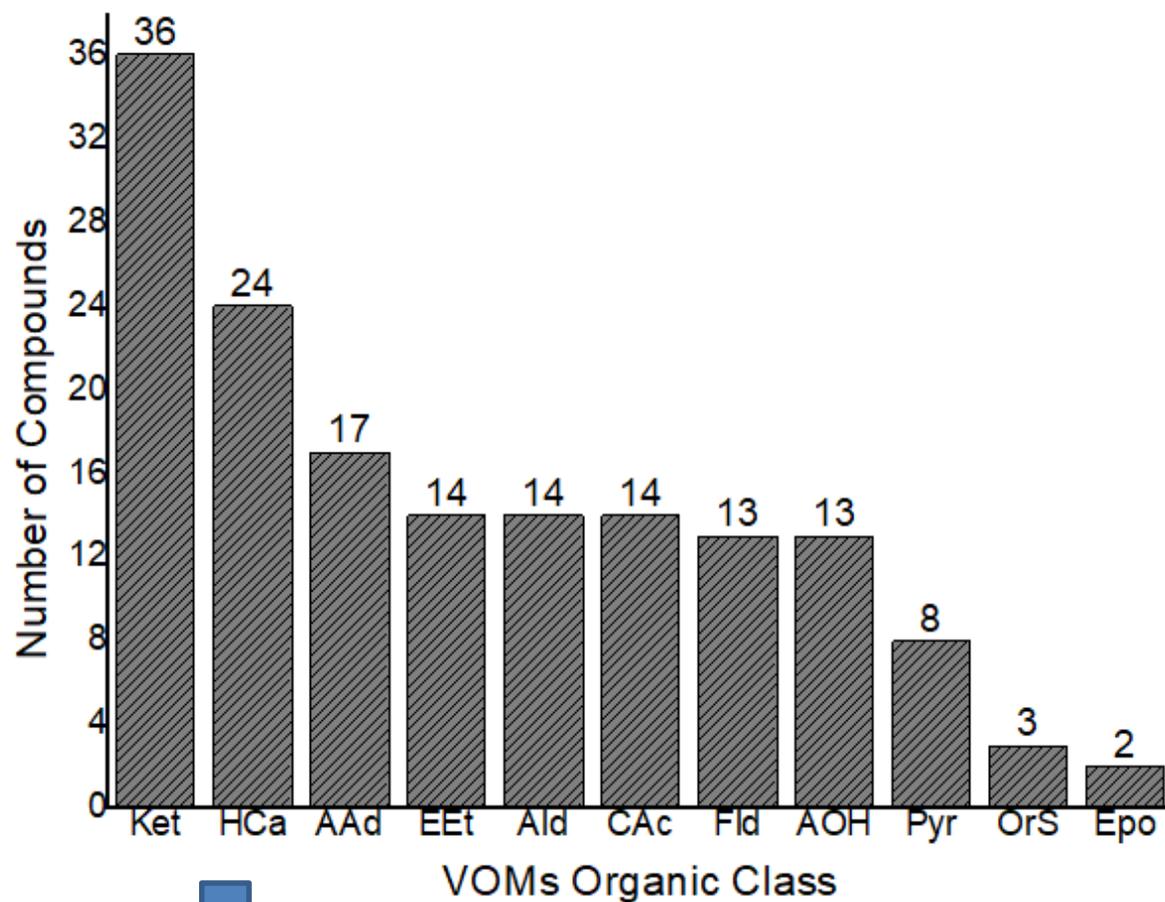
Cerumenograma



Perfil de VOM para Diagnóstico de Câncer



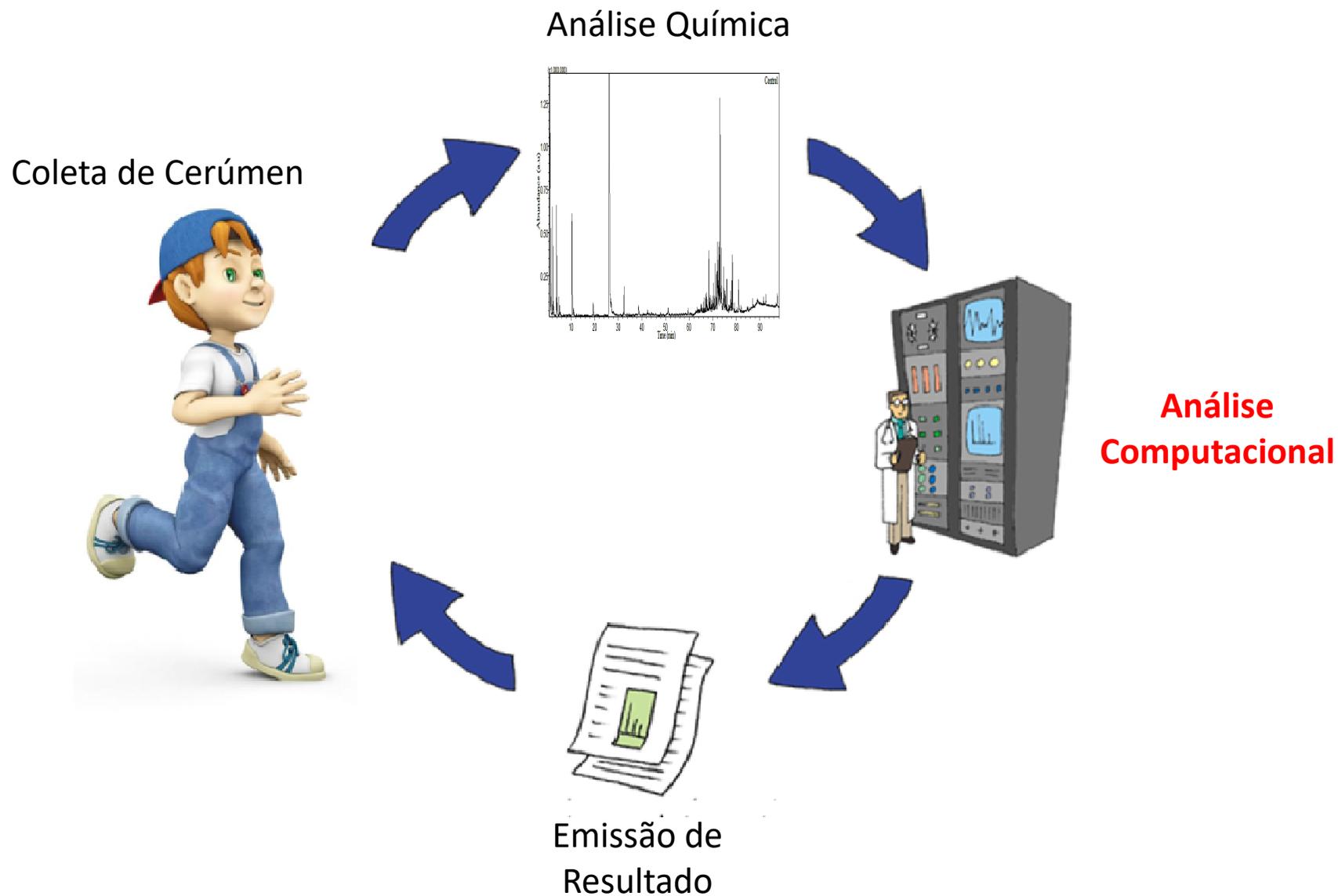
- Cetonas (Ket)
- Hidrocarbonetos (HCa)
- Aminas e amidas (AAd)
- Éstere and Ethers (EEt)
- Aldeídos (Ald)
- Ácidos carboxílicos (CAc)
- Furanos e Lactonas (Fld)
- Álcoois (AOH)
- Piranos (Pyr)
- Organosulfurícos (OrS)
- Epóxidos (Epo)



