One in twelve medical scientists in Flanders admits to making up or ‘massaging’ data in order for it to match a hypothesis. And almost six in twelve see such fraudulent practices happening around them. They identify high publication pressure as one of the causes.
In November and December 2012 Belgian science journalist Reinout Verbeke (editor of Eos Magazine) spread an anonymous survey on fraud and pressure to publish among scientists of the Medical Science faculties of all Flemish universities. The result was 315 completely filled in questionnaires. It is the first quantitative survey on science fraud in Flanders. Psychiatrist and researcher Joeri Tijdink (VU University Medical Center Amsterdam) collaborated on the survey. He did another sounding in 2011 in the Netherlands, before the scandal surrounding Diederik Stapel had broken out – the social psychologist who had made up data and experiments. For years nobody had been on to him. Stapel and his unsuspecting doctoral students and co-authors even made top magazines with their fictitious studies. Luckily though, such large-scale fraud is rather rare.

The results of the Flemish survey are striking. Of the 315 participating scientists, four (1.3%) admit to having made up data at least once in the last three years. If what they say is true, this probably concerns fraud that is still undiscovered. 23 respondents (7.3%) admit to having selectively removed data or results to make research match a hypothesis, so-called ‘data massaging’. Overall, about 8% of the Flemish medical scientists admits to recently having made up and/or massaged data. The figures are worse than the international average. A meta-analysis of 18 scientific studies on fraud by Daniele Fanelli showed that on average 2% of all scientists (from different fields of study) admitted to having done similar practices at least once (PloS ONE, 2009).

Why are the results among Flemish respondents even worse? “That doesn’t surprise me, because we are talking about medical scientists”, says American journalist and fraud expert Ivan Oransky from RetractionWatch.com. “Cooperating with the pharmaceutical industry gains researchers financial rewards. That could pressurise scientists to cut corners.” André Van Steirteghem, a pioneer in reproductive medicine and secretary of the Committee on Publication Ethics (COPE), thinks there is something else at play. “There is a significant lack of openness on fraud and malpractice at Flemish universities. This survey asked scientists about their perceptions for the very first time. They were able to vent their feelings. I think that explains the high figures in Flanders.”

We can even suspect malpractices in Flanders to be more widespread still. “Surveys have their limits”, says Daniele Fanelli. “Many cheaters won’t admit to having done it, or will falsely assume they have a clean conscience.”

**FRAUDULENT COLLEAGUES**

But ask scientists if they see similar practices happening around them and there will less hesitation to answer. Fanelli’s meta-analysis showed that an average of 14% of the respondents had noticed made up or manipulated data in colleagues’ research. Here, too, Flemish figures are much higher: 47% has witnessed such practices in their direct surroundings or heard about them firsthand. In this case, reality will probably be less harsh: “When it comes to reporting other people’s fraud, the Mohammed Ali effect comes in play”, Fanelli says (Ali found himself morally better than the others, Ed.). “You always think the others are just marginally less reliable and less honest than yourself. That explains in part why the questions about the researchers’ colleagues resulted in many more positive answers than

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**In certain labs there seem to be a ‘culture’ in which malpractice is commonplace**

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**Fraud: black area (last three years)**

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<th>Self</th>
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<td>7,9% yes</td>
<td>92,7% yes</td>
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the questions about their own practices.” We cannot rule out the possibility that several researchers from a certain lab all refer to the same dubious colleague. Still, the high amount of recently recorded or declared fraud – 24% witnessed the ‘making up of data’ happening around them, 44% witnessed colleagues ‘massage data’ – could mean that in certain labs there is a ‘culture’ in which malpractice is commonplace. In an anonymous survey many researchers point to fraud by colleagues. But they are too little inclined to officially report it – considering the few complaints filed with the universities’ commissions of scientific integrity (cf. ‘Discovered fraud’).

**PLAGIARISM**
Plagiarism – using someone else’s ideas without their consent or without citing correctly – is a delicate topic, too. Many universities see it as one of the ‘big three’, in addition to making up and manipulating. It is a violation of intellectual property as well. Still, you could say that from a scientific point of view, plagiarism is less harmful than the other two: it does not disrupt scientific knowledge as such. Few medical scientists (0.6%) admit to recently having committed plagiarism, but – remarkably – one in three (35%) sees it occurring in their direct surroundings. Unnoticed stealing of texts, parts of texts or ideas is more difficult today than it used to be. Many specialist journals use plagiarism software, which scans science articles entirely for copied passages.

**GREY AREA**
We also probed for different practices situated in the grey area – so-called sloppy science. That comprises, among others, salami slicing, dividing research into as many separate science articles as possible, or the shotgun approach, including as many variables as possible in the hope that one will show something interesting. The selective reporting of research that ‘works out’ or that confirms your own previous research also belongs to this grey area (cf. ‘Fifty shades of fraud’). Dropping observations or data based on a gut feeling that they were not right, is a dubious practice, too. In our survey 27% of the respondents admit to having done it in the past. A 2005 study among more than three thousand American medical researchers yielded 15% yesses (Brian Martinson, *Nature*).

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**46% of professors think that pressure to publish makes science ‘ill’**
One in five Flemish medical scientists tolerate colleagues’ inadequate data or dubious interpretations every now and then (13% in Martinson’s study). To the question whether they had ever withheld data that contradicted some of their own previous research, 3% of the Flemish medical scientists answered affirmatively (6% in Martinson’s study).

