



Astım Farmakoterapisi, Doğru İnhalasyon Tekniği ve Uygun İnhaler Seçimiyle Başlar ve Bu Doğrultuda İlerler

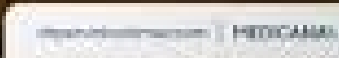
NURHAN SARIOĞLU

Balıkesir Üniversitesi Tıp Fakültesi
Göğüs Hastalıkları Anabilim Dalı

GSK 'nın Koşulsuz Eğitim Desteği ile

NP-TR-CAU-PPTX-260001

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26



Neden İnhalasyon Tedavisi ?

- ✓ İlacın doğrudan **etki bölgesine** uygulanması
- ✓ Etkinin çok **hızlı** başlaması
- ✓ Sistemik alıma göre;
 - ✓ Etkinin **daha güçlü** olması
 - ✓ **Daha düşük doz** ilaç gereksinimi
 - ✓ **Daha az yan etki** olması



GINA 2024-25

KONTROL EDİCİ ve
TERCİH EDİLEN KURTARICI

1. YOL



STEPS 1 – 2

Gerektiğinde düşük doz İKS-Form

STEP 3

Düşük doz
İKS-Form

STEP 4

Orta doz
İKS-Form

STEP 5

LAMA, Fenotipik
değerlendirme
anti-IgE, anti-IL-5/
5R, anti-IL4, anti-TSLP
Yüks. doz İKS-Form

Gerektiğinde düşük doz İKS-Formoterol

KONTROL EDİCİ ve
ALTERNATİF KURTARICI

2. YOL



STEP 1

Her SABA
aldığında İKS

STEP 2

Düşük doz İKS

STEP 3

Düşük doz
İKS-LABA

STEP 4

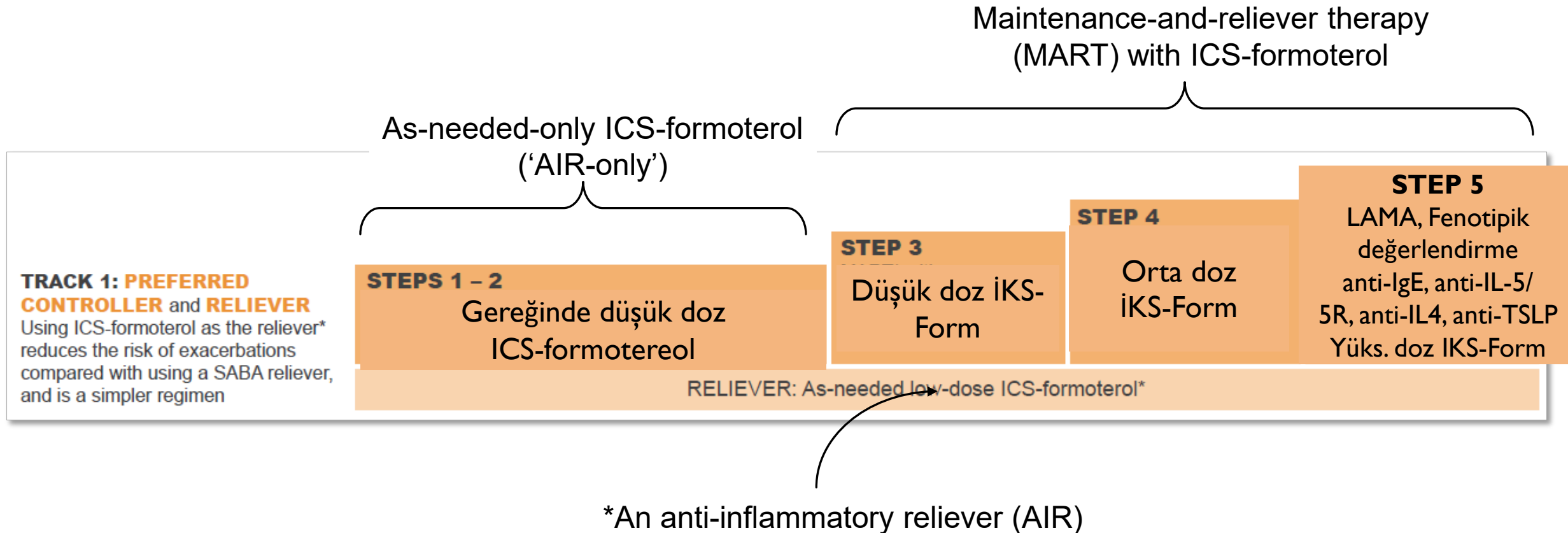
Orta/
doz İKS-LABA

STEP 5

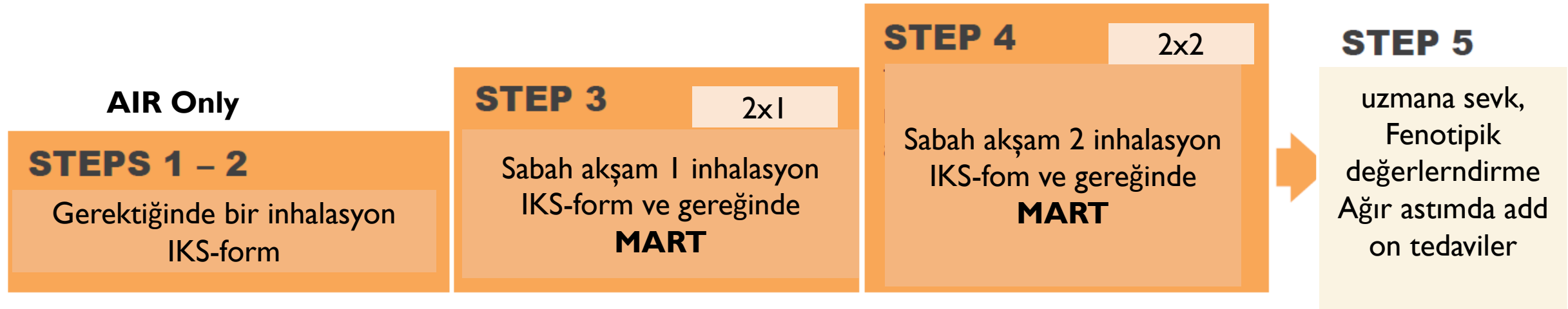
LAMA, Fenotipik
değerlendirme
anti-IgE, anti-IL-5/
5R, anti-IL4, anti-TSLP
Yüks. doz İKS-LABA

