

# NEW RESULTS REGARDING GONADAL EXPOSURE IN UROLOGIC X-RAY DIAGNOSTICS

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## 1. INTRODUCTION

The importance of Radiodiagnosis as a dominant factor for the exposure to ionizing radiation is generally accepted. The estimation of the genetic significant dose of the population produced by Roentgenology is of great interest and means a request of WHO.

The base for any statistical review is in every case the measuring of the individual gonadal exposure in patients undergoing an examination in the X-ray department.

## 2. IMPORTANCE OF I.V.UROGRAPHY

In the different types of X-ray examination it is only a small number, which causes the main part of genetic dose. I.v. urography belongs to those procedures of essential importance for gonadal exposure. It is the most practised examination in urologic X-ray diagnosis, and SIELENTAG (1) regards it to be the procedure with the highest gonadal exposure in conventional diagnostic.

In statistical reviews from different countries we find that the share of i.v. urography in the genetic significant dose produced by Radiology is of varying percentage (2):

Great Britain	12 %
USA	13 %
Sweden	15 %
GFR	8 %

In i.v. urography the gonadal exposure of men may be defined relatively exact, where as the exposure of the ovaries must be estimated from indirect measuring. A reliable reference method is not yet available. The factor for reducing the exposure dose of the testicles when using lead protectors is about 30 : 1. Previous statistical reviews are not suitable to be the base for a comprehensive estimation of the GSD produced by Radiodiagnosis.

It is necessary to gain new results of measuring for all those examinations for which a high genetic radiation exposure must be expected.

Own experiences with condensor chambers and TLD let us prefer the latter for further investigations.

#### REFERENCES

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iciency of some modifying factors (used filmsizes resp. field sizes, distance of field border to the testicles, influence of radiation energy which must be varied according to body weight - tables in poster session -).

#### 4. RESULTS

In 65 men, using X-ray protectors (2 mm resp. 1 mm lead) for the testicles the gonadal dose amounted to 28 mR on an average for the complete urography.

The doses for a single exposure were

- 0,4 mR per minimum for the small sized exposition of the kidneys (great distance of X-ray beam to the testicles)
- about 4,5 mR for exposures of the uropoetic system in large format
- about 10 mR for a radiograph of the urinary bladder.

In urographies under the same standard conditions but without any protectors for the testicles the gonadal dose increased up to more than 850 mR.

In female patients the ovarian dose amounted to 1 500 mR on an average. As it is impossible to carry out direct measuring in patients the use of tables (determined for Radiotherapy) and mathematic operations are necessary. Thus we obtain results within a wide range (800 - 2 400 mR!).

#### 5. SUMMARY AND CONCLUSION

Exact measuring of gonadal dose is the base for determination of the GSD produced by X-ray diagnosis.

In previous communications the values for gonadal exposure in iv. urography differ within wide ranges. We find results of measuring from 14 mR (3) up to 1 000 mR (ZUPPINGER 1961) or even 2 630 mR (4).

### 3. MATERIAL, METHODS

To define the GSD of our own population it was necessary to gain actual results of measuring the gonadal exposure. Reasons therefore were additionally:

- Methods of X-ray examination for urology changed (more contrast medium, more exposures pro patient, better X-ray protection).
- Progress in radiological technic, especially referring to the sensibility of the imaging systems resulted in better conditions for a lower dose exposure.

In 130 patients undergoing i.v. urography the X-ray dose for the gonades was evaluated by means of condensor chambers (PTW Condiometer) and in several cases by TLD. Male patients were examined using a special X-ray protector (2 mm lead) for testicles and a 45 mm condensor chamber. Only in a few cases the gonadal dose without X-ray protector was determined. In female patients the exposure dose of the ovaries was estimated from measuring the surface dose, and in some cases by intravaginal application of TLD detectors.

I.v. Urography in all cases was performed under standard conditions recommended by the Radiological Society of the GDR. The efficient dose was - if possible - measured for each single exposure within one examination. Thus it was possible to define the ef-