158 VOMs

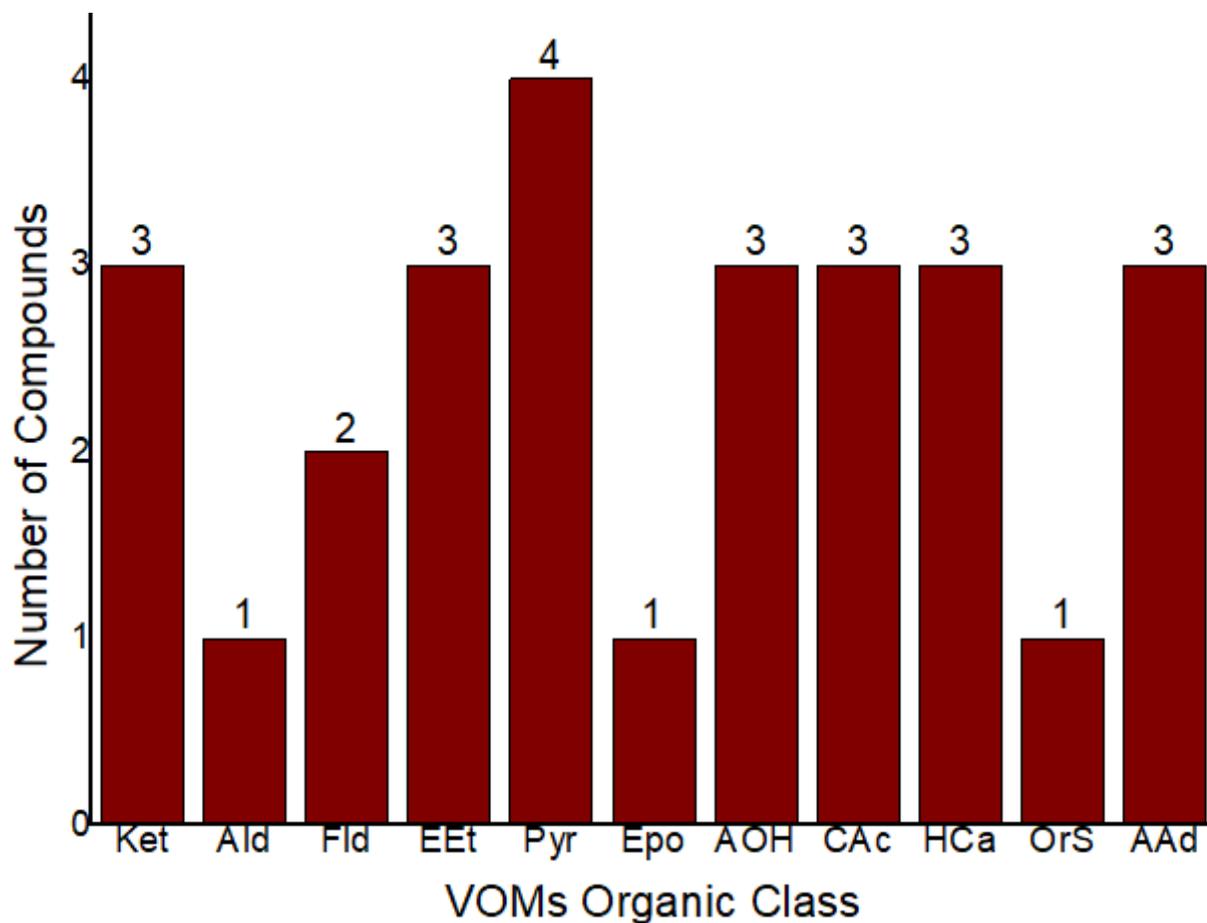
VOMs de diferentes classes de compostos orgânicos polares e apolares

Roteiro de Análise em Volatolômica



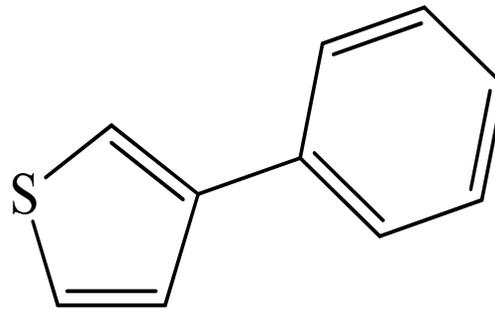
Potenciais Biomarcadores

- 27 VOMs biomarcadores para Câncer



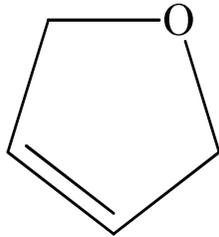
- Cetonas (Ket)
- Hidrocarbonetos (HCa)
- Aminas e amidas (AAd)
- Éstere and Ethers (EEt)
- Aldeídos (Ald)
- Ácidos carboxílicos (CAc)
- Furanos e Lactonas (Fld)
- Álcoois (AOH)
- Piranos (Pyr)
- Organosulfurícos (OrS)
- Epóxidos (Epo)