Gerektiğinde SABA veya İKS-SABA*

Terminology: AIR, AIR-only and MART



TRACK 1

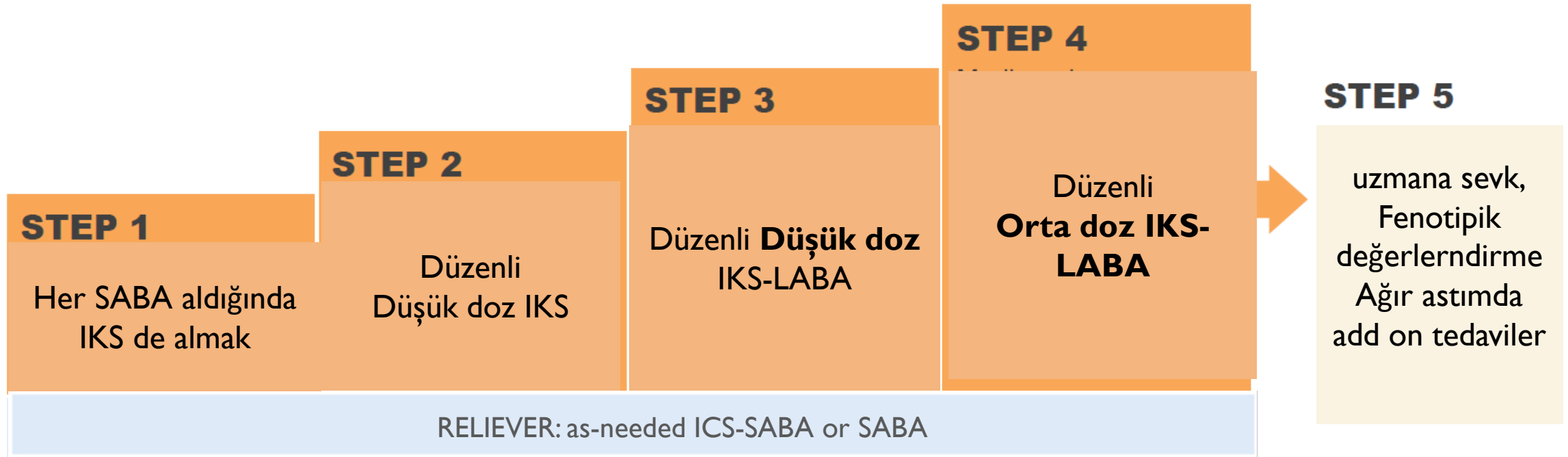


These examples are for budesonide-formoterol 160/4.5 mcg or BDP-formoterol 100/6 mcg, DPI or pMDI. See Box 4-8 for other formulations.

TRACK 1, Steps 1–4: the **PREFERRED** treatment for adults and adolescents.

Using ICS-formoterol as an anti-inflammatory reliever (AIR), with or without maintenance ICS-formoterol,

TRACK 2



TRACK 2, Steps 1–4: Alternative **CONTROLLER and **RELIEVER** for adults and adolescents.**

Box 4-2. Low, medium and high daily metered doses of inhaled corticosteroids (alone or with LABA)

This is not a table of equivalence, but suggested total daily doses for “low”, “medium” and “high” dose ICS options for adults/adolescents (Box 4-6, p.77) and children 6–11 years (Box 4-12, p.96), based on product information.

The table does NOT imply potency equivalence. For example, if you switch treatment from a “medium” dose of one ICS to a “medium” dose of another ICS, this may represent a decrease (or an increase) in potency, and the patient’s asthma may become unstable (or they may be at increased risk of adverse effects).

Inhaled corticosteroid (alone or in combination with LABA)	Total daily ICS dose (mcg) – see notes above		
	Low	Medium	High
Adults and adolescents (12 years and older)			
Beclometasone dipropionate (pMDI, standard particle, HFA)	200–500	>500–1000	>1000
Beclometasone dipropionate (DPI or pMDI, extrafine particle, HFA)	100–200	>200–400	>400
Budesonide (DPI, or pMDI, standard particle, HFA)	200–400	>400–800	>800
Ciclesonide (pMDI, extrafine particle, HFA)	80–160	>160–320	>320
Fluticasone furoate (DPI)	100	200	
Fluticasone propionate (DPI)	100–250	>250–500	>500
Fluticasone propionate (pMDI, standard particle, HFA)	100–250	>250–500	>500
Mometasone furoate (DPI)	Depends on DPI device – see product information		
Mometasone furoate (pMDI, standard particle, HFA)	200–400		>400

Change in 2025

Hangi Cihazlarla İnhaler Tedavi ?



Basıncılı ölçülü doz inhaler (pMDIs)

Kuru toz inhaler (DPIs)



Soft mist inhaler (SMIs)

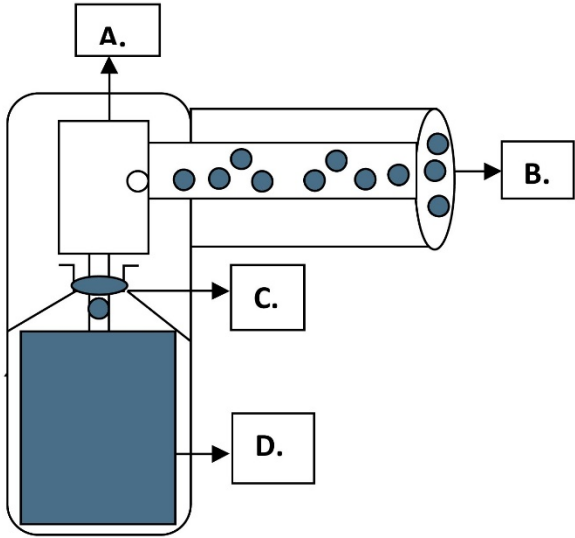


Nebülizatörler

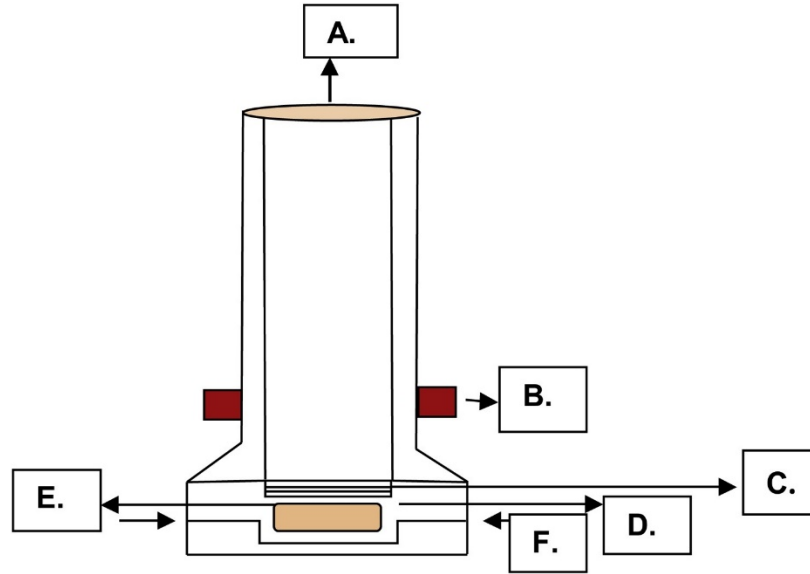
Review

Recent advances in aerosolised drug delivery

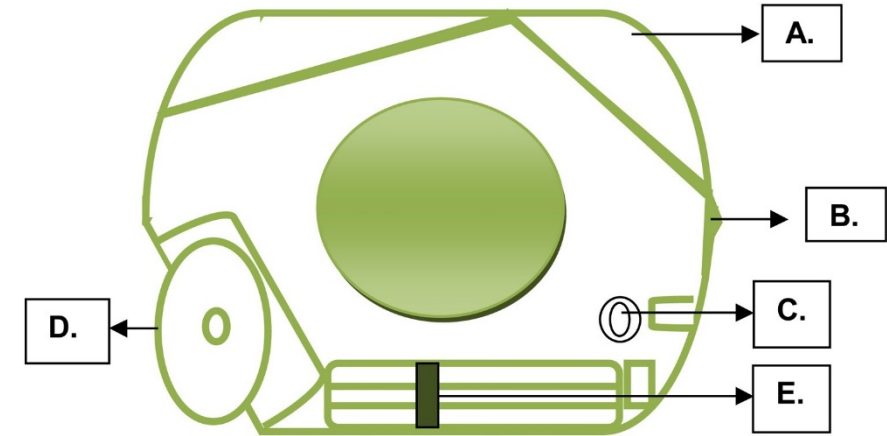
Astım ve KOAH te en çok reçete: Kuru Toz inhaler - DPI: (%62.8-%88.5)
Ölçülü doz inhaler -PMD (%18.9- %35.3)



Pressurized metered dose inhaler (pMDI). (1 to 7 μm)



