

Date: 25th February-2026

SOVUQ ZANJIR (COLD CHAIN) BUZILISHI VA VAKSINA SAMARADORLIGI.

Sharofova Feruza Furqat qizi
Ziyoqulova Salomat Jasur qizi

Qorako'l Abu li ibn Sino nomidagi Jamoat salomatligi texnikumi.

Annotatsiya: Vaksinalarning samaradorligi ularni ishlab chiqarishdan boshlab qo'llashgacha bo'lgan bosqichlarda sovuq zanjirga qat'iy rioya qilinishiga bog'liq. Harorat rejimining buzilishi vaksinaning immunogenligini pasaytirishi, klinik samaradorligini kamaytirishi va noto'g'ri emlash natijalariga olib kelishi mumkin. Ushbu maqolada sovuq zanjir tushunchasi, buzilish sabablari, vaksinalarga ta'siri hamda nazorat mexanizmlari tahlil qilinadi.

Kalit so'zlar: sovuq zanjir, vaksina saqlash, immunogenlik, harorat monitoringi, logistika, emlash samaradorligi.

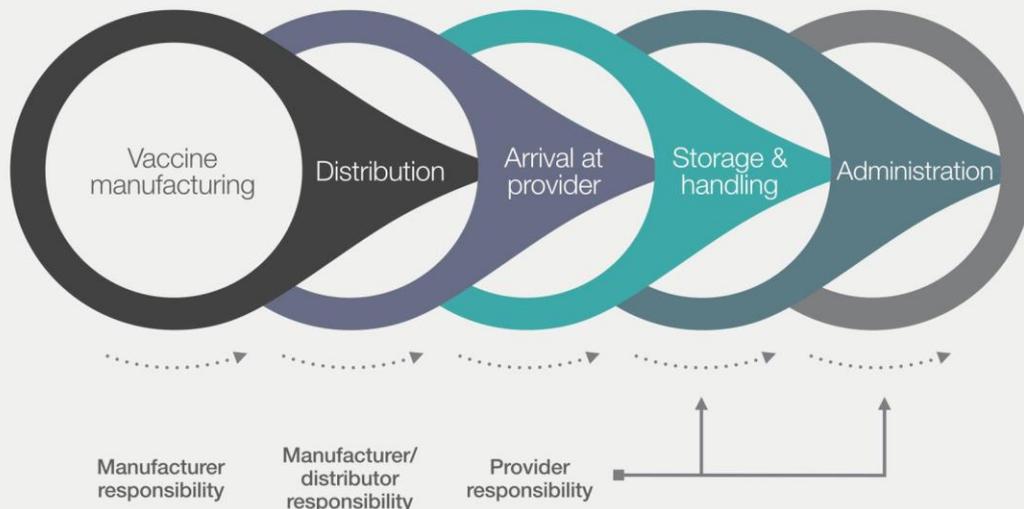
1. Kirish

Sovuq zanjir — bu vaksinalarni ishlab chiqarishdan tortib emlash punktigacha belgilangan haroratda saqlash va tashish tizimidir. World Health Organization ma'lumotlariga ko'ra, dunyo bo'yicha vaksinalarning 20–50% qismi noto'g'ri harorat sharoitida saqlanishi xavfi ostida.

Ko'pchilik vaksinalar uchun optimal harorat: **+2°C dan +8°C gacha.**

2. Sovuq zanjir tizimining asosiy komponentlari

The cold chain flow chart



Date: 25th February-2026



4

Sovuq zanjir quyidagi bosqichlardan iborat:

1. Ishlab chiqarish korxonasi
2. Markaziy ombor
3. Hududiy distribyutor
4. Tibbiyot muassasasi
5. Emlash punkti

Asosiy vositalar:

- Tibbiy sovutkichlar
- Muzli konteynerlar (cold box)
- Harorat registratorlari
- VVM (Vaccine Vial Monitor)

