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Modern Arterial Hypertension: Nocturnal Hypertension, Inflammatory Mechanisms, And Personalized Therapy

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MODERN ARTERIAL HYPERTENSION: NOCTURNAL HYPERTENSION, INFLAMMATORY MECHANISMS, AND PERSONALIZED THERAPY

Abstract

In recent years, arterial hypertension has been increasingly recognized not merely as a hemodynamic disorder, but as a complex, multifactorial disease closely associated with inflammatory processes and individual biological characteristics. This article examines the clinical significance of nocturnal and masked arterial hypertension, their role in the development of cardiovascular complications, and modern diagnostic approaches. Particular attention is paid to the role of 24-hour ambulatory blood pressure monitoring (ABPM) as the gold standard for detecting nocturnal hypertension, as well as to the prognostic value of non-dipper and reverse-dipper blood pressure patterns. In addition, the contribution of chronic low-grade inflammation to the pathogenesis of arterial hypertension is analyzed, with emphasis on key inflammatory biomarkers, including interleukin-6, tumor necrosis factor-alpha, and high-sensitivity C-reactive protein. The article also discusses current trends in personalized antihypertensive therapy, such as genetically guided drug selection, risk-oriented treatment strategies, and the use of artificial intelligence and digital technologies to optimize blood pressure control. It is emphasized that an individualized therapeutic approach improves blood pressure stability, reduces adverse effects, and significantly lowers the risk of cardiovascular complications.

Keywords: arterial hypertension, nocturnal hypertension, inflammation, personalized therapy, ABPM.

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Introduction

In traditional clinical practice, arterial hypertension has primarily been assessed based on blood pressure measurements obtained in outpatient settings. However, studies conducted between 2023 and 2025 have demonstrated that this approach is insufficient. According to modern concepts, masked forms of the disease, inflammation-related mechanisms, and individual biological characteristics of patients play a crucial role.

The Problem of Nocturnal and Masked Arterial Hypertension

Recent clinical studies indicate that nocturnal arterial hypertension significantly increases the risk of cardiovascular complications, particularly stroke and heart failure. Patients with normal daytime blood pressure but absent nocturnal blood pressure reduction are classified as a high-risk group.

Modern clinical guidelines recommend:

24-hour ambulatory blood pressure monitoring (ABPM) as the primary diagnostic method;

special clinical importance of “non-dipper” and “reverse-dipper” phenotypes.

These approaches allow early detection of masked hypertension and prevention of complications.

Role of Inflammatory Mechanisms in Arterial Hypertension

In recent years, chronic low-grade inflammation has been recognized as a key factor in the pathogenesis of arterial hypertension. Scientific studies confirm that vascular endothelial damage is directly associated with inflammatory mediators.

Key biomarkers include:

interleukin-6 (IL-6),

tumor necrosis factor-alpha (TNF-α),

high-sensitivity C-reactive protein (hs-CRP).

This approach enables evaluation of arterial hypertension not only through blood pressure values but also at the molecular level.

Personalized Antihypertensive Therapy

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In modern medicine, an individualized approach to the treatment of arterial hypertension is considered a priority. The variability in drug effectiveness among patients is explained by genetic, metabolic, and age-related factors.
In recent years, the following have been widely implemented:
drug selection based on genetic polymorphisms,
therapy tailored to cardiovascular risk profiles,
prediction of treatment effectiveness using artificial intelligence.
As a result, stable blood pressure control is achieved, adverse effects are reduced, and patient adherence to therapy improves.

Conclusion

According to modern scientific perspectives, arterial hypertension is not merely elevated blood pressure but a complex disease associated with nocturnal dysregulation, inflammatory processes, and individual biological characteristics. These approaches are essential for early diagnosis and reduction of cardiovascular complications.

MODERN APPROACHES TO ARTERIAL HYPERTENSION (2023–2025)

1. Expansion of the Concepts of Masked and Nocturnal Hypertension

Recent studies have proven that nocturnal hypertension is even more dangerous than daytime hypertension in terms of cardiovascular risk. Therefore:
ABPM is considered the gold standard;
reliance solely on office measurements is regarded as outdated.
Innovation: asymptomatic patients with elevated nocturnal blood pressure are classified as high-risk.

2. The Concept of “Inflammatory Hypertension”

Arterial hypertension is increasingly viewed as a disease associated with chronic low-grade inflammation rather than purely hemodynamic changes.
Identified markers include:
IL-6,

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TNF-α,
hs-CRP.
Innovation: antihypertensive drugs with anti-inflammatory properties are gaining preference.