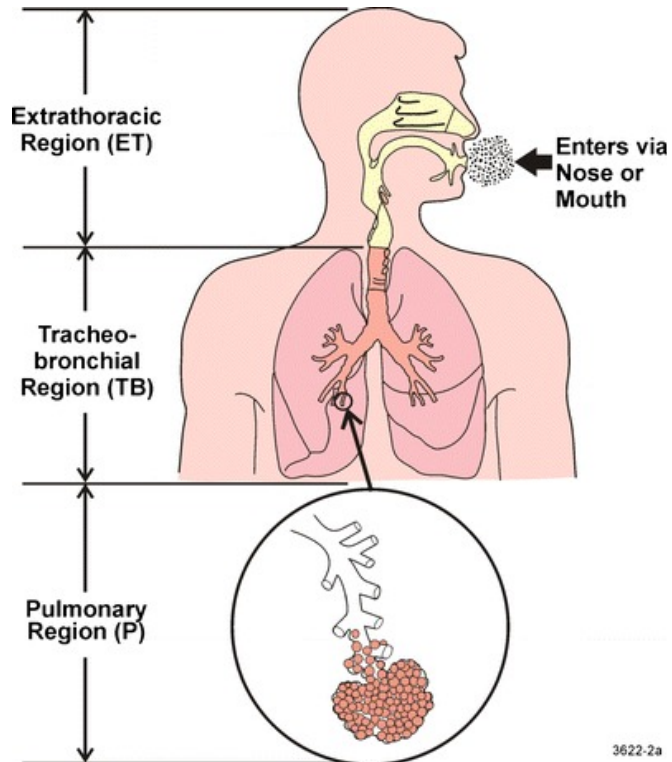
Capsule based DPI technology (particle size <5 μm)



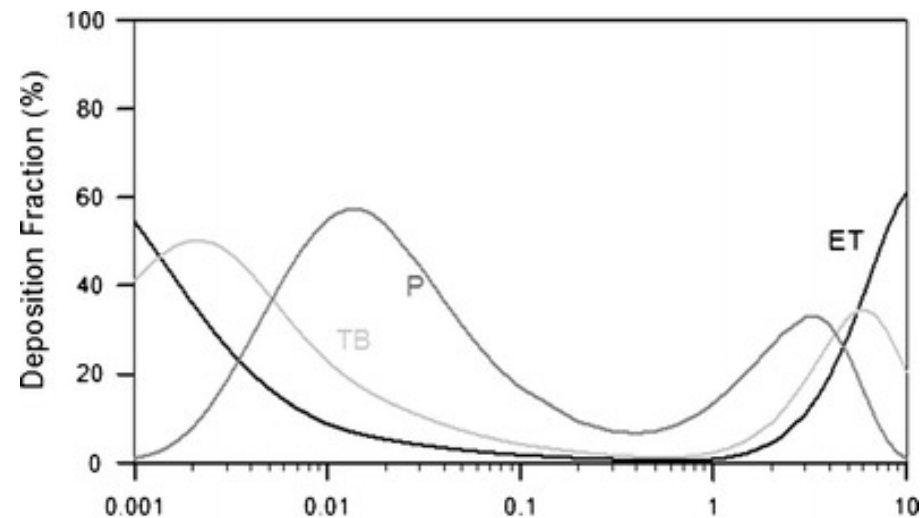
Diskus inhaler is an dry powder inhaler (1–5 μm)

Kloroflorokarbon (CFC) itici gaz-çalkalama
hidrofloroalkan (HFA)

Mechanisms of Pharmaceutical Aerosol Deposition in the Respiratory Tract



		Device/actuator/mouthpiece (%)	Oropharyngeal region (%)	Lung (%)	Expired air (%)
Nebulizer	Measurement	61.5 ± 16	10.9 ± 6.5	15.3 ± 12.8	12.2 ± 2.4
	Calculation	61.5	8.2	16.7	13.5
pMDI-CFC	Measurement	10	81.0 ± 12.6	6.3 ± 2.7	2.7 ± 0.9
	Calculation	10	64.70	17.20	8.10
pMDI-HFA	Measurement	15	24.7 ± 11.0	46.8 ± 10.2	13.5 ± 3.4
	Calculation	15	37.0	18.3	29.7
DPI	Measurement	18.1 ± 6.4	66.7 ± 8.0	14.8 ± 3.3	0.5 ± 0.4
	Calculation	18.1	49.5	27.0	5.4



5. Guided asthma self-management education and skills training

INHALER TECHNIQUE, ADHERENCE AND ASTHMA EDUCATION

Box 5-1. Shared decision-making between healthcare provider and patient about choice of inhalers	109
Box 5-2. Choice and effective use of inhaler devices	110
Box 5-3. Poor adherence to prescribed maintenance treatment in asthma	112
Box 5-4. Asthma information	114

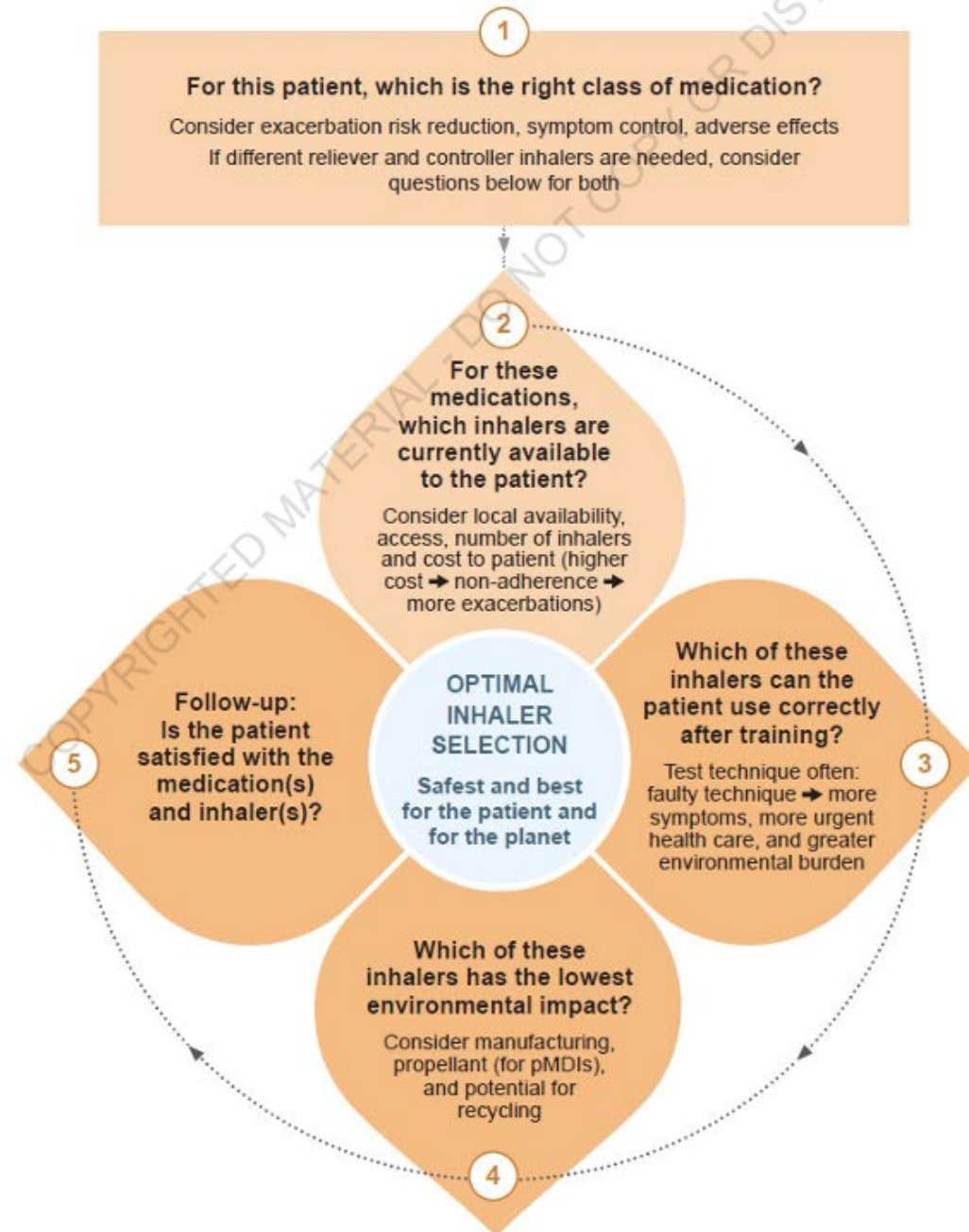
5. Guided asthma self-management education and skills training

