Biodegradable Intra-arterial Devices for Focal Drug Delivery to Targeted Organs

Tech ID: 34807 / UC Case 2023-987-0

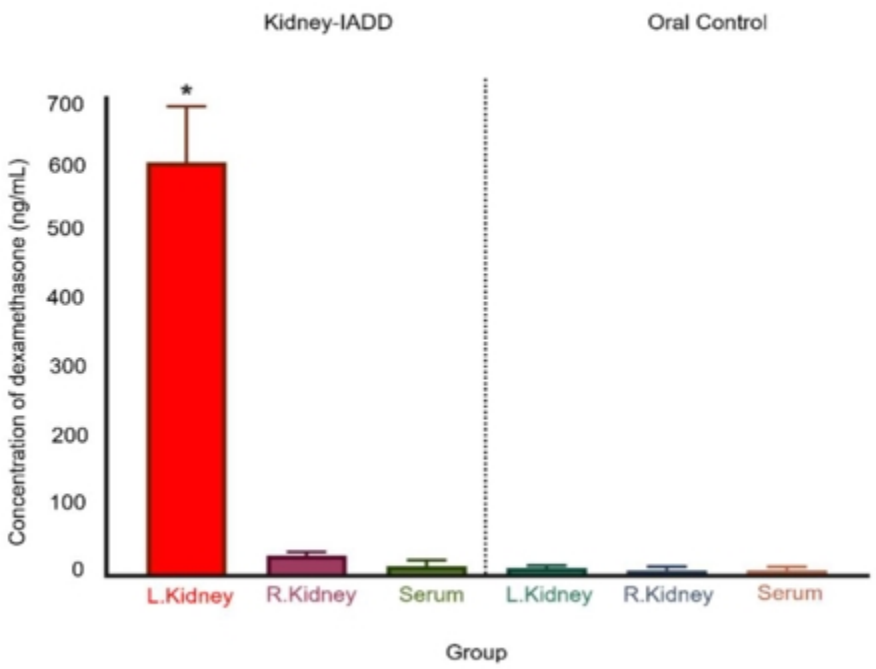
BACKGROUND

The development of focal drug delivery systems represents a significant advancement in treating diseases localized to specific tissues or organs. Compared with conventional methods, such as intravenous (IV) and oral administration, these systems allow for precise medication delivery directly to the targeted area while reducing systemic exposure and off-target side effects. Several delivery techniques have been proven to achieve focal drug delivery, including intra-arterial (IA) injectables. However, current IA technology is limited to the duration of endovascular catheterization and allows for acute delivery only.

BRIEF DESCRIPTION

Professors Edward Zagha and Huinan Liu at the University of California, Riverside, have developed the Intra-Arterial Drug Delivery (IADD) system to deliver highly localized, organ-specific drug targeting utilizing the body's vascular network as a direct perfusion conduit.

The IADD system targets a specific non-vessel organ or tissue by positioning a biodegradable, drug-eluting device within an upstream feeding artery. The device slowly releases the agent into the local arterial blood supply over an extended duration. This technology is advantageous because it establishes robust target-organ enrichment while vastly minimizing systemic circulation exposure and its accompanying adverse reactions.



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OTHER INFORMATION

KEYWORDS

Intra-arterial drug delivery (IADD), localized perfusion, spatial specificity, target-organ enrichment, biodegradable device, poly(glycerol sebacate), magnesium substrate, non-stent device, sustained release.

CATEGORIZED AS

- Medical
  - Devices

RELATED CASES

2023-987-0

Fig. 1: The focal delivery of dexamethasone (DEX) loaded UCR IADD device after a 7-day in vivo implantation in the left renal artery. The IADD system delivered 600x the localized concentration of DEX when compared to oral administration.

SUGGESTED USES

- For possible site-specific neurological and cardiovascular condition management such as for localized hypertension, epilepsy, stroke, traumatic brain injuries, and focal pain.
- May enable the targeted delivery of corticosteroids or immunomodulators to localized visceral spaces to treat chronic inflammatory diseases such as Crohn's disease or ulcerative colitis.
- For potential focal chemotherapeutic delivery into feeding target vessels to treat primary tumors (e.g., glioblastoma) while preventing systemic toxicities like neuropathy or kidney failure.

PATENT STATUS

Patent Pending

RELATED MATERIALS

- Kinra, M., Sheng, R., Chen, Y., de Souza, A. J., Bhatia, A., Sakomizu, G., Tan, J., Sun, D., Zagha, E., & Liu, H. (2026). Biodegradable intra-arterial devices for focal drug delivery to targeted organs. bioRxiv. Preprint. https://doi.org/10.64898/2026.02.23.707478 - 02/24/2026

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