Biomarcador derivado de Proteínas

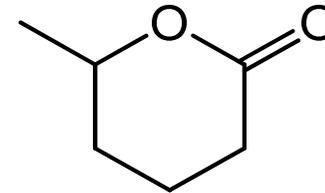


3-Phenylthiophene

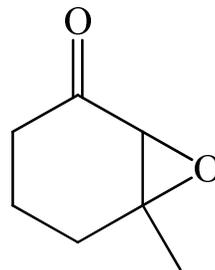
Biomarcadores derivados de Açúcares



2,5-Dihydrofuran

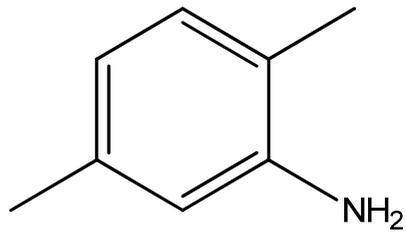


6-Methyltetrahydro-2H-pyran-2-one

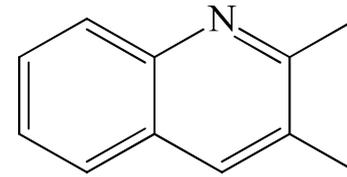


6-Methyl-7-oxabicyclo[4.1.0]heptan-2-one

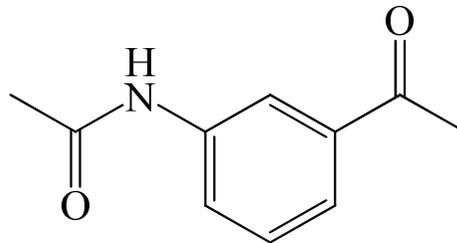
Biomarcadores derivados de DNA



2,5-Dimethylaniline

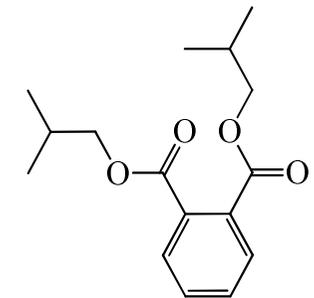
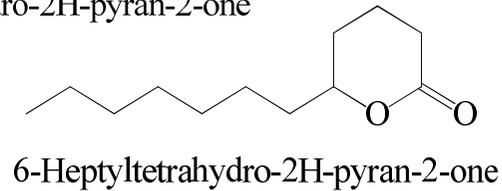
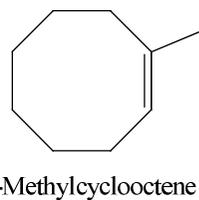
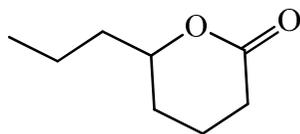
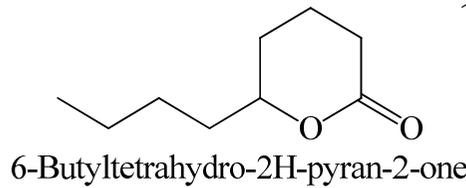
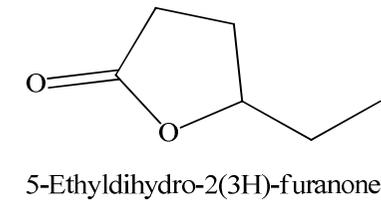
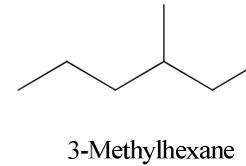
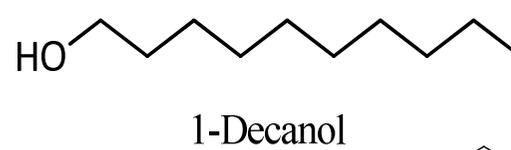
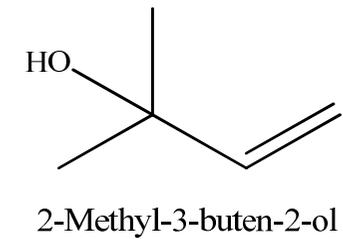
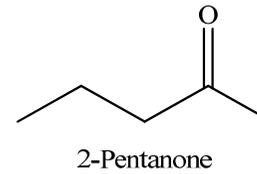
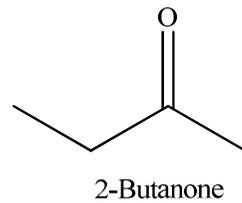
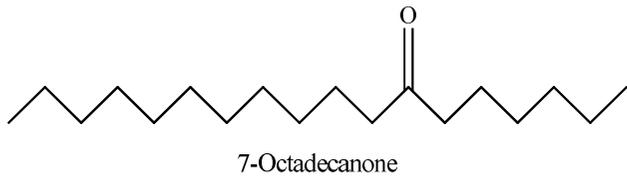


2,3-Dimethylquinoline



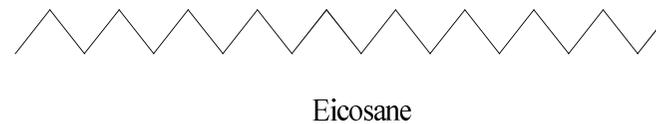
N-(3-Acetylphenyl)acetamide

Biomarcadores derivados de Gorduras

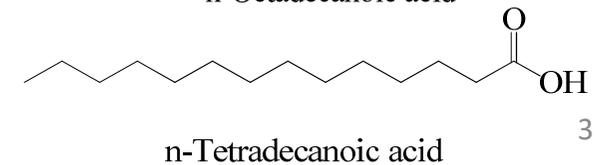
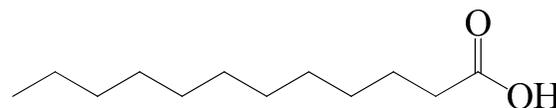
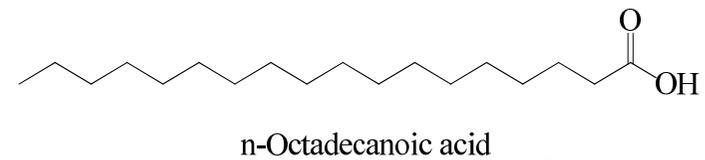
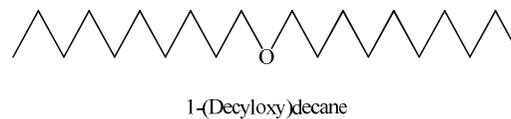
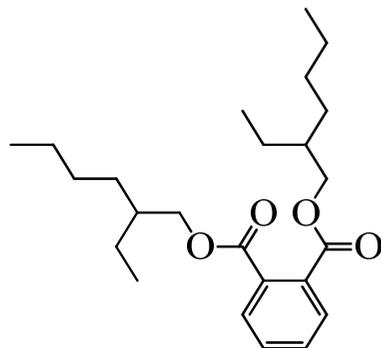