- ▶ **Zayıf inhaler teknik**----zayıf astım kontrolü ve astım atak riskinde artış ve yan etkilerde artış
- ▶ Hastaların **%70-80 inhaleri doğru kullanmıyor**
- ▶ Ne yazık ki sağlık profesyonellerinin de bir çoğu reçete ettiği ilacın doğru kullanımını bilmiyor

Mükemmel inhaler yoktur

Hastalar herhangi bir inhaler cihazıyla sorun yaşayabilir

Box 5-1. Shared decision-making between healthcare provider and patient about choice of inhalers





exacerbations, in risk of adverse effects of OCS, and in urgent health care, but also, if implemented with a dry powder inhaler (as in most of the clinical trials), it provides a very large reduction in carbon footprint.^{7,87} For both Track 1 and Track 2, GINA fully supports initiatives to encourage use of dry-powder inhalers, where they are available and clinically appropriate, and to replace environmentally harmful propellants with low-carbon alternatives. At the same time, it is

Box 5-2. Choice and effective use of inhaler devices

CHOOSE

- Choose the most appropriate inhaler device for the patient before prescribing. Consider the preferred medication (Box 4-6, p.77 and Box 4-12, p.96), available devices, patient skills, environmental impact and cost (see Box 5-1, p.109).
- If different options are available, encourage the patient to participate in the choice.
- For pMDIs, use of a spacer improves delivery and (with ICS) reduces the potential for side-effects.
- Ensure that there are no physical barriers, e.g., arthritis, that limit use of the inhaler.
- Avoid use of multiple different inhaler types where possible, to avoid confusion.

CHECK

- Check inhaler technique at every opportunity.
- Ask the patient to show you how they use their inhaler (don't just ask if they know how to use it).
- Identify any errors using a device-specific checklist.

CORRECT

- Show the patient how to use the device correctly with a physical demonstration, e.g., using a placebo inhaler, or using videos.⁵⁰⁰
- Check technique again, paying attention to problematic steps. You may need to repeat this process 2–3 times within the same session for the patient to master the correct technique.⁴⁸⁶
- Consider an alternative device only if the patient cannot use the inhaler correctly after several repeats of training.
- Re-check inhaler technique frequently. After initial training, errors often recur within 4–6 weeks.⁵⁰¹

CONFIRM

- Clinicians should be able to demonstrate correct technique for each of the inhalers they prescribe.
- Inhaler skills training provided by specially trained pharmacists and nurses is highly effective.^{492,493}

Box 5-3. Poor adherence to prescribed maintenance treatment in asthma

Factors contributing to poor adherence

Medication/regimen factors

Difficulties using inhaler device (e.g., arthritis)
Burdensome regimen (e.g., several times per day)
Multiple different inhalers

Unintentional poor adherence

Misunderstanding about instructions
Forgetfulness
Absence of a daily routine
Cost

Intentional poor adherence

Perception that treatment is not necessary
Denial or anger about asthma or its treatment
Inappropriate expectations
Concerns about side-effects (real or perceived)
Dissatisfaction with healthcare providers
Stigmatization
Cultural or religious issues
Cost

- ✓ Elektronik inhaler hatırlatıcı
- ✓ Astım hemşiresi tarafından ev ziyaretleri
- ✓ İKS dozunu arttırmadan önce inhaler kullanımını detaylı gör
- ✓ Telemedicine- okul eğitimi
- ✓ Elektronik inhaler monitorizasyon

Common errors in inhalation therapy: Impact and solutions

Carlota Rodriguez-Garcia¹  | Esther Barreiro^{2,3,4} | Xavier Muñoz-Gall^{4,5,6,7} |

- ✓ İleri yaşta hatalı inhalasyon fazla
- ✓ Düşük eğitim seviyesi
- ✓ Reçete etmeden önce eğitim verilmemiş olması
- ✓ Aynı anda birden fazla inhaler cihaz reçete edilmesi

2000 and 2019, using the key words: asthma, COPD, obstructive lung disease, inhalers, misuse and errors

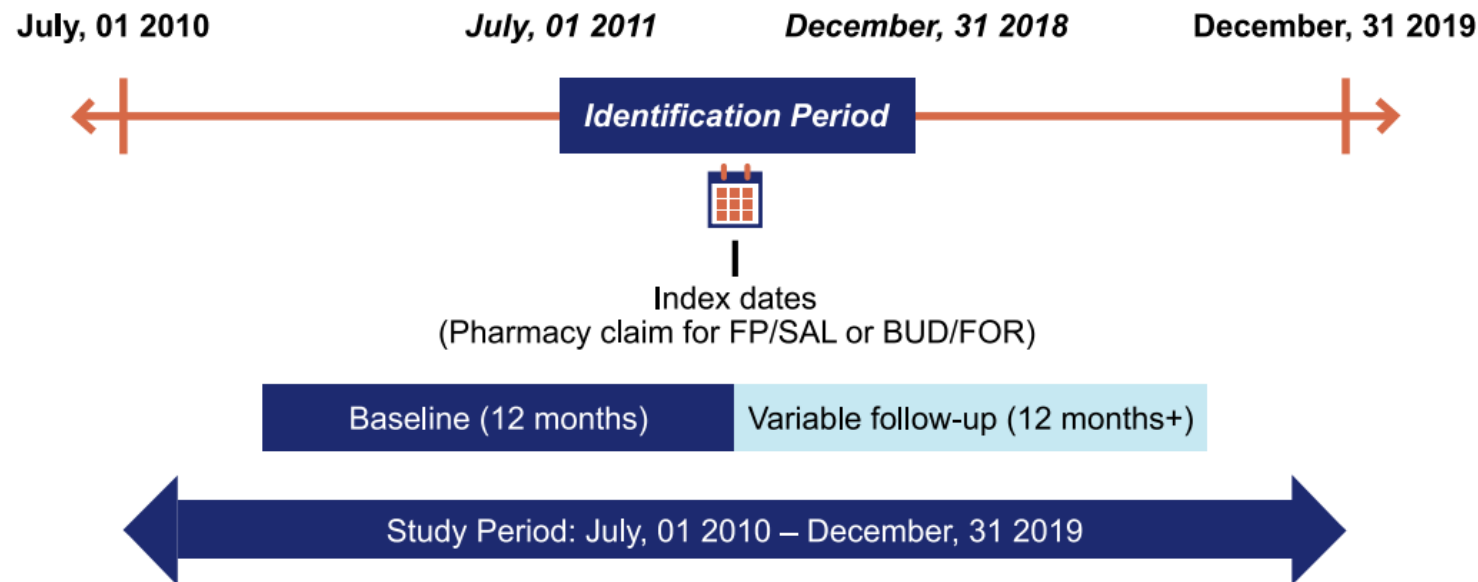
✓ 114 makale

It is considered that the different patient characteristics, such as age, gender, education level, number of inhalers prescribed or having received prior instructions on the use of each inhaler, have an influence on the inhalation technique of our patients.