3. Sovuq zanjir buzilishining sabablari

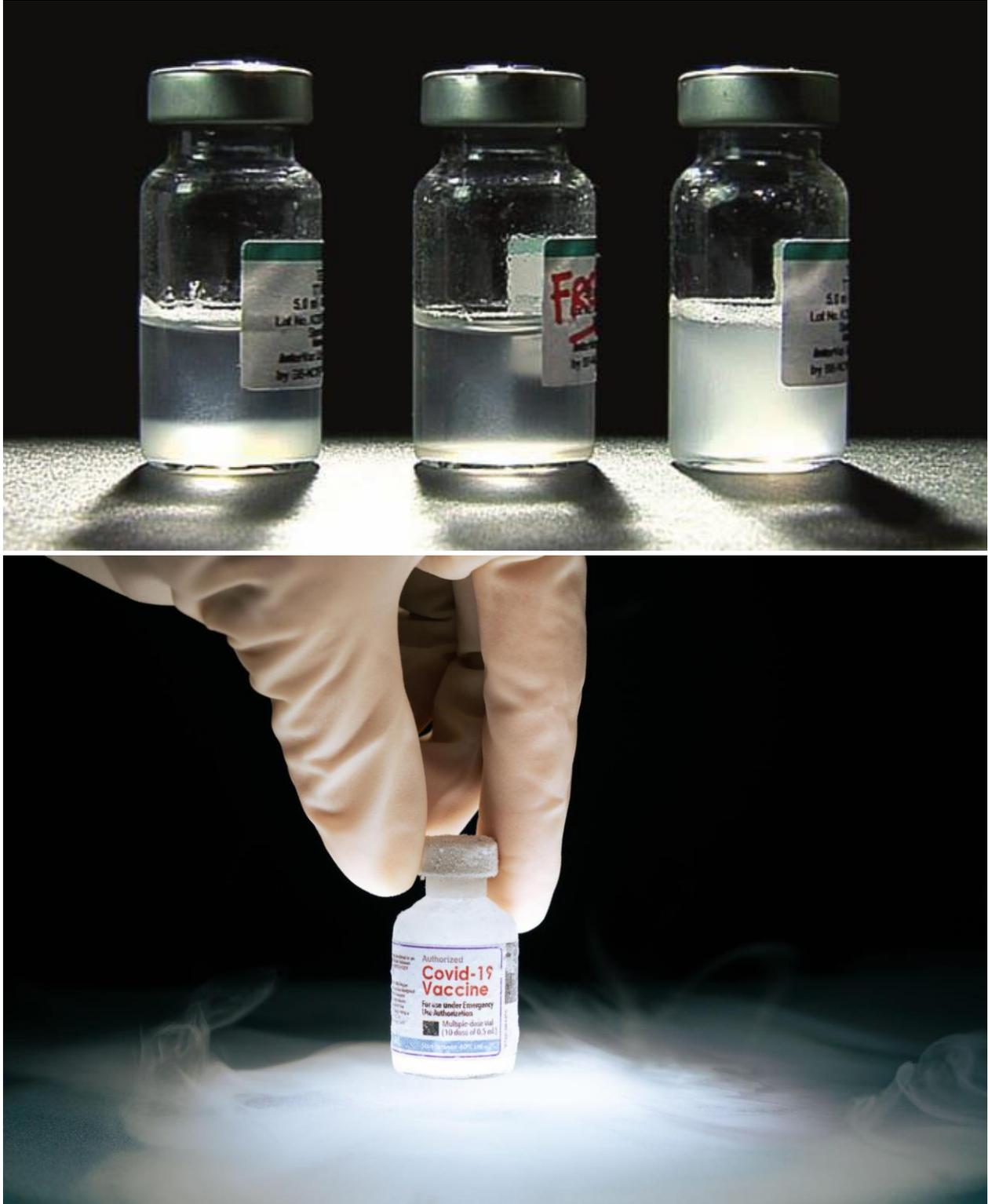
- Elektr ta'minotidagi uzilishlar
- Sovutkich nosozligi
- Transport vaqtida nazoratning yetishmasligi
- Xodimlarning noto'g'ri ishlashi
- Muzlatib yuborish (ayniqsa adsorbtsiyalangan vaksinalar uchun xavfli)

Ba'zi vaksinalar issiqqa sezgir bo'lsa, boshqalari muzlashga sezgir.