6-Propyltetrahydro-2H-pyran-2-one

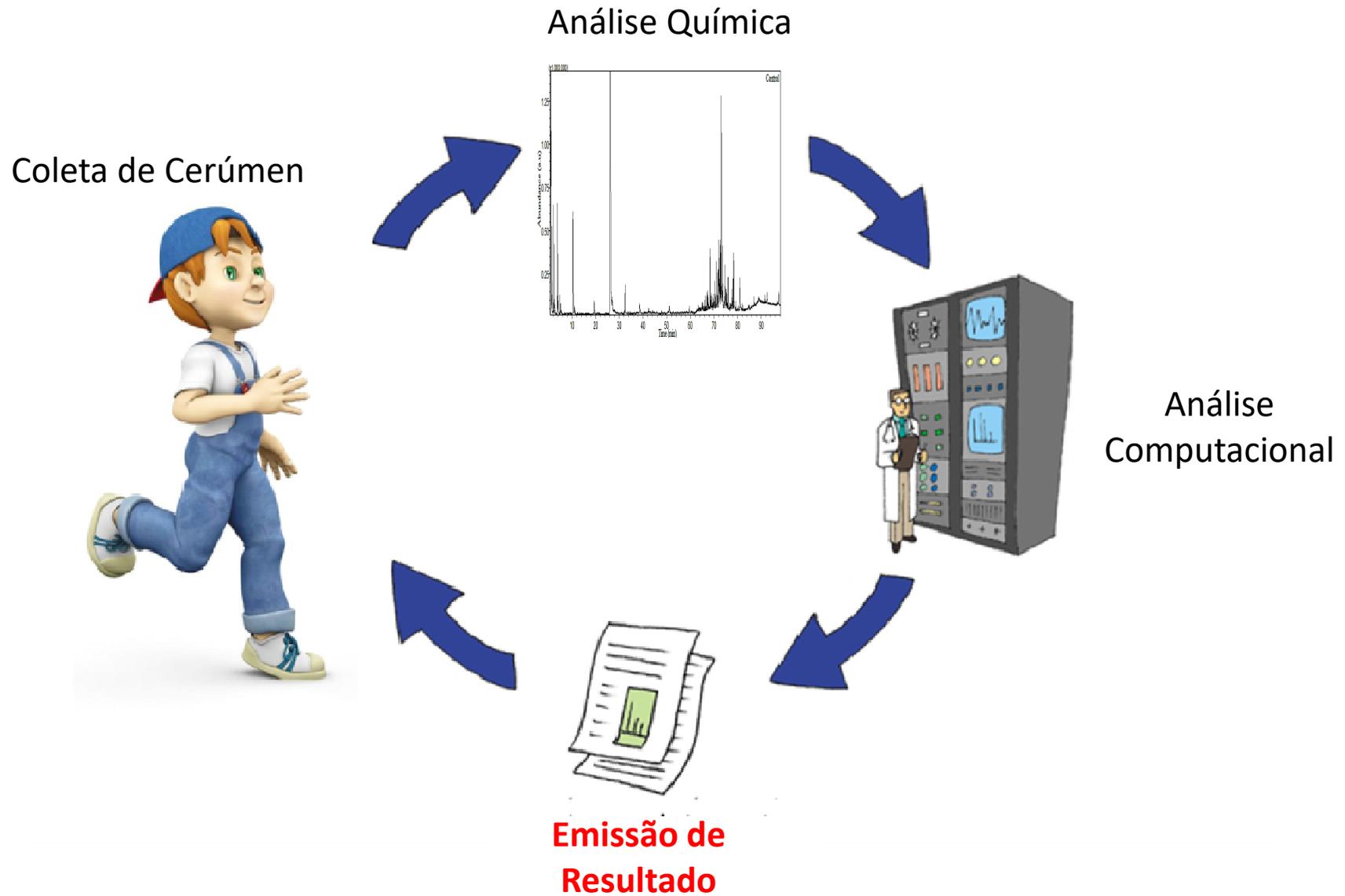
1-Methylcyclooctene



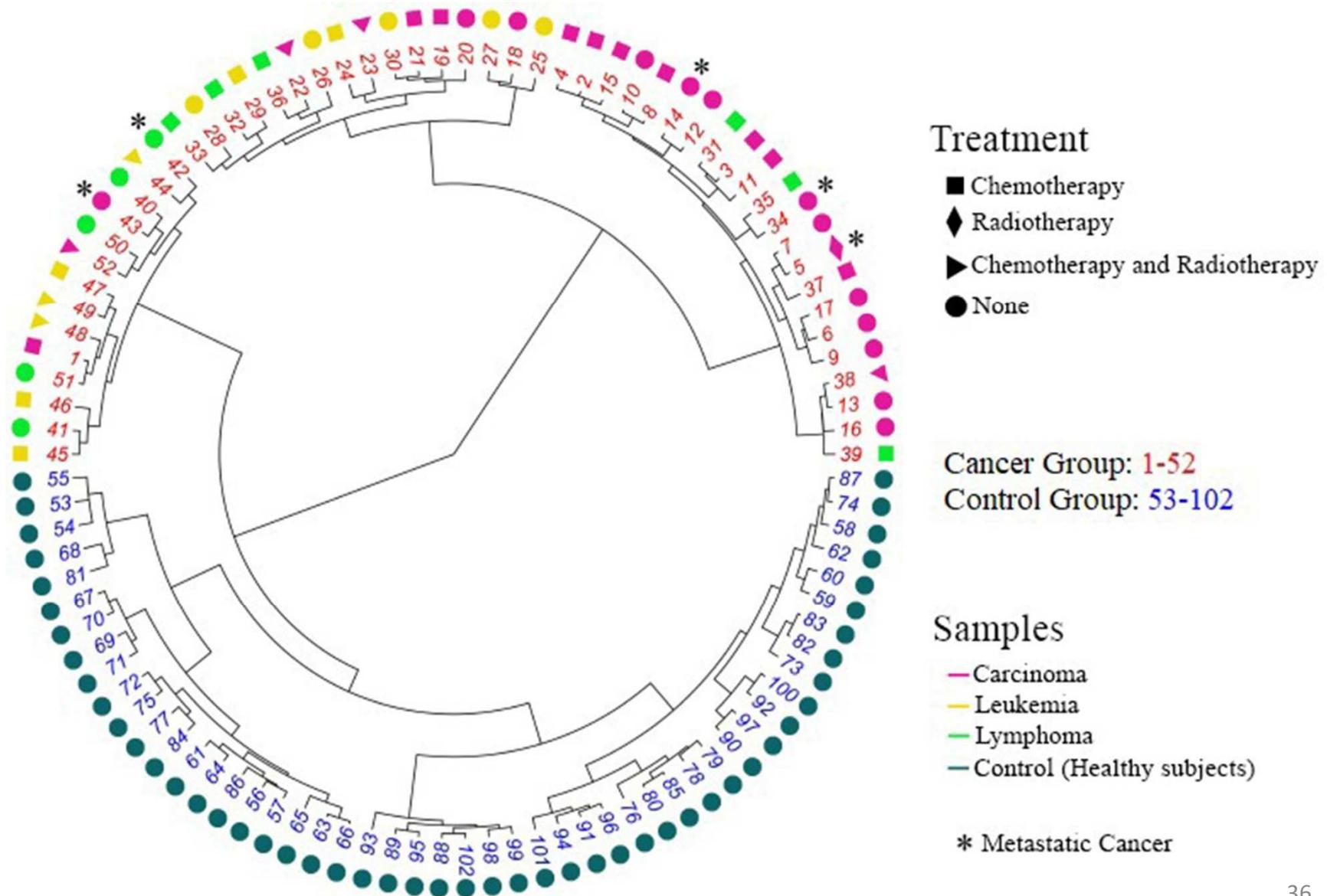
Diisobutyl phthalate



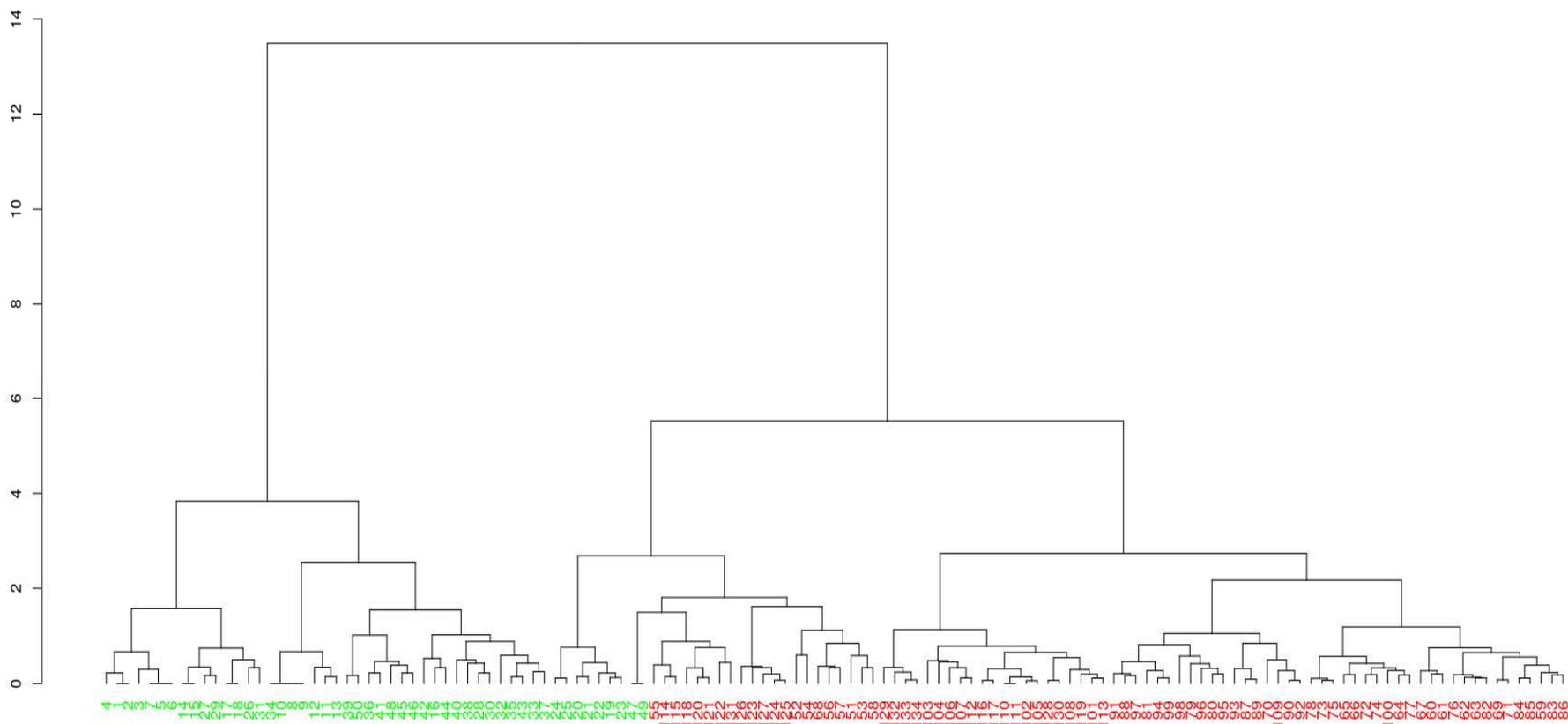
Roteiro de Análise



Câncer em Humanos



Câncer em Cachorros



50 Cachorros Saudáveis (Cor Verde) e 84 Cachorros com Câncer (Cor Vermelha)

Cerumenograma



Earwax: A neglected body secretion or a step ahead in clinical diagnosis?
A pilot study