Original Research

Comparative effectiveness of inhaled fluticasone propionate/salmeterol and budesonide/formoterol fixed-dose combinations in asthma control – a retrospective United States database analysis



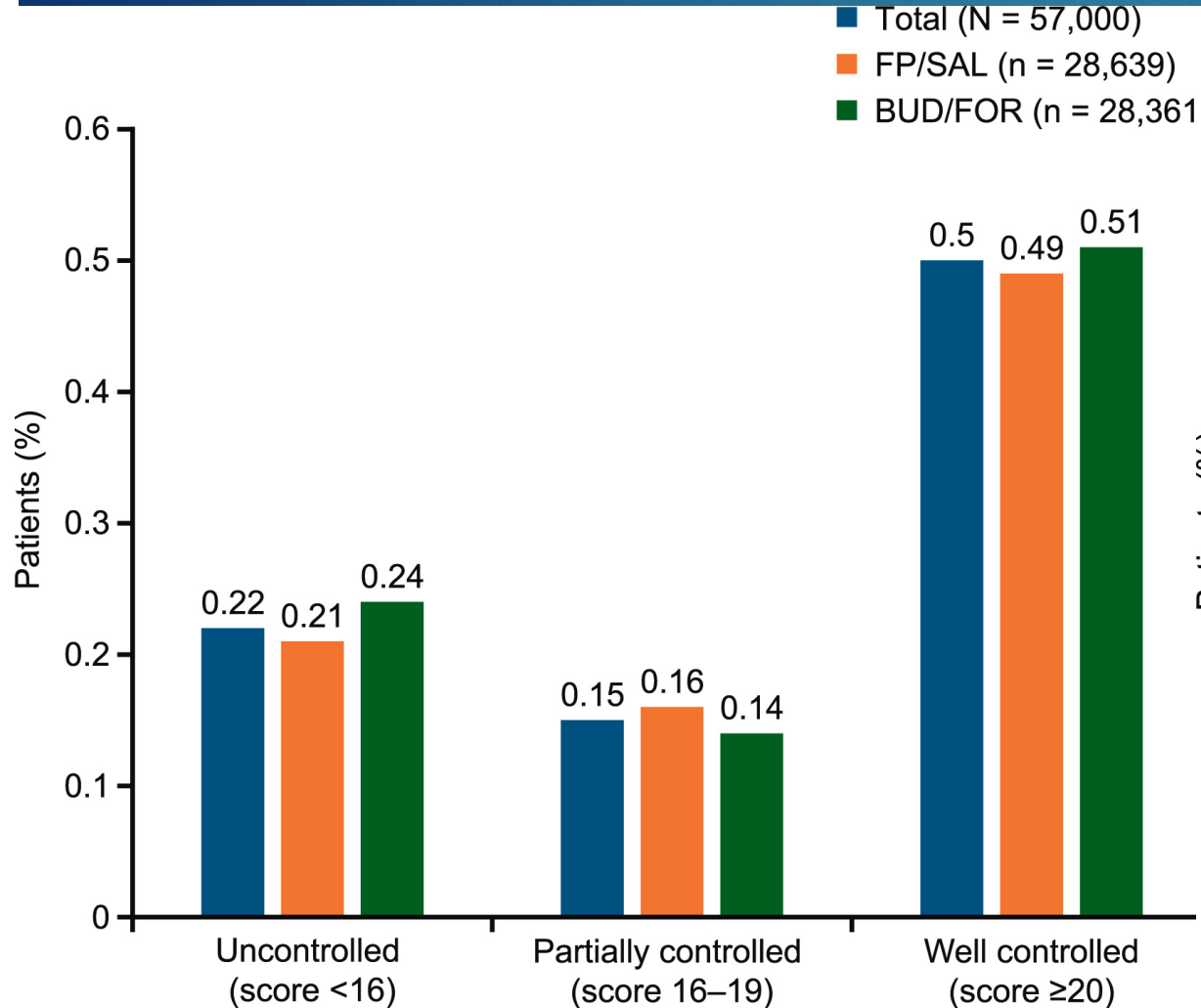
Retrospektif Kohort çalışma
GINA step 3,4
Fiks doz IKS/LABA

FP/SAL cohort: n = 28,639;
BUD/FOR cohort: n = 28,361)

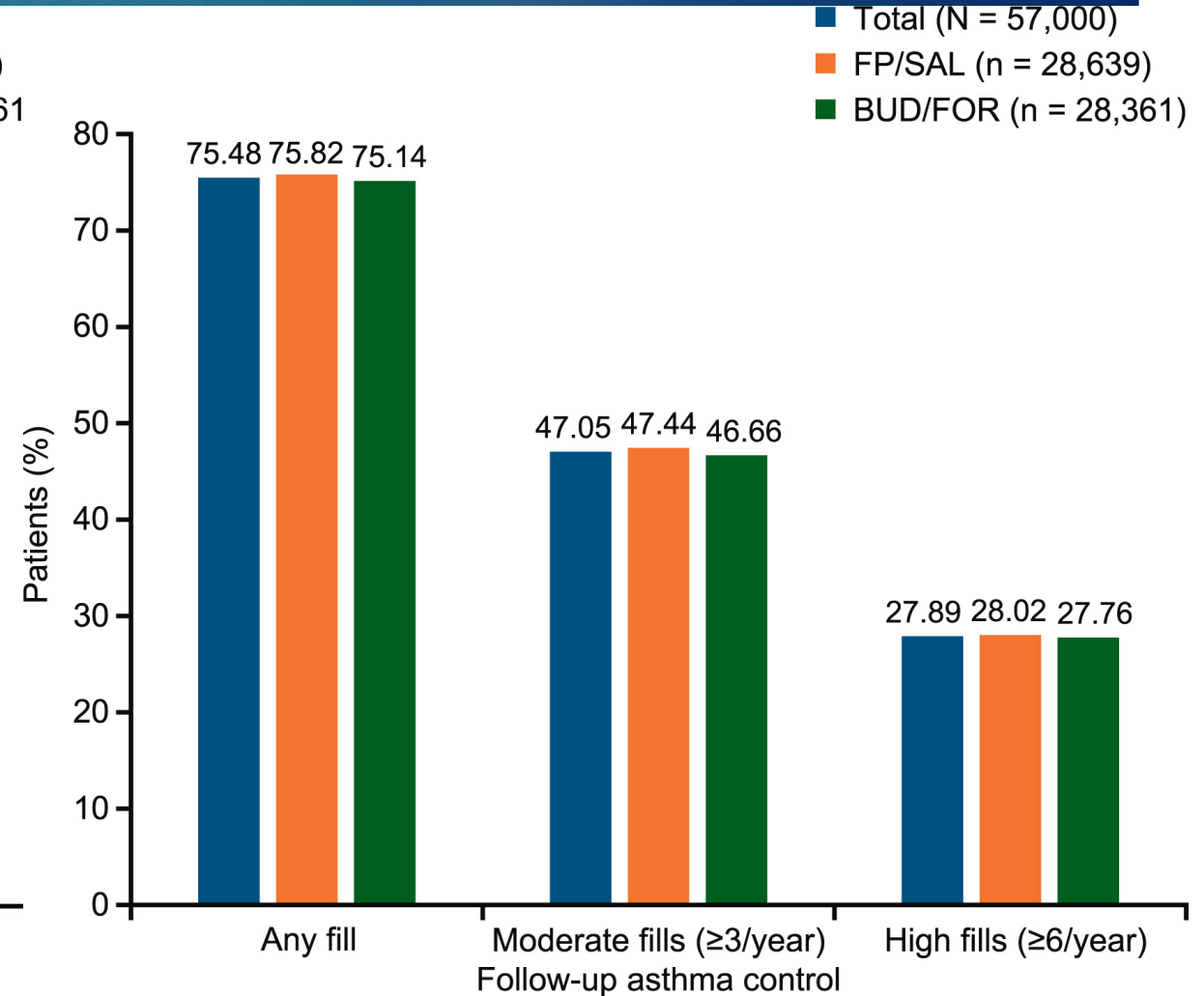
FP/SAL versus BUD/FOR asthma control and exacerbation outcomes.