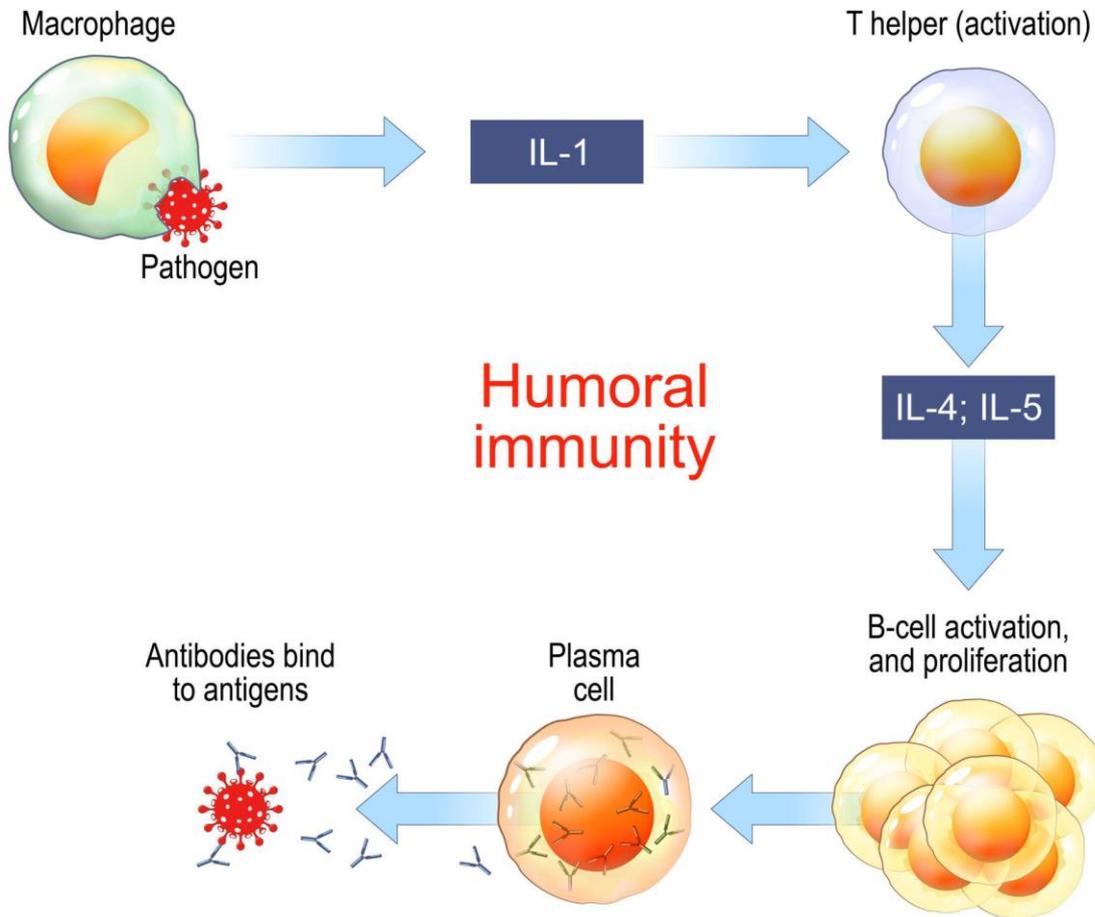


Date: 25th February-2026

4. Vaksina samaradorligiga ta'siri



IMMUNE RESPONSE



4

Sovuq zanjir buzilganda:

- Antigen strukturasi denaturatsiyasi
- Immun javobning pasayishi
- Yetarli antitela hosil bo'lmashligi
- Klinik himoya darajasining kamayishi

Natijada:

- "Vaksina muvaffaqiyatsizligi" holatlari
- Epidemiologik xavfning oshishi

5. Monitoring va nazorat mexanizmlari



Date: 25th February-2026



4

Zamonaviy nazorat vositalari:

- Raqamli harorat registratorlari
- Avtomatik signal tizimlari
- Quyosh energiyasida ishlovchi sovutkichlar
- Harorat jurnali yuritish

UNICEF va Gavi, the Vaccine Alliance sovuq zanjir infratuzilmasini mustahkamlash bo'yicha global dasturlar olib bormoqda.

6. Amaliy tavsiyalar

- Sovutkich haroratini kuniga kamida 2 marta qayd etish
- Elektr uzilganda favqulodda rejani ishga tushirish
- Muzlatishga sezgir vaksinalarni muz bilan bevosita kontakt qilmaslik
- Xodimlarni muntazam o'qitish

7. Muhokama

Sovuq zanjir buzilishi ko'pincha yashirin muammo bo'lib, klinik jihatdan darhol sezilmasligi mumkin. Ammo ommaviy emlash dasturlarida kichik xatoliklar ham katta epidemiologik oqibatlariga olib keladi.

8. Xulosa

Vaksina samaradorligi sovuq zanjirning uzluksiz ishlashiga bevosita bog'liq. Harorat nazoratini kuchaytirish, logistika tizimini takomillashtirish va xodimlar malakasini oshirish immunizatsiya dasturlarining muvaffaqiyatini ta'minlaydi.



Date: 25thFebruary-2026

FOYDALANILGAN ADABIYOTLAR:

1. World Health Organization. Temperature sensitivity of vaccines. Geneva: WHO; 2006.
2. World Health Organization. Immunization in practice: A practical guide for health staff. Geneva: WHO; 2015.
3. UNICEF. Effective Vaccine Management (EVM) Initiative. New York: UNICEF; 2019.
4. Gavi, the Vaccine Alliance. Cold chain equipment optimization platform (CCEOP). Geneva: Gavi; 2020.
5. Matthias DM, Robertson J, Garrison MM, Newland S, Nelson C. Freezing temperatures in the vaccine cold chain. *Vaccine*. 2007;25(20):3980–3986.
6. Kartoglu U, Milstien J. Tools and approaches to ensure quality of vaccines throughout the cold chain. *Expert Review of Vaccines*. 2014;13(7):843–854.
7. Chen D, Kristensen D. Opportunities and challenges of vaccine thermostability. *Human Vaccines & Immunotherapeutics*. 2009;5(3):210–215.
8. Hanson CM, George AM, Sawadogo A, Schreiber B. Is freezing in the vaccine cold chain an ongoing issue? *Vaccine*. 2017;35(17):2127–2133.
9. Zipursky S, Djingarey MH, Lodjo JC, Olodo L, Tiendrebeogo S, Ronveaux O. Benefits of using vaccine vial monitors. *Vaccine*. 2011;29(38):7126–7130.
10. Centers for Disease Control and Prevention. Vaccine storage and handling toolkit. Atlanta: CDC; 2023.