Medical scientists very often do research in cooperation with pharmaceutical companies. 4% of the respondents state that they have changed the methodology or results of a study after being pressured by financiers – less than the 16% in Martinson’s study. But 18% of the respondents in the Flemish survey has recently witnessed a colleague cave in to the pressure of a financier.

“Grey area practices are dangerous, it’s a slippery slope”, says Joeri Tijdink, who conducted our survey. “If you start by forgetting a citation just once, more serious ‘offences’ are just behind the corner. There is no penalty for not following academic ethical standards. Especially if you only do research and seldom cooperate with other scientists who can keep an eye on your activities such practices can be tempting. One tap on the delete key and a test subject is gone from your dataset…”

**Publication Pressure**

One of the causes of the malpractices is the pressure to publish. Publication of research articles is crucial for scientists’ careers and for the esteem of the research groups to which they belong. Individual researchers are ranked according to the production of papers and their ‘impact scores’. That ranking is important for promotions at the university or for acquiring research funding. The publish-or-perish culture increases the pressure on researchers to publish a lot and also adds to competition between them. That could benefit the efficiency and productivity of science research. It is one of the reasons for the significant increase in the number of science papers that the last decennia have seen: every twelve years the number of articles doubles. In 2012 the medical database PubMed registered more than 1.1 million new articles, that equals as many as 126 per hour. The total number of papers published last year, in all fields of study, is estimated to be twice as high. The number of specialist journals increased as well: from 5,000 in 1997 to 8,281 in 2012.

But the pressure to publish and the intense competition among scientists also have negative effects. Researchers are urged to produce ‘publishable’ results, which, possibly comes at the cost of the quality and integrity of their research. Specialist journals with a high impact predominantly publish ‘positive’ research: results that confirm the predetermined hypothesis. “Negative research is equally valuable from a scientific point of view, but it isn’t sexy for the specialist journals and their readers”, says Joeri Tijdink. “That is why some scientists interfere with the data to improve the outcome and thereby increase their chances at being published. That goes from small manipulations – leaving out a test subject – to grave violations, such as photoshopping images of experiments or making up complete datasets.” Such practices are harmful for science, because other studies will sooner or later rely on or build on the results. And medical research based on such unreliable research results, presents a possible danger to test subjects in clinical studies and to patients.

**Rotten Science**

A majority of the Flemish medical scientists experiences publication pressure. If we only take professors into account, 66% thinks the pressure to publish is “excessive”, a number that is higher than in Joeri Tijdink’s identical survey held in the Netherlands at the end of 2011 (54%).

The answers of Flemish medical professors also show a noticeable degree of sceptics. 58% thinks that pressure to publish urges some colleagues to (un)consciously manipulate data (compared to 33% of Dutch medical professors). The pressure also makes them question the value of science. 57% is of the opinion that pressure to publish leads to serious doubts as to the validity of global research results (Netherlands: 38%). And 46% thinks that pressure to publish makes science downright ‘ill’ (Netherlands: 25%).

“I always thought that Dutch medical professors had a cynical view on science”, says Tijdink. “But now that I see the Flemish figures, I must say I am rather shocked. Are Flemings more cynical towards science or are there other factors at play? Maybe the lower science budgets play a part. There might be more of a ‘sports star culture’ in the Netherlands: a higher encouragement of science and a higher budget. That means that the ‘sports stars’ – professors - can focus more on science and are less subjected to publication pressure.”

**Fifty Shades of Fraud**

Fraud comprises a wide array of malpractices. The most blatant forms of fraud include ‘making up data’, ‘manipulating data to make it match a hypothesis’ and plagiarism (black area). In addition, there are several ‘dubious research practices’ (grey area), such as double publishing (self-plagiarism), withholding undesirable research results, undeserved authorships or dividing research into as many separate science articles as possible (salami slicing).
The Flemish survey also shows that young researchers – doctoral students, doctors and post-docs – are exposed to higher pressure to publish than professors. “In a way, that makes sense: their job security and career depend even more heavily on the number of publications they can boast”, says Tijdink.

LAVISH WITH AUTHORSHIPS
An easy way to make your publication list longer is to hitch a ride on someone else’s research as a co-author. “Pressure to publish adds significantly to that temptation”, says Luca Consoli, assistant professor in Science and Society at Radboud University in Nijmegen. Our survey shows that it is the order of the day among medical scientists: 69% adds significantly to that temptation”, says Consoli. That is what we call honorary authors. A recent report that looked into six big medical science journals showed that 25% of the articles mentioned honorary authors. It is often a win-win game, because for young researchers adding a big name as honorary author helps get the paper through the peer review process, in which a number of colleagues assess the research for publication in a specialist journal. The heads of the lab, in turn, can benefit from a longer list of publications for fundraising purposes. To discourage authors from hitching, more and more specialist journals ask all authors to confirm their authorship in writing and state what their share was in the paper in question.

Self-plagiarism – publishing the same research results in different peer reviewed journals – is yet another way to quickly lengthen your list of publications. 4.7% of the respondents admits to having done it themselves, 40% witnesses colleagues doing it. Double publishing is reprehensible, but, like under- served authorships, it is situated in the grey area of malpractices.

DEBATE
In our survey Flemish medical researchers make mention of fraud and dubious research practices without hesitation. For many aspects their scores are worse than those in similar surveys in other countries. Has publication pressure and the demand of specialist journals for positive and spectacular results become so high that it jeopardises the scientific value of many studies? This survey can be a starting point to open the debate, and, where possible, improve or thoroughly revise the scientific system.

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Reinout Verbeke and Joeri Tijdink (VU University MC Amsterdam) are preparing a scientific paper of this survey.