

## **Not both genders, but all genders.**

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**Biologically speaking, we all fall somewhere along a spectrum of gender, of which male and female represent the extreme ends. Authoritarian heads of government repudiate biological science in order to appease religious and conservative voters.**



Photo: Sturlason

Gender theorists and historians have long argued for how genders are historic, cultural and social constructions [\(1, 2\)](#). In different periods of history, gender has been defined based on name, role in society, sexuality, external genitalia, internal genitalia, chromosomes and genes – to name a few markers. For more than a century, medicine has diagnosed sex and gender variants as deviations. Through diagnostics, assessment and treatment of transgender people, doctors have drawn up the boundaries of gender normality – what is a man and what is a woman [\(3\)](#). When it was confirmed in the first decade of the 20th century that the X and Y chromosomes are distributed at the moment of fertilisation, the foundation was laid for the modern understanding of chromosomes as *the* determining factor for sex development [\(4\)](#). The discovery of the *SRY* gene (sex-determining region Y) on the Y chromosome in 1990, the gene that codes for testis-determining factor, was crucial for a genetic understanding of how gonad development is mediated through chromosomes [\(5\)](#).

In recent years, the increased genetic insight into the biology of sex development has chipped away at the binary model of sex and gender on several levels. Firstly, we now know that gonadal development is not governed solely by the *SRY* gene, but rather through several genes and molecular mechanisms in a network that includes epigenetic mechanisms [\(6\)](#). The development of gonads and genitalia is thus not a question of the presence of one particular gene, but the result of a balance between various factors [\(7\)](#).

Secondly, intersex and differences of sex development (DSD) – where the normal correspondence between chromosomes, gonads and genitalia is absent – are more common than has been assumed: in its broadest definition, in one out of 100 individuals [\(8\)](#). Thirdly, it has been shown that during fetal life, DNA and cells are exchanged in both directions between the mother and the fetus via the placenta. DNA and cells may persist in both children and adults (so-called microchimerism). DNA and cells from the mother can be detected in males, and cells from male fetuses in the mother. Male chimerism has been detected in the female brain [\(9\)](#). The extent to which this type of chimerism plays a role in the development of disease is unclear. Perhaps in the future we will gain a better understanding of the links between biological sex variation, disease and personalised medical treatment. In any case, an increasing amount of knowledge is available with regard to the biological complexity of sex and gender, and proof that the binary model of sex and gender finds no support in biology [\(10\)](#).

This knowledge is now being repudiated at the highest level globally. The Trump administration is attempting to change the laws such that gender is defined on a biological basis, based on genitalia or genetic testing. With a stroke of the pen, the definition of transgender people and persons with gender incongruence or a non-binary gender identity is obliterated. Viktor Orbán, the president of Hungary, has prohibited gender research programmes in Hungarian universities because 'people are born either male or female' [\(10\)](#). Brazil has recently elected as president a misogynistic and self-declared proud homophobe who has promised to fight against 'gender ideology' [\(11\)](#). The pattern is one of ageing, authoritarian, heterosexual men discriminating against minorities in a wish to appease their voters. There is no room in their world view for the human complexity that actually characterises the societies they are elected to govern; but the ideas of purity that are partly rooted in national conservatism and partly in religious fundamentalism are not echoed by science.

Transgender people throughout the world are stigmatised and marginalised, and suffer from a lack of access to necessary healthcare services. The right to self-determination of legal gender, introduced in Norway in 2016, is an important step along the way to ensuring good health care for persons of all genders [\(12\)](#). As a way of further strengthening minority rights and as a recognition of biological science, it is time to introduce a third gender category, as several countries have already done [\(12\)](#). As doctors we should disseminate knowledge about the complexity of biological sex and the normality of gender diversity. The aim should be a society where everyone can live a good life with their different bodies and genders.

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Publisert: 22. November 2018. *Tidsskr Nor Legeforen*. DOI: 10.4045/tidsskr.18.0888

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