Follow-up	Total (N = 57,000)	FP/SAL cohort (n = 28,639)	BUD/FOR cohort (n = 28,361)	p-value
<i>Asthma control</i>				
ACT, n	467	244	223	0.551
Mean (SD)	19.21 (11.79)	18.87 (5.54)	19.53 (15.62)	
Number of SABA refills/year, mean (SD)	5.82 (10.45)	5.80 (10.29)	5.85 (10.62)	0.686
<i>Asthma treatment adherence</i>				
PDC (continuous), mean, %	71.8	73.5	70.1	0.003
PDC (categorical), n (%)				
≥1	229 (0.40)	122 (0.43)	107 (0.38)	0.365
≥0.8	2795 (4.90)	1538 (5.37)	1257 (4.43)	<0.001
≥0.5	8581 (15.05)	4447 (15.53)	4134 (14.58)	0.007
Follow-up time (days)				
Mean (SD)	1206.06 (663.08)	1197.40 (661.71)	1214.81 (664.36)	0.019
<i>Exacerbation outcomes</i>				
Asthma exacerbation counts/year (continuous), mean (SD)	0.39 (1.04)	0.38 (1.01)	0.40 (1.07)	0.092
Asthma exacerbation episodes, n (%)	12,674 (22.24)	6327 (22.09)	6347 (22.38)	0.475
With ER/ambulatory visits	11,778 (92.93 ^a)	5865 (92.70)	5913 (93.15 ^b)	0.420
With hospitalization	1749 (13.80 ^a)	859 (13.58)	890 (14.02 ^b)	0.560
<i>Treatment switching patterns</i>				
Discontinuation of index medication, n %	54,852 (96.23)	27,420 (95.74)	27,432 (96.72)	<0.001

Hem FP/SAL hem de BUD/FOR, astım kontrolünde benzer derecede etkili



Toplam AKT puanları



İzlemde SABA reçetelenme oranı



Asthma: diagnosis, monitoring and chronic asthma management (BTS, NICE, SIGN)

1.11 Adherence

- 1.11.1 Check adherence, using prescription records, and inhaler technique at every asthma-related healthcare review. Use the principles outlined in the [NICE guidelines on shared decision making](#) (endorsed by SIGN for use in Scotland) and [medicines adherence](#). [NICE 2017, BTS/SIGN 2019]

Shared decision making

NICE guideline | NG197 | Published: 17 June 2021

Ortak karar alma

- hem kanıtlara hem de kişinin bireysel tercihlerine, inançlarına ve değerlerine dayanarak testler ve tedaviler seçmeyi içerir

Geri öğret

- verilen talimatları 'geri öğretmeleri'

Üç aşamalı model

- Seçim tanıtım
- Seçenekleri tanımlamak, genellikle hasta karar desteğinin kullanımını entegre ederek
- İnsanların tercihlerini keşfetmesine ve karar vermelerine yardımcı olmak.

İnhaler Tedavilerin Ortak SORUNLARI

İnspiratuvar
akış

İnhalasyon
süresi

Koordinasyon

Doz hazırlığı

İnhalasyondan
önce nefes
verme

İnhalasyondan
sonra nefes
tutma

From the infant to the geriatric patient—Strategies for inhalation therapy in asthma and chronic obstructive pulmonary disease

- ▶ Bilişsel, koordinasyon ve el becerisi gereksinimlerinin tamamını karşılayan hastalarda **basınçlı ölçülü doz inhaler** tercih edilebilir.
- ▶ **Kuru toz inhaler**, yeterli tepe inspiratuvar akış hızına ve iyi bilişsel ve el becerilerine sahip hastalar için tercih edilebilir
- ▶ El tipi inhaler cihazlarını kullanmak istemeyen veya kullanamayan kişilerde nebülizatörler endike olabilir.

Inhaler technique: facts and fantasies. A view from the Aerosol Drug Management Improvement Team (ADMIT)

- ▶ pMDI inhaler cihazları alkalanmalıdır.
- ▶ **Nefes aldıktan sonra nefesi tutmak** klinik olarak faydalıdır (en az 5 saniye)

**Hastaların tek tip inhaler kullanmaları hataları azaltır
Kendi tercih ettikleri inhaler cihazı kullanan hastaların sonuçları daha iyidir.**

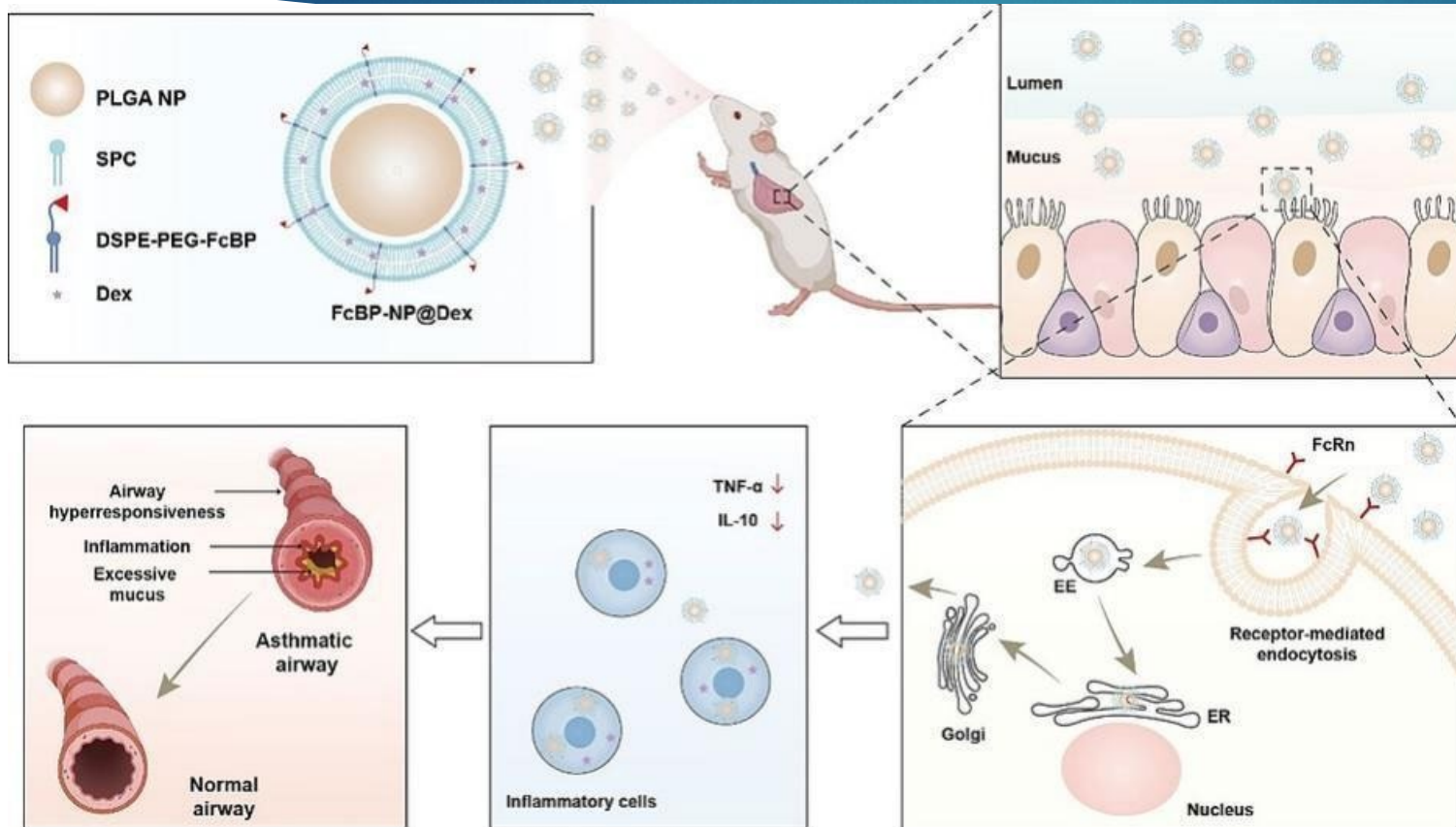
partikülleri solunabilir bir boyuta (<5 mikron) ayırmak için önemli bir kuvvete/
yüksek bir akış hızına ihtiyaç duyar (60 L/dk)