3. Gut Microbiota and Arterial Hypertension

Studies from 2024–2025 demonstrate a direct relationship between gut microbiota and blood pressure. In salt-sensitive hypertension, alterations in microbiota composition and reduced short-chain fatty acids (SCFAs) contribute to elevated blood pressure.
Innovation: probiotics and dietary interventions are considered promising strategies.

4. Personalized Antihypertensive Therapy

The "one drug fits all" approach is obsolete. Modern strategies include:
genetically guided drug selection,
therapy adjusted for age, sex, and metabolic status,
AI-based risk prediction.
Innovation: individualized treatment strategies are more effective in blood pressure control.

5. Digital Technologies and Artificial Intelligence

Recent advancements include:
smart blood pressure monitors,
mobile applications,
AI-based monitoring systems.
Innovation: artificial intelligence can predict stroke or myocardial infarction risk years in advance.

6. "Low Blood Pressure Is Also Dangerous" (J-Curve Phenomenon)

Since 2024, excessively aggressive blood pressure reduction has been confirmed as dangerous in elderly patients and those with diabetes or chronic kidney disease.

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Innovation: target blood pressure levels are now determined based on individual risk rather than fixed numbers.

7. Superiority of Fixed-Dose Combination Therapy

Recent clinical trials show that single-pill combinations containing 2–3 drugs increase treatment adherence by 40–50%.

Innovation: monotherapy is recommended only for mild cases.

Final Conclusion

Arterial hypertension is no longer considered a simple elevation of blood pressure but a complex disease associated with inflammation, metabolism, microbiota, and digital technologies. Modern approaches play a crucial role in early diagnosis and reduction of complications.

References

1. Schiffrin P.W., Nosalski R., Maffia P., et al. *Immune and inflammatory mechanisms in hypertension.* Nat Rev Cardiol. 2024;21:396–416.
2. *Diagnostic and Therapeutic Approach to Different Hypertensive Phenotypes According to the 2023 ESH Guidelines.* High Blood Pressure & Cardiovascular Prevention. 2025.
3. *Resistant Blood Pressure: New Frontiers in Interventional Hypertension Therapy.* Cardiology and Therapy. 2025;14:513–530.
4. *Optimisation of arterial hypertension therapy in patients with metabolic disorders: aspect of fixed combination lipophilic of perindopril and amlodipine.* Exploration in Medicine. 2025.
5. *Hypertension burden in CKD: is nocturnal hypertension the primary culprit?* Clin Kidney J. 2025;18(9).
6. *Impact of cytokines on the onset and progression of arterial hypertension.* CyberLeninka. 2024.
7. *Zilebesiran – a promising RNAi therapeutic agent for hypertension.* NEJM; Annals of Medicine & Surgery. 2023–2025.

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ZAMONAVIY ARTERIAL GIPERTENZIYA: TUNGI GIPERTENZIYA, YALLIG‘LANISH MEXANIZMLARI VA SHAXSIYLASHTIRILGAN TERAPIYA

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ZAMONAVIY ARTERIAL GIPERTENZIYA: TUNGI GIPERTENZIYA, YALLIG‘LANISH MEXANIZMLARI VA SHAXSIYLASHTIRILGAN TERAPIYA

Annotatsiya

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So‘nggi yillarda arterial gipertenziya klassik gemodinamik kasallik sifatida emas, balki ko‘p omilli, yallig‘lanish va individual biologik xususiyatlar bilan bog‘liq patologiya sifatida qaralmoqda. Ushbu maqolada tungi va yashirin arterial gipertenziya muammosi, yallig‘lanish mexanizmlarining ahamiyati hamda shaxsiylashtirilgan antihipertenziv terapiyaning zamonaviy imkoniyatlari yoritiladi.

Kalit so‘zlar: arterial gipertenziya, tungi gipertenziya, yallig‘lanish, shaxsiylashtirilgan terapiya, ABPM.

Kirish

An’anaviy klinik amaliyotda arterial gipertenziya asosan poliklinik sharoitda o‘lchangan qon bosimi ko‘rsatkichlariga tayanib baholanib kelindi. Biroq 2023–2025 yillarda o‘tkazilgan tadqiqotlar ushbu yondashuvning yetarli emasligini ko‘rsatdi. Zamonaviy qarashlarga ko‘ra, kasallikning yashirin shakllari, yallig‘lanish bilan bog‘liq mexanizmlari va bemorning individual biologik xususiyatlari asosiy ahamiyat kasb etmoqda.

