2021 GLOBAL YEAR ABOUT **BACK PAIN** fact sheet

PATHOPHYSIOLOGICAL ASSESSMENT OF NON-SPECIFIC BACK PAIN

BACK PAIN CAN HAVE A CLEAR UNDERLYING PATHOLOGY

Various clearly defined pathologies can be associated with back pain, including autoimmune disorders, spinal infections, or osteoporotic fractures. These pathologies have relatively clear signs and symptoms and well-defined diagnostic work-ups that ideally lead to a definite diagnosis and targeted treatment.

PATHOLOGY IS UNCLEAR IN ~90% OF BACK PAIN PATIENTS

Nevertheless, back pain in at least 90% of patients cannot be attributed to any specific pathology [6]. As a consequence, diagnostic labels are descriptive in nature, e.g. 'Low back pain, unspecified' (ME.84.2Z in the ICD-11). In many research studies, the description is equally vague (e.g. 'non-specific low back pain').

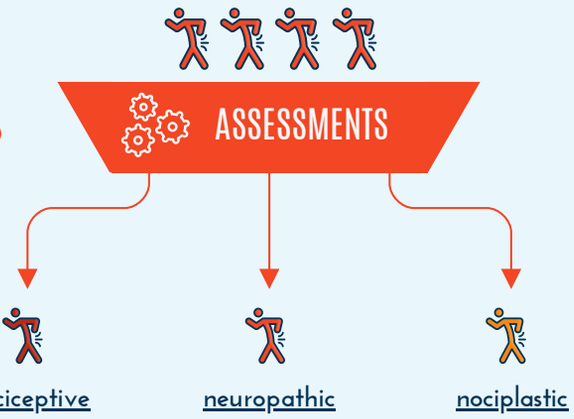
THIS LARGE PROPORTION IS UNLIKELY A HOMOGENOUS GROUP

It is highly unlikely that this large category of patients constitutes a similarly unified category as e.g., the autoimmune disorder ankylosing spondylitis. The important question becomes which pathophysiological mechanisms contribute to back pain in this category and how such mechanisms can be identified when assessing individual patients.

PATIENT ASSESSMENT ALLOWS BROAD PATHOPHYSIOLOGICAL CATEGORIZATION

Not all mechanisms are currently known nor can they necessarily be assessed in humans. Nevertheless, broad pathophysiological categories can, at least partly, already be inferred at this point from patient assessment.

Like anywhere in the body, pain in the back can be ascribed to three fundamental pathophysiological categories: nociceptive, neuropathic and nociplastic pain [4], which are not mutually exclusive.



ASSESSMENT SUMMARY

ROUTINE CLINICAL ASSESSMENTS

History taking/ clinical exam

Pain drawings

Questionnaires

Laboratory tests

ADDITIONAL OPTIONS

to better understand pathophysiology (not exhaustive)

Imaging, including Magnetic Resonance Imaging (MRI)

Quantitative Sensory Testing (QST) [8]

PATIENT EXAMPLES

Let's consider three patients: Alex, Billy, and Sam. They are between 45 and 55 years of age, have had low back pain for six months (i.e. they have chronic pain per definition [10]) and they have recently received MR imaging of the lumbar spine (albeit this might not be in line with recommendations [2,5]). For all three, the MRI shows mild disc degeneration and mild facet joint degeneration at L3/4 and L4/5 without nerve root compression or Modic changes. The GP now sends the three patients to your office for further assessment. How will you find out to which pathophysiological category their pain predominantly belongs?

ALEX

HISTORY TAKING & CLINICAL EXAM

Alex complains about **persistent, burning pain** in the lower lumbar region extending paravertebrally and into the buttock in a **diffuse pattern**. No radiation to the lower limbs. **Movement does not aggravate** the pain, but sometimes, Alex feels some **itching** when wearing tight belts or pants.

Clinical examination:

- no sensory or motor deficits
- range of motion (ROM) somewhat reduced in lumbar flexion and extension
- **no clear mechanical pattern** of pain aggravation by movement
- local tenderness upon palpation in the midline at the level L4/L5

ADDITIONAL ASSESSMENTS

No clear mechanical pattern, but burning pain and itchiness... neuropathic pain?