- ▶ Hastalar, inhaler cihazlarına nefes vermemeli veya üflememeleri konusunda bilgilendirilmeli- çünkü bu durum yoğunlaşmaya ve neme neden olur



Gelecekte ne tür tedaviler
bizi bekliyor !!

Airway epithelial-targeted nanoparticle reverses asthma in inhalation therapy

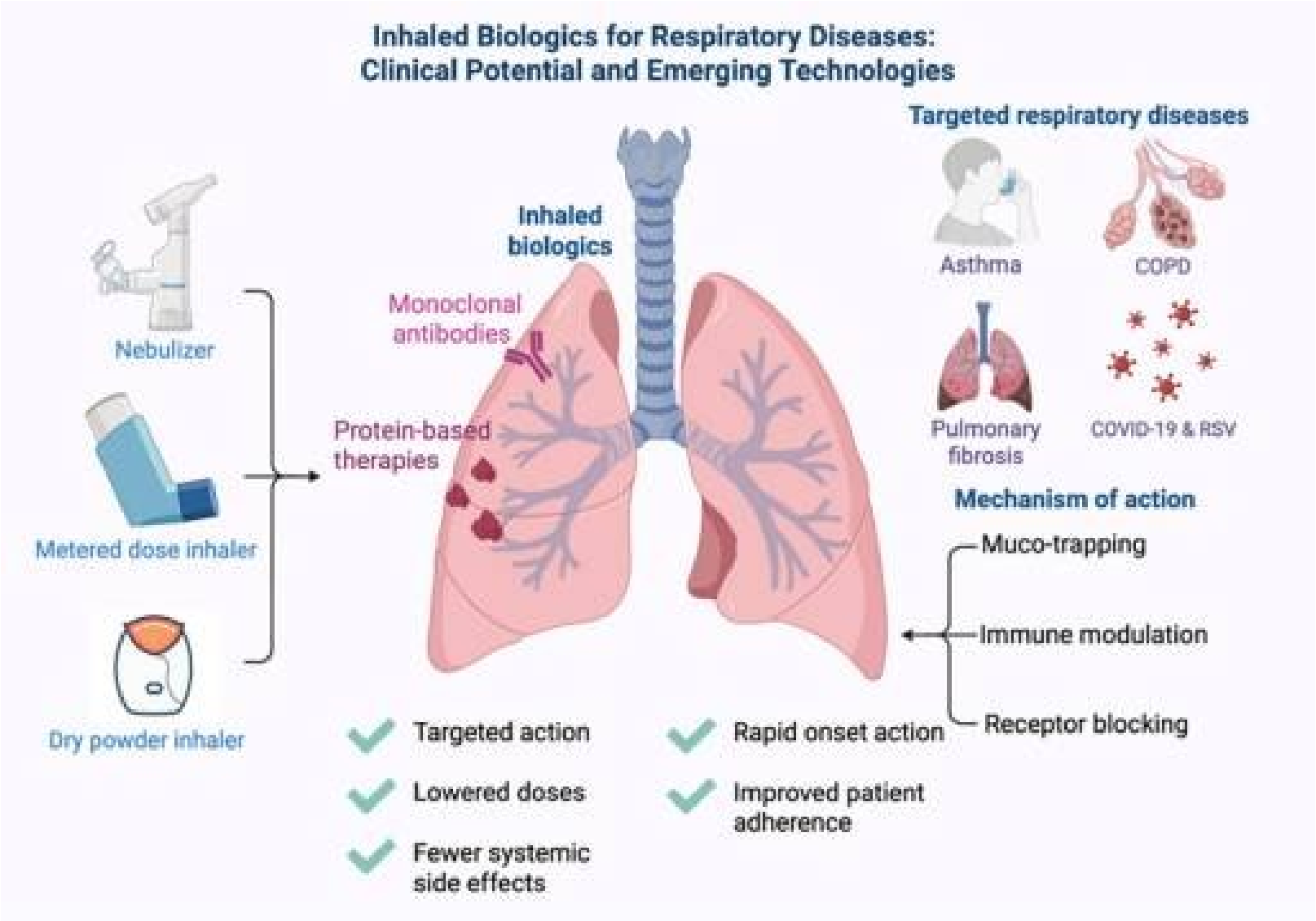


► PEG kaplı (PLGA)-lipit nanopartikülleri (PEG-NP)

nanotaşıyıcılar astımın inhalasyon tedavisi için yeni bir uygulama yöntemi olabilir*



Inhaled biologics for respiratory diseases: clinical potential and emerging technologies