Tungi va yashirin arterial gipertenziya muammosi

So‘nggi klinik tadqiqotlar tungi arterial gipertenziya yurak-qon tomir asoratlari, xususan insult va yurak yetishmovchiligi xavfini sezilarli oshirishini ko‘rsatdi. Kunduzgi qon bosimi normal bo‘lgan, ammo tungi paytda bosimi pasaymaydigan bemorlar yuqori xavf guruhiga kiritilmoqda.

Zamonaviy klinik tavsiyalarda:

- 24 soatlik ambulator qon bosimi monitoringi (ABPM) diagnostikaning asosiy usuli sifatida tavsiya etilmoqda;
- “non-dipper” va “reverse-dipper” fenotiplari alohida klinik ahamiyatga ega deb baholanmoqda.

Bu holatlar arterial gipertenziyaning yashirin kechishini erta aniqlash va asoratlarning oldini olish imkonini beradi.

Arterial gipertenziyada yallig‘lanish mexanizmlarining roli

So‘nggi yillarda arterial gipertenziya patogenezida surunkali past darajali yallig‘lanish muhim omil sifatida ko‘rilmoqda. Ilmiy ishlar qon tomir endoteliysi shikastlanishi yallig‘lanish mediatorlari bilan bevosita bog‘liq ekanini tasdiqladi. Asosiy biomarkerlar sifatida:

- interleykin-6,

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- TNF-α,
- yuqori sezuvchan C-reaktiv oqsil
- ko‘rsatkichlari muhim prognostik ahamiyatga ega.

Ushbu yondashuv arterial gipertenziyani faqat bosim ko‘rsatkichlari orqali emas, balki molekulyar darajada baholash imkonini bermoqda.

Shaxsiylashtirilgan antigipertenziv terapiya

Zamonaviy tibbiyotda arterial gipertenziya davolashda individual yondashuv ustuvor hisoblanadi. Bir xil dori vositasining barcha bemorlarda bir xil samaradorlik ko‘rsatmasligi genetik, metabolik va yoshga bog‘liq omillar bilan izohlanadi.

So‘nggi yillarda:

- genetik polimorfizmlarga asoslangan dori tanlash,
- yurak-qon tomir xavf profiliga mos terapiya,
- sun’iy intellekt yordamida davolash samaradorligini prognozlash

keng qo‘llanila boshlandi.

Natijada qon bosimini barqaror nazorat qilish bilan birga nojo‘ya ta’sirlar kamayishi va bemorlarning davolanishga rioya qilishi yaxshilanmoqda.

Xulosa

Zamonaviy ilmiy qarashlarga ko‘ra arterial gipertenziya — bu faqat qon bosimining ko‘tarilishi emas, balki tungi disbalans, yallig‘lanish jarayonlari va individual biologik xususiyatlar bilan bog‘liq murakkab kasallikdir. Ushbu yondashuvlar kasallikni erta aniqlash va yurak-qon tomir asoratlarini kamaytirishda muhim ahamiyat kasb etadi.

ARTERIAL GIPERTENZIYA BO‘YICHA ZAMONAVIY YANGI YONDASHUVLAR (2023–2025)

1. “Yashirin” va “tungi” gipertenziya tushunchasining kengayishi So‘nggi tadqiqotlarda tungi arterial gipertenziya (nocturnal hypertension) yurak-qon tomir asoratlari uchun kunduzgi gipertenziyadan ham xavfliroq ekani isbotlandi. Shu sababli: 24 soatlik qon bosimi monitoringi (ABPM) oltin standart sifatida qaralmoqda; faqat poliklinik o‘lchovlarga tayanish eskirgan yondashuv deb hisoblanmoqda.

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Yangilik: klinik simptomlarsiz, lekin tungi bosimi yuqori bemorlar yuqori xavf guruhiga kiritilmoqda.

2. “Yallig‘lanish gipertenziyasi” konsepsiyasi Oxirgi yillarda arterial gipertenziya faqat gemodinamik emas, balki surunkali past darajali yallig‘lanish bilan bog‘liq kasallik sifatida ko‘rilmoqda. Aniqlangan yangi markerlar: IL-6, TNF-α yuqori sezuvchan C-reaktiv oqsil (hs-CRP)

Yangilik: yallig‘lanishga qarshi ta’sirga ega antihipertenziv preparatlar ustunlikka ega bo‘lmoqda.

3. Ichak mikrobiotasi va arterial gipertenziya 2024–2025 yillardagi tadqiqotlar ichak mikroflorasi va qon bosimi o‘rtasida to‘g‘ridan-to‘g‘ri bog‘liqlik mavjudligini ko‘rsatdi. Tuzga sezgir gipertenziyada mikrobiota tarkibi o‘zgargan Qisqa zanjirli yog‘ kislotalari (SCFA) kamayishi bosim oshishiga olib keladi

Yangilik: probiotiklar va ovqatlanish orqali gipertenziyani nazorat qilish istiqbolli yo‘nalish sifatida baholanmoqda.