Engy Shokry^{a,*}, Anselmo Elcana de Oliveira^b, Melissa Ameloti Gomes Avelino^{cd},
Mariana Moreira de Deus^c, Nelson Roberto Antoniosi Filho^{a,*}

Forensic Toxicol (2017) 35:348–358
DOI 10.1007/s11419-017-0363-z



CrossMark

ORIGINAL ARTICLE

Earwax as an alternative specimen for forensic analysis

Engy Shokry¹ · Jair Gonzalez Marques¹ · Paulo César Ragazzo² · Naiara Zedes Pereira¹ ·
Nelson Roberto Antoniosi Filho¹

Forensic Toxicol (2017) 35:389–398
DOI 10.1007/s11419-017-0370-0



CrossMark

ORIGINAL ARTICLE

Earwax: an innovative tool for assessment of tobacco use or exposure. A pilot study in young adults

Engy Shokry¹ · Anselmo Elcana de Oliveira² · Melissa Ameloti Gomes Avelino³ ·
Mariana Moreira de Deus³ · Naiara Zedes Pereira² · Nelson Roberto Antoniosi Filho¹

Earwax metabolomics: An innovative pilot metabolic profiling study for assessing metabolic changes in ewes during periparturition period

Engy Shokry^{1e,*}, Julião Pereira¹, Jair Gonzalez Marques Júnior¹, Paulo Henrique Jorge da Cunha^{2f}, Antônio Dionísio Feitosa Noronha Filho^{2f}, Jessica Alves da Silva², Maria Clorinda Soares Fioravanti^{2f}, Anselmo Elcana de Oliveira^{3g}, Nelson Roberto Antoniosi Filho^{1e}



Short communication

Earwax: A clue to discover fluoroacetate intoxication in cattle



Engy Shokry^{a,*}, Fabrício Carrião dos Santos^b, Paulo Henrique Jorge da Cunha^c,
Maria Clorinda Soares Fioravanti^c, Antônio Dionísio Feitosa Noronha Filho^c,
Naiara Zedes Pereira^a, Nelson Roberto Antoniosi Filho^a

Review

Insights into cerumen and application in diagnostics: past, present and future prospective

Engy Shokry^a, Nelson Roberto Antoniosi Filho

Laboratório de Métodos de Extração e Separação, Instituto de Química, Universidade Federal de Goiás, Goiânia, Brazil

*Corresponding author: angeliqa26582@yahoo.com

Diagnóstico de Intoxicação de Bovinos pela Ingestão de Barbatimão



Diagnóstico de Tripanossomose Bovina



Diagnóstico de Xeroderma Pigmentoso



Diagnóstico do Transtorno do Espectro Autista



**Autism Exists in the Brain,
but May Stem from the Gut**

Diagnóstico do Alzheimer



Diagnóstico de Tipos de Depressão



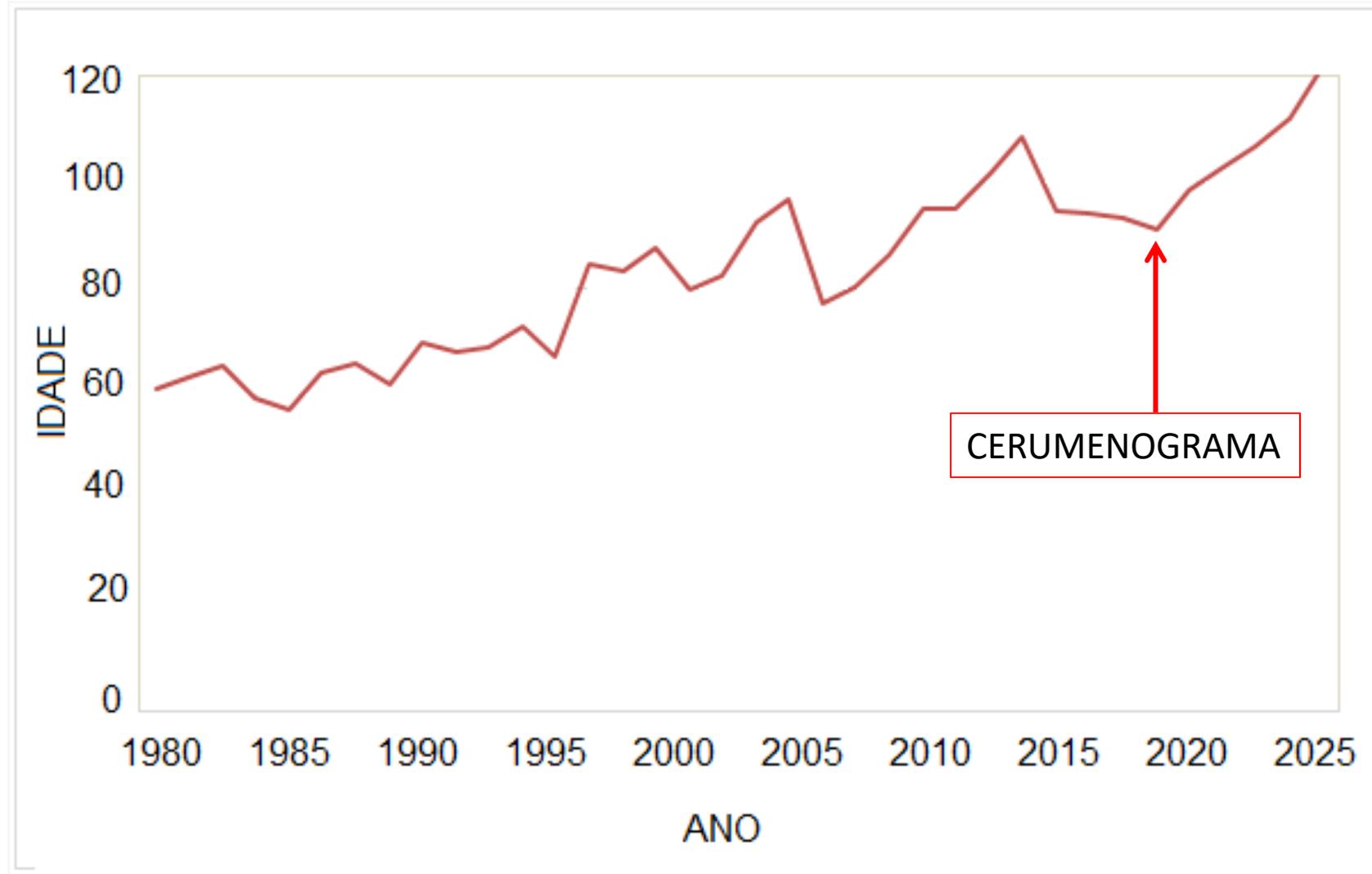
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5. Doenças Pulmonares Obstrutivas Crônicas
6. Infecções Respiratórias
7. Câncer de Cólon e Reto
8. Diabetes Mellitus
9. Doenças Renais
10. Câncer de Mama