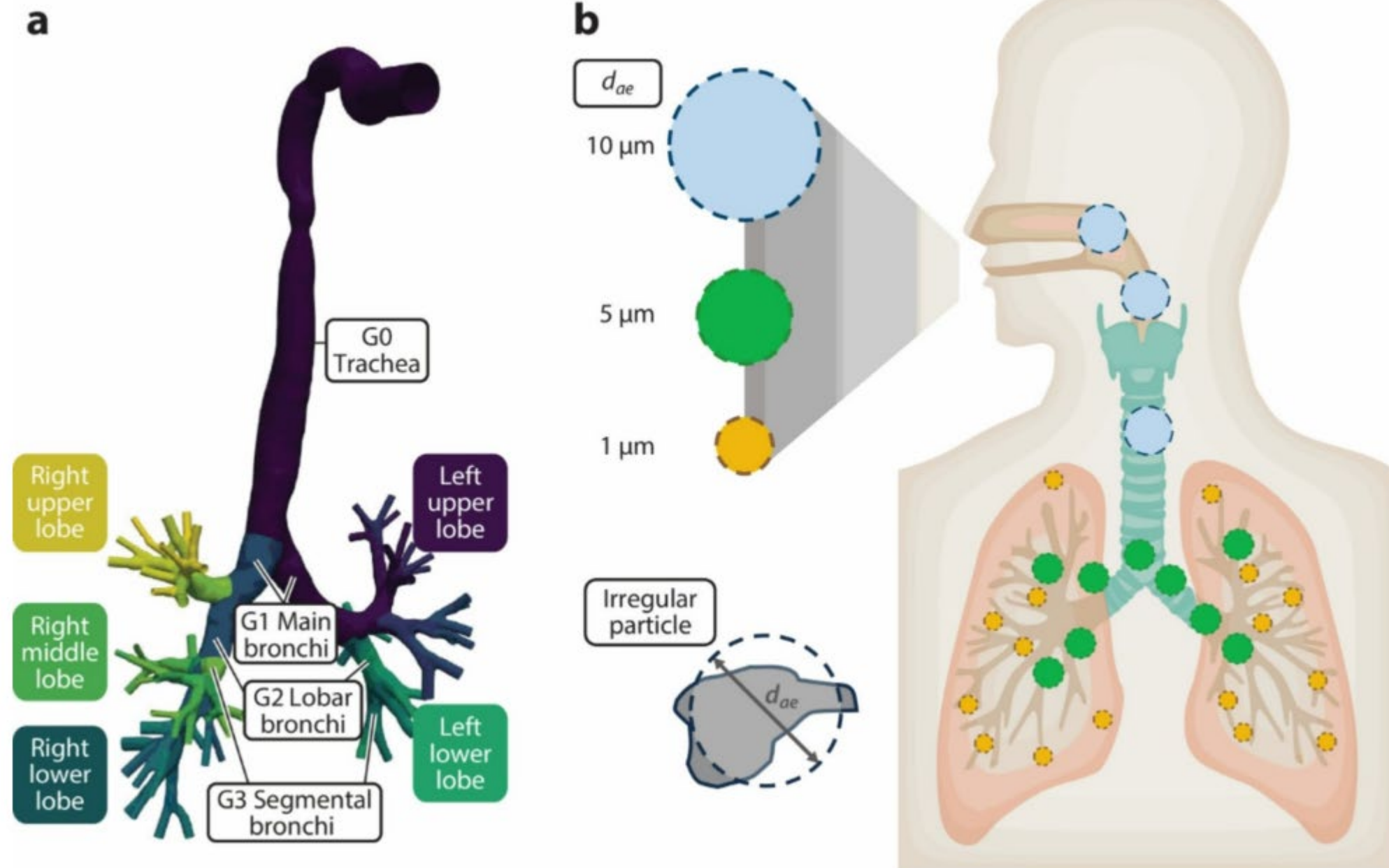


Table 2 Shows a summary of the key findings discussed in section below

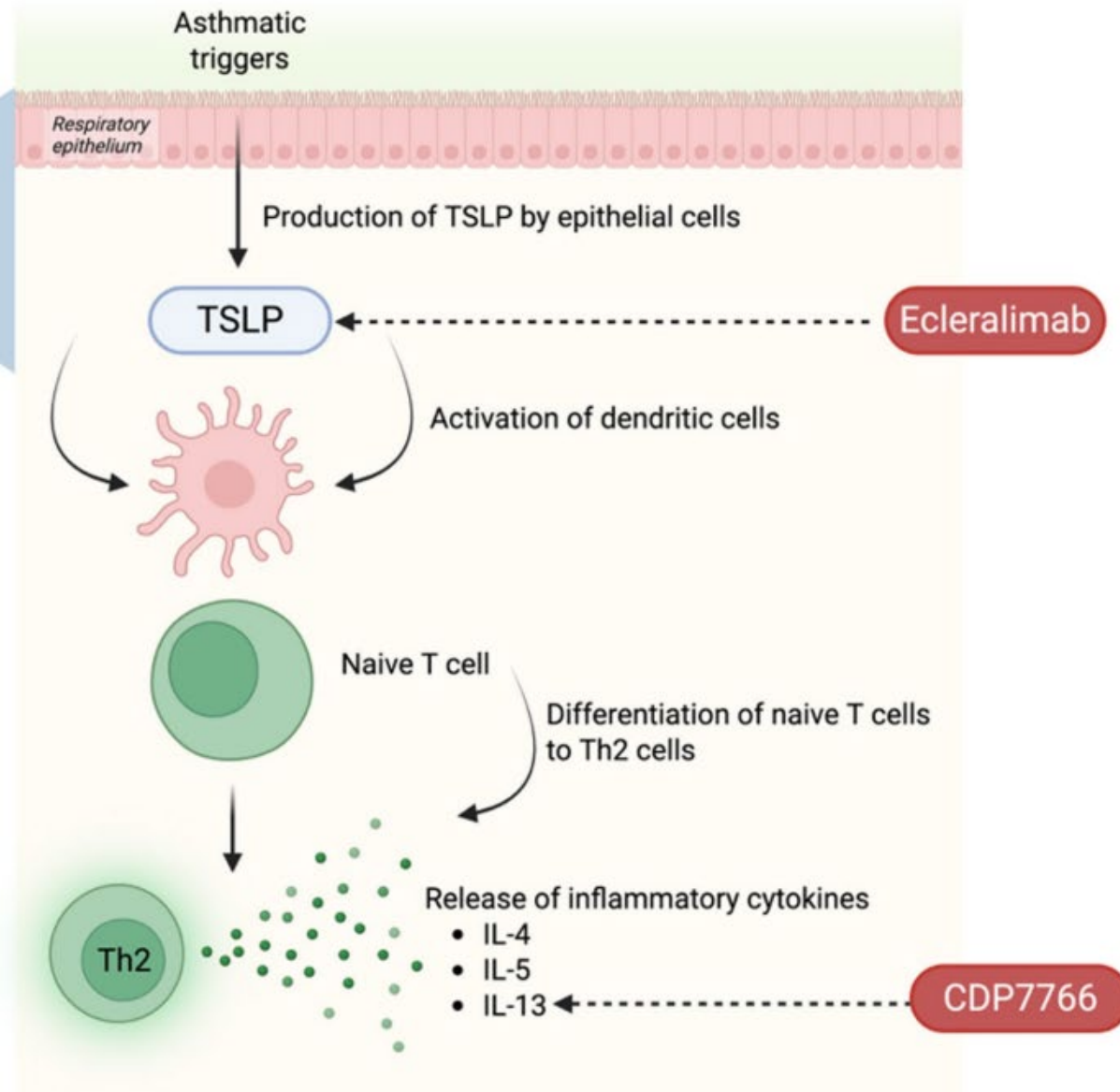
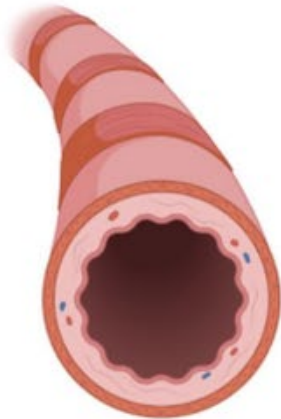
Respiratory disease	Biologics involved	Type of biologics	Mechanism of action	Development status	References
Asthma	Ecleralimab	mAb fragment	Anti-TSLP therapy	Phase II clinical trial	[16, 59]
	CDP7766	mAb fragment	Prevents IL-13 from binding to its receptor, IL-13R α 1	Preclinical animal-model study	[60]
Pulmonary fibrosis	OM-85	Bacterial lysate	Promote a Th1-biased immune environment by increasing interferon-gamma (IFN- γ) and reducing interleukin-4 (IL-4)	Preclinical animal-model study	[61]
	PRS-220	Protein	Blocks CCN2, preventing the over-activation of fibroblasts and the excessive deposition of extracellular matrix components	Preclinical ex-vivo human study	[62]
COVID-19	Lung spheroid cell secretomes or exosomes	Biologic mixture or nanoparticle-based biologic	Modulates fibrosis, inflammation, and tissue repair processes	Preclinical animal-model study	[63]
	Pittsburgh inhalable Nanobody 21 (PiN-21)	Single-domain antibody fragment	Bioengineered into a trimeric form for higher affinity towards SARS-CoV-2	Preclinical animal-model study	[64]
	SNG001	Protein (recombinant cytokine)	Increases high concentrations of interferon- β in the lungs resulting in a robust local antiviral response	Phase II clinical trial	[65]
	HH-120	Multivalent, recombinant fusion protein	High binding affinity to the viral S protein, increasing ability of viral neutralization	Preclinical animal-model study	[66]

Asthmatic airway



- Smooth muscle tightened
- Inflamed airway
- Mucus build up

Normal airway





8 Şubat 2025-İzmir-MASTERCLASS



TEŞEKKÜRLER.....