4. Shaxsiylashtirilgan (personalized) antihipertenziv terapiya Endi “bitta dori – hamma uchun” yondashuvi eskirdi. Zamonaviy yo‘nalishlar: genetik polimorfizmlarga asoslangan dori tanlash yosh, jins, metabolik holatga qarab terapiya sun’iy intellekt asosida xavfni prognozlash

Yangilik: individual davolash strategiyasi qon bosimini barqaror nazorat qilishda ancha samarali.

5. Raqamli texnologiyalar va sun’iy intellect So‘nggi yillarda: smart-tonometrlar mobil ilovalar AI asosidagi monitoring tizimlari keng joriy qilinmoqda.

Yangilik: sun’iy intellekt bemorda insult yoki infarkt xavfini bir necha yil oldin prognoz qila olmoqda.

6. “Past bosim ham xavfli” (J-curve phenomenon) 2024 yildan boshlab haddan tashqari agressiv bosim tushirish: keksa yoshda diabet va buyrak yetishmovchiligida xavfli ekanligi yana tasdiqlandi.

Yangilik: maqsadli qon bosimi endi individual xavfga qarab belgilanmoqda, qat’iy raqamlar emas.

7. Kombinatsiyalangan bir martalik preparatlar ustunligi

So‘nggi klinik tadqiqotlar shuni ko‘rsatdiki: 1 tabletkada 2–3 ta preparat → dori ichishga rioya qilishni 40–50 % ga oshiradi.

Yangilik: monoterapiya faqat yengil holatlarda tavsiya etilmoqda.

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Xulosa (zamonaviy ruhda)

Arterial gipertenziya endi oddiy “qon bosimi balandligi” emas, balki yallig‘lanish, metabolizm, mikrobiota va raqamli texnologiyalar bilan bog‘liq kompleks kasallik sifatida qaralmoqda. Zamonaviy yondashuvlar kasallikni erta aniqlash va asoratlarni kamaytirishda muhim ahamiyatga ega.

Adabiyotlar ro‘yxati

1. Schiffrin P.W., Nosalski R., Maffia P. va boshqalar. *Immune and inflammatory mechanisms in hypertension.* **Nat Rev Cardiol.** 2024;21:396–416.
   — yallig‘lanish mexanizmlari va immuun tizimning arterial gipertenziyadagi roli haqida tizimli sharh.
2. Diagnostic and Therapeutic Approach to Different Hypertensive Phenotypes According to the 2023 ESH Guidelines. *High Blood Pressure & Cardiovascular Prevention.* 2025.
   — 2023 ESH yo‘riqnomalari asosida **tungi gipertenziya (nocturnal hypertension)** va uning terapevtik yondashuvlari.
3. Resistant Blood Pressure: New Frontiers in Interventional Hypertension Therapy. *Cardiology and Therapy.* 2025;14:513–530.
   — rezistent gipertenziya va yangi intervension terapiyalar istiqbollari (qon bosimni boshqarish mexanizmlari bilan).
4. Optimisation of arterial hypertension therapy in patients with metabolic disorders: aspect of fixed combination lipophilic of perindopril and amlodipine. *Exploration in Medicine.* 2025.
   — metabolik sindrom bilan kechuvchi gipertenziyani davolash yondashuvlari va **yallig‘lanish faoliyatini kamaytirish** bo‘yicha klinik natijalar.
5. Hypertension burden in CKD: is nocturnal hypertension the primary culprit? *Clin Kidney J.* 2025;18(9).
   — buyrak yetishmovchiligi kontekstida **tungi gipertenziya patofiziologiyasi va klinik oqibatlari**.

Academicia Review-A Multidisciplinary Online Journal
ISSN (Online): 3070-6726
Website: https://academicia.org
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6. Impact of cytokines on the onset and progression of arterial hypertension. *CyberLeninka*. 2024.
— sitokinlarning gipertenziya rivojlanishidagi o‘rni va yallig‘lanish mexanizmlari.
7. Zilebesiran – a promising RNAi therapeutic agent for hypertension. *Arterial Hypertension; New England Journal of Medicine; Annals of Medicine & Surgery*. 2023–2025.
— **shaxsiylashtirilgan terapiya yo‘nalishida** siRNA asosidagi yangi dori, angiotenzinogen sintezini to‘xtatish orqali uzoq muddatli qon bosimini tushiradi.