Neuropathic pain questionnaire, e.g. the Neuropathic Pain Symptom Inventory (NPSI) [1]

- Alex scores 63 points on the weighted NPSI [9]

QST

- QST @back: increased mechanical detection threshold, reduced pressure pain threshold, mechanical allodynia and hyperalgesia. No alterations in thermal detection or thermal pain thresholds, relative to normative data [7]
- QST @hand (control area): all tests are normal [8]

CATEGORIZATION

Evidence for a **neuropathic** component

Classical signs of central sensitization (mechanical allodynia and hyperalgesia in a secondary zone, i.e., the skin) and of nerve damage (increased mechanical detection threshold). Nevertheless, neuropathic pain cannot be definitely diagnosed because a lesion or disease of the somatosensory system is not confirmed in Alex [3]. Also, the signs and symptoms cannot be ascribed to a specific nerve territory or dermatome.

BILLY

HISTORY TAKING & CLINICAL EXAM

Billy suffers from **episodic**, right-sided **paraspinal** and right buttock pain, **aggravated by movement** and **standing** for a long time and **relieved by sitting and walking**. Billy denies pain at rest but after intense physical activity s/he feels **stiff** the next morning for **20-30 minutes**.

Clinical examination:

- symptoms can be **provoked with extension and rotation** of the lumbar spine
- local tenderness over L4/L5 facet joints and musculature

ADDITIONAL ASSESSMENTS

Symptoms provoked by segmental movements... nociceptive pain?

Detailed clinical assessment according to Vining and colleagues [11] to confirm the impression and identify the likely nociceptive source

- history taking and clinical exam (3 or more of: > age 50, relief by walking, relief by sitting, paraspinal onset, positive extension-rotation test [11]) point to the facet joint as the most likely source of pain

CATEGORIZATION

Evidence for a **nociceptive** component

No further assessments are needed because Billy most likely suffers from nociceptive pain. It is possible that there is an inflammatory component associated with the degenerative changes that result in the movement-associated allodynia. However, there is no indication to suspect systemic inflammation.

SAM

HISTORY TAKING & CLINICAL EXAM

Sam reports **pain fluctuating in intensity and location, sometimes extending** to the **buttocks** and left or right **posterior thigh**. The pain gets **worse with movement,** but Sam **also** experiences **pain sometimes at rest**, sometimes waking him/her up at night.

Clinical examination:

- **diffuse tenderness** over lumbar spinous processes and paraspinal muscles
- lumbar **movement** is **painful** in the end-range **in all directions** and ROM is somewhat restricted
- no sign of sensory or motor impairment

ADDITIONAL ASSESSMENTS

Pain at rest, waking up at night... inflammatory component?

Blood test

- negative for inflammatory markers

Pain extending in the buttock and legs... neuropathic component?

- NPSI weighted score is 48, i.e., inconclusive [9]

QST

- QST @painful sites (back and leg): reduced pain thresholds for all modalities, increased pain sensitivity and normal detection thresholds. No dynamic mechanical allodynia [7,8]
- QST @hand: similar pattern of hypersensitivities, but to a lesser extent [8]

CATEGORIZATION

Evidence for a **nociplastic** component

There is no clear evidence for an inflammatory or neuropathic component. A potential nociceptive component remains unclear (because of the movement-related pain), but the exam according to Vining and colleagues [11] does not allow a clear classification. The widespread hypersensitivity (at the hand in addition to the back and leg), the increased spatial pain extent and potentially the fluctuating character point towards nociplastic pain.

OVERALL CONCLUSION

Alex, Billy and Sam represent relatively clear examples of pathophysiological pain categories. In reality, an individual's pain might of course arise from a mix of different pathophysiologies. In addition, each category ought to be comprised of different mechanisms, which themselves are again the product of different sub-mechanisms. It is currently unclear in how much detail pathophysiology has to be understood to be most relevant for treatment; this will also depend at which mechanism treatment is targeted. Nevertheless, contributions of different pathophysiologies to an individual's 'non-specific' back pain can be identified with assessment methods that are already available. The ultimate goal should be to get rid of the unfortunate diagnostic label of 'non-specific' back pain and, by better understanding of pathophysiological mechanisms, to develop and promote more targeted treatment in the future.

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