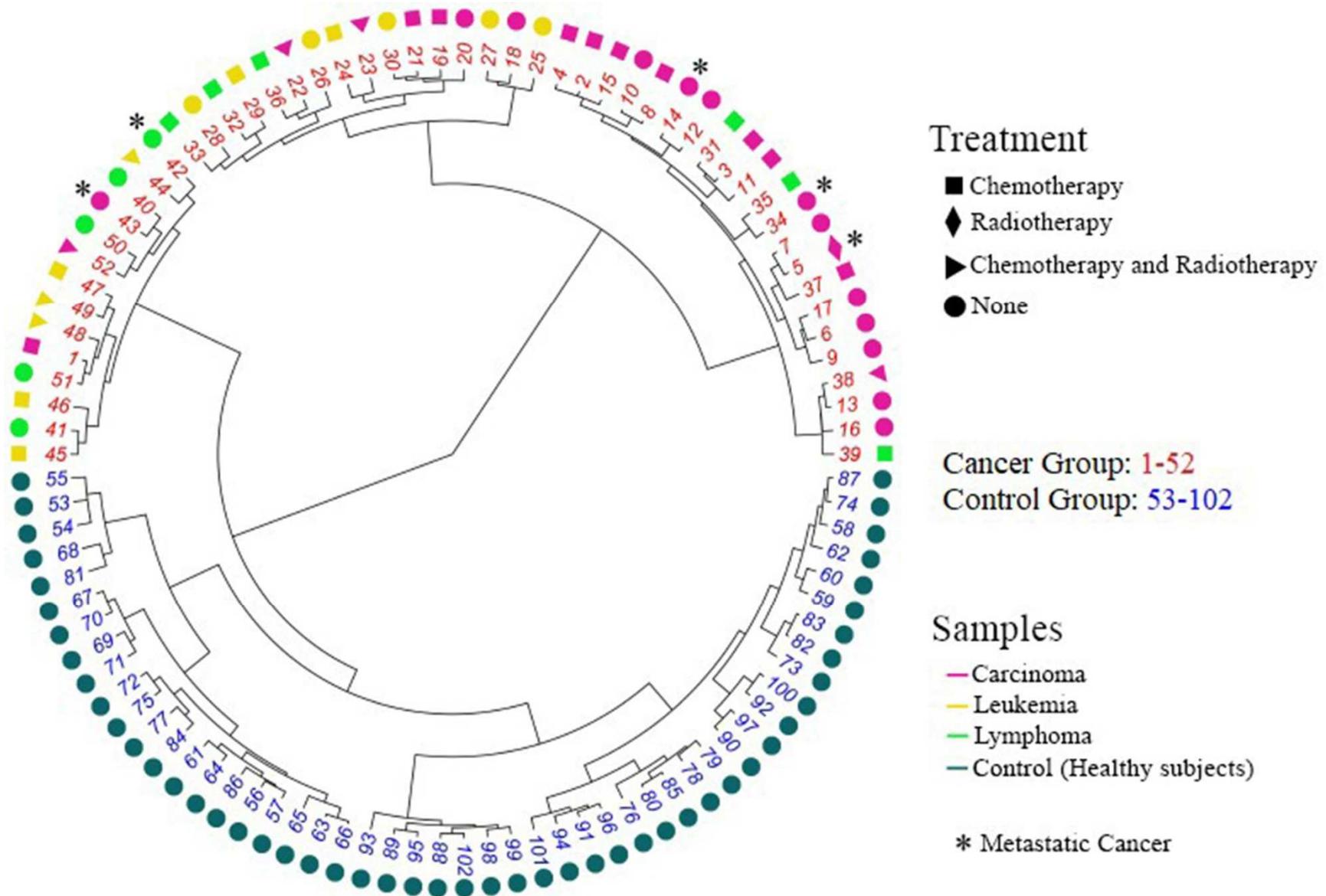
Fonte: OMS

Viver mais e melhor!



