

Do we need separate his and hers medicine cabinets?

July 26 2017



Medication has different effects on men and women. In recent studies, Jena researchers have once again given concrete indications for the need for a gender-specific medicine. Credit: Jan-Peter Kasper/FSU

One difference between the sexes that medical professionals take

seriously is the susceptibility to certain diseases.

"We know, for example, that inflammatory diseases such as asthma, psoriasis or rheumatoid arthritis occur much more frequently in women than in men," says Prof. Oliver Werz of the Friedrich Schiller University Jena. The German pharmacist and his team, together with colleagues from Italy, Denmark and Sweden, have uncovered a significant cause for these sex differences at the molecular level. In two high-profile publications in the *Journal of Clinical Investigation* and *Scientific Reports*, they show how the male sex hormone [testosterone](#) interferes with the biosynthesis of inflammatory substances, and additionally reduces the effectiveness of anti-inflammatory drugs.

The researchers comprehensively analysed and compared [inflammatory processes](#) in diverse animal models and isolated immune cells from the blood of male and female human donors. This was made possible by a cell system developed in Prof. Werz's laboratory, in which the biochemical processes can be observed with high precision through time-resolved microscopy. "We investigated the formation of inflammatory substances, such as leukotrienes and prostaglandins, and looked at whether the effect of [anti-inflammatory drugs](#) differs in male and female cells," explains Werz.

As expected, the effect of the drugs under investigation was significantly stronger in the female samples than in the male samples—after all, the inflammatory process is much more pronounced in women. "However, these differences are completely abolished by the administration of testosterone," says Dr Simona Pace, first author of both papers. Previous studies—including work by Prof. Werz's team in Jena—have already shown that testosterone can protect against inflammatory reactions. "However, now we have been able to throw light on the molecular mode of action and show that testosterone also influences the therapeutic effect of drugs," notes the postdoc from the Department for

Pharmaceutical and Medical Chemistry of the University of Jena.

The researchers found that the sex hormone directly interferes with leukotriene biosynthesis by blocking the necessary interaction between the "5-Lipoxygenase" and "FLAP" proteins. Secondly, they were able to prove that the reduced leukotriene synthesis leads to increased amounts of prostaglandins, which further promote inflammatory reactions. This means that testosterone plays a key role in the inflammatory process and in modulating the immune response.

With this work, the researchers have once again provided specific evidence supporting the need for gender-specific medicine. "Anti-inflammatory substances that are suitable for women may have only a limited effect in men, and the opposite might also be true," concludes Prof. Werz. Treatment using a single product from the medicine cabinet could therefore lead to very different levels of success. This is a fact that should clearly be considered much more carefully in future in developing new drugs—especially for treating [inflammatory diseases](#). In future, this could even lead to separate 'his' and 'hers' medicine cabinets.

More information: Simona Pace et al. Androgen-mediated sex bias impairs efficiency of leukotriene biosynthesis inhibitors in males, *Journal of Clinical Investigation* (2017). [DOI: 10.1172/JCI92885](https://doi.org/10.1172/JCI92885)

Simona Pace et al. Sex differences in prostaglandin biosynthesis in neutrophils during acute inflammation, *Scientific Reports* (2017). [DOI: 10.1038/s41598-017-03696-8](https://doi.org/10.1038/s41598-017-03696-8)

Provided by Friedrich Schiller University of Jena

Citation: Do we need separate his and hers medicine cabinets? (2017, July 26) retrieved 5 May

2024 from <https://medicalxpress.com/news/2017-07-medicine-cabinets.html>

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