*O que resta fazer para o
Cerumenograma estar à
disposição da sociedade?*

Discriminar os diferentes tipos de Câncer

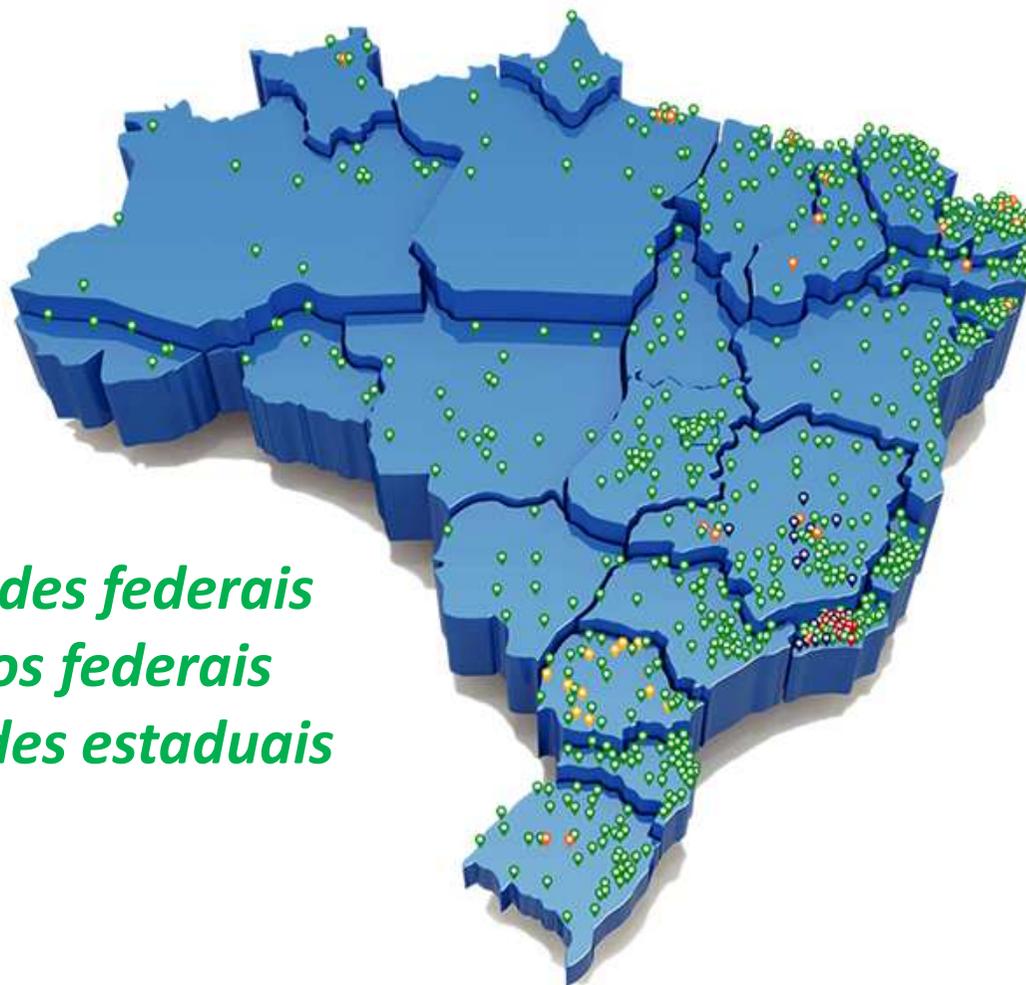


Discriminar os diferentes tipos de Câncer

*Aquisição de infraestrutura de coleta de cerúmen, equipamentos de análise química e de inteligência artificial:
R\$ 10 milhões (2020)*



Rede Pública do Ensino Superior para o Cerumenograma



*69 universidades federais
661 Institutos federais
50 universidades estaduais*

± 780 instituições públicas de ensino superior no Brasil

Número de deputados por estado

Acre	8	Paraíba	12
Alagoas	9	Pernambuco	25
Amazonas	8	Piauí	10
Amapá	8	Paraná	30
Bahia	39	Rio de Janeiro	46
Ceará	22	Rio Grande do Norte	8
Distrito Federal	8	Rondônia	8
Espírito Santo	10	Roraima	8
Goiás	17	Rio Grande do Sul	31
Maranhão	18	Santa Catarina	16
Minas Gerais	53	Sergipe	8
Mato Grosso do Sul	8	São Paulo	70
Mato Grosso	8	Tocantins	8
Pará	17		

Em 2021:

*1 Equipamento (R\$ 400 mil)
a cada 4 parlamentares:
R\$ 100 mil/parlamentar*

*513 deputados e 81
senadores:*

Total: R\$ 59,4 milhões

*150 equipamentos
instalados no Brasil*

520 mil diagnósticos/ano



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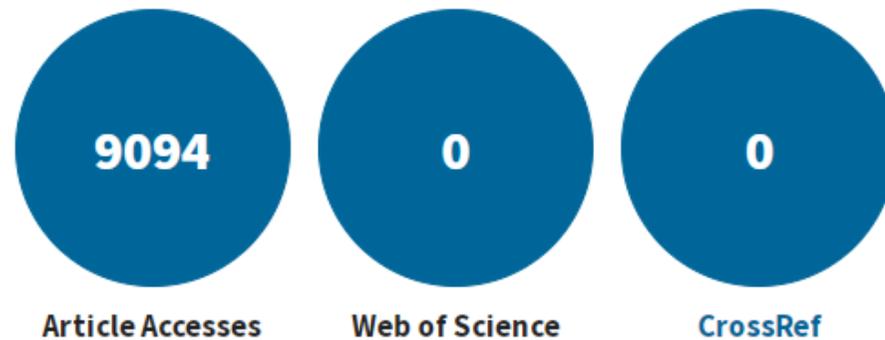
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Article metrics for:

Cerumenogram: a new frontier in cancer diagnosis in humans

Last updated: Wed, 23 Oct 2019 03:06:12 GMT

Total citations



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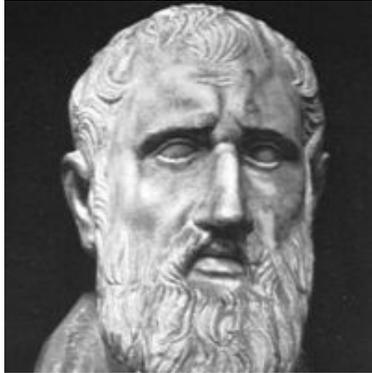
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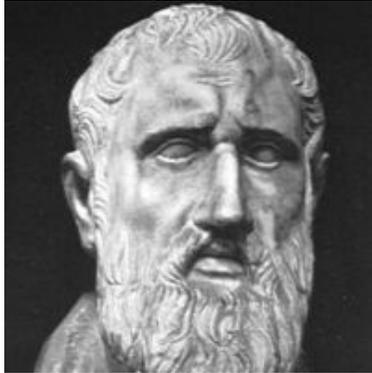


Prof. Dr. Gregory Paul Winter
Ganhador do Prêmio Nobel de Química de 2018



Zenon de Cítio (Creta - 334-262 a.C.)

“A natureza deu-nos duas orelhas e uma só boca para nos advertir de que se impõe mais ouvir do que falar.”



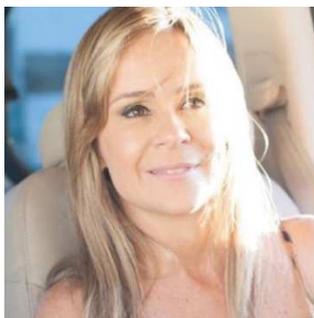
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Nelson de Matão (Brasil - 1967- ? d.C.)

“A natureza deu-nos duas orelhas e uma só boca para facilitar o diagnóstico clínico, favorecendo a longevidade.”



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Câmara dos Deputados
Comissão de Seguridade Social e Família - CSSF

***Cerumenograma:
uma nova fronteira no
diagnóstico clínico